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OMS Group
Polyurethane Evolution

22212

16 June, 1999

UNIDO PROJECT MP/JOR/94/420 - HAMCO
UNIDO CONTRACT No 97/099

COMMISSIONING & FINAL REPORT

COMMISSIONING REPORT

Commissioning

The commissioning at client's factory (Jordan) has been carried out in the presence of our technicians, from 30 November to 23 December 1998.
All the installation, commissioning, start up and the first part of "on the job training" in accordance to UNIDO contract, have been completed.

Certificate of Acceptance

Enclosed you will find the Certificate of Acceptance of the performed work: "Testing Report for Supply and Acceptance" dated 23 December 1998, signed by OMS technician (Mr. Tiziano Perego) and the Counterpart (Mr. Hayyan Jaber).

From 5th to 11th May 1999 our technician Mr. Vincenzo Cannata was at client's factory (Jordan) to verify and solve the problems reported in occasion of the commissioning carried out on last December 1998.

Commissioning Report

Enclosed you will find also the commissioning report (Performance Test) printed on OMS and HAMCO headed paper, drawn up on 11 May 1999.

Safety Certificate issued by CESI on June 1999

The Safety Certificate here enclosed covers also the points 2-5-6-7-8-9 of the minutes of the meeting held on 23 December 1999, for which OMS had sent a letter of clarification to HAMCO and in copy to UNIDO (letter dated 20 January 1999).

Here enclosed you will find also the transport documentation indicating the despatch of the "Special tools for maintenance" (last marked item) and the spare parts - item 16 and item 21 of the minutes of the meeting held on 23 December 1998 - (first four marked items).
The enclosed proforma invoice No 41/99 dated 26 May 1999 and Air Waybill dtd 1st June 1999 are related to the despatch of the Rossi fixture's electric motor replaced under guarantee and to the 5 m. hydraulic pipe, indicated in the minutes of meeting held on 11 May 1999.

The enclosed proforma invoice No 046/99 dated 11 June 1999 is related to the non-return valve provided by OMS under guarantee as per HAMCO's request accepted by our fax dated 4 June 1999 of which we are enclosing copy.

On the job training

The first stage of the training was held on last December 1998 by Mr. Tiziano Perego (OMS technician) and it was completed by Mr. Cannata Vincenzo (OMS technician) during the period from 5 May 1999 and 11 May 1999 as indicated at point 7 of Technical Service No 10/99 signed by HAMCO (Mr. Jaber).

FINAL REPORT

Works performed at the plant site

- Emplacement of C-Pentane tank and relevant valves and accessories
- Emplacement of C-Pentane transferring pumps
- Emplacement and connection of C-Pentane piping
- Emplacement and connection of fire-proof system
- Apply of antistatic paint in the foaming area
- Emplacement and mechanical/electric connection of the metering machine according to the safety standards
- Emplacement of cabinets and doors cabins
- Emplacement and connection of suction systems
- Emplacement and electric connection of cabinets foaming fixtures
- Modification to the cabinets and doors existing fixtures according to the C-Pentane foaming technology and the relevant safety requirements.
- Electric connection of all C-Pentane gas sensors
- Commissioning of the equipment and functional trials
- On the job training held in two stages

IMPIANTI OMS SPA

Italo Melizzi
Commercial Director

Marco Dell'Orto
OMS Consultant
(Project Leader)

Via Sabbionetta n. 4
20050 Verano Brianza (MI)
Partita IVA 0832500151

TESTING REPORT FOR SUPPLY ACCEPTANCE

TODAY 22/12/98 C/O: HAMCO (JORDAN)

Present for OMS: MR PEREGO

Present for :

HAS BEEN CARRIED OUT THE TESTING IN RELATION TO THE SUPPLY AS PER:

WORK ORDER NO. 1M 7249/97 DATED 19/08/97

PARTIAL SUPPLY ☐ TOTAL SUPPLY ☒

INTERNAL WORK ORDER REFERENCE NO. 102/97

and with specific reference to what here below described:

N°1 FIXTURE

the testing has given **POSITIVE** result so the supply of what above is considered as accepted.

Possible observations of OMS:

Possible observations of the customer:

TO SEE THE LIST OF PROBLEMS BY MR PEREGO MR SABER MR MALAVERI

ACCEPTANCE SIGNATURES:

For OMS:

Stamp and signature of the customer:

22/12/1998

HAMCO HOUSEHOLD APPLIANCES MANUFACTURING COMPANY LTD.

Tel. 0 - Fax 0 - Tlx. 23428 HIMCON JO - P. O. Box 926123 - Amman - Jordan

MINUTE OF MEETING

PRESENTS:
MR. VICENZO CANNATA / OMS
MR. HAYYAN JABER / HAMCO

DATE: 11/05/1999

SUBJECT: ORDER No. 724/97

DURING THE PERIOD OF 05/05/1999 TO 11/05/1999 MR. VINCENZO CANNATA / TECHNICAL SERVICE - OMS HAS VISITED HAMCO - JORDAN AND HAVE CARRIED OUT THE CORRECTION AND/OR MODIFICATION OF ALL OUTSTANDING MATTERS OF THE ABOVE PROJECT, AND NOW THE PLANT IS WORKING NORMALLY, HOWEVER, BOTH PARTIES AGREED TO THE FOLLOWINGS:

1. THE MOVEMENT OF THE CABINET AREA FOAMING HEAD IS NOT SATISFACTORY, AND NEED TO MODIFIED TO MAKE EASY AND DURABLE HANDLING OF THE FOAMING HEAD.

2. OMS WILL SUPPLY, FREE OF COST AND FREIGHT, AS REPLACEMENT 5 METERS PIPE FOR HYDRAULIC, AND ONE MOTOR FOR THE ROSSI FIXTURE.
3. MODIFICATION DRAWINGS FOR ELECTRICAL WIRING DIAGRAM FOR THE FOAMING FIXTURE.

HAMCO CERTIFIED THAT THEY HAVE DURING THE PERIOD FROM JANUARY 1999 TO END OF MAY 1999, THAT HAMCO FACTORY HAVE PRODUCED ABOUT 900 REFRIGERATORS OF OMS EQUIPMENT.

FOR: OMS

VICENZO CANNATA

FOR: HAMCO

HAYYAN JABER

CESISERVICE

Services for Electrical Installations

Client Impianti OMS SpA - Verano Brianza (Italy

Subject Inspection regarding safety aspects against risk of explosion on the OMS plant for the production and injection of expanded polyurethane in the HAMCO (Household Appliances Manufacturing Company) factory in Amman (Jordan).

Date and place of inspection 14 to 19 December 1998

Note: This document substitutes the preceding report SYST – 99/000132 on the same subject

No. of pages 13 **No. of pages annexed** 1

Issue date June 1999

Prepared Ing. P. Ostano

Approved SYST – Ing. A. Ardito

CESI
CENTRO ELETTROTECNICO SPERIMENTALE ITALIANO
Il Responsabile Tecnico Scientifico
Area Sistemi

TABLE OF CONTENTS

Reference documents

- Lay-out of the HAMCO plant (Prot. 99/000133)
- ASTRA technical note on the dimensioning of ventilation (Prot. N. 96/036820)
- OMS instructions for the use of cyclopentane (Prot. N. 96/036824)
- OMS technical note (Prot. N. 96/036825)
- OMS declaration Prot. 99/015269

keywords: 12035F 20801C 54301V 66540E

1. SUBJECT OF THE INSPECTION

The inspection was made on the plants supplied by Impianti OMS for the production of expanded polyurethane using cyclopentane as blowing agent which feeds the lines for production of refrigerators in the HAMCO (Household Appliances Manufacturing Company) factory in Amman (Jordan).
The inspection was carried out by Mr. P. Ostano of CESI, with the attendance of Mr. Jaber (HAMCO) and Mr. Perego (OMS).

2. SCOPE OF THE INSPECTION

Scope of the inspection was to verify the safety measures adopted on the plant against the risk of explosion due to electrical causes (sparks or overtemperatures of electrical apparatus) in presence of vapours of cyclopentane emitted during the operation of the plant.
To this purpose a classification of the hazardous areas produced by OMS machines and plants because of cyclopentane presence has been made and an inspection on electrical plants and safety measures adopted has been carried out.

3. REFERENCE STANDARDS

The following standards have been used as reference:

- CEI EN 60079-10 (1996) "Electrical apparatus for explosive gas atmospheres - Part 10: Classification of hazardous areas"
- CEI EN 60079-14 (1998) "Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in explosive gas atmospheres (other than mines)"

4. DESCRIPTION OF THE PLANT

The parts of the plant concerned with the cyclopentane circuit are the following:

a) storage tank, 1.000 dm^3 capacity, installed above ground, pressurized with nitrogen. Near the tank, a pump is installed for transferring cyclopentane to the Pentafoam unit for the production of the foam.

b) mixing and foaming unit Pentafoam HP 100, including a nitrogen pressurized 250 dm^3 storage tank and high pressure pumps.

c) foaming cabin for refrigerator cabinets, with three foaming fixtures and one injection head, manually operated.

d) foaming cabin for refrigerator doors, with two foaming fixtures and one injection head, manually operated.

More details about the OMS plants for production of polyurethane with use of cyclopentane are given in the reference document 96/036820.

5. FLAMMABLE MATERIALS

From the point of view of the explosion risk, the only dangerous material present in the OMS plant is the cyclopentane.

The data significant for the classification of hazardous areas relevant to this material are as follows:

Relative density (referred to air)	2.4
Flashpoint	< -20 °C
Lower explosive limit (LEL)	1.5 %
Upper explosive limit (UEL)	8.7 %
Group of electrical apparatus	IIA
Ignition temperature	191 °C
Temperature class	T4

Since the relative density of the cyclopentane is 2.4, the classification must be made according to the rules established for heavy gases and vapours.

6. CLASSIFICATION OF HAZARDOUS AREAS, INSPECTION OF THE ELECTRICAL INSTALLATIONS AND OF THE SAFETY MEASURES ADOPTED

6.1 Methods for classification of hazardous areas and selection of electrical equipment

The standard IEC 79-10 has recently been adopted in Europe, as CEI EN 60079-10 standard, for the classification of hazardous areas. Its basic criteria have therefore been used as reference in this work.

The CEI EN 60079-10 standard requires the evaluation of the possible losses of flammable gases and the consequent evaluation of the extent of the hazardous zones on the basis of the "hypothetical volume" V_Z defined as follows:

$$V_Z = \frac{f.Q_g}{k.LEL.C} \qquad [1]$$

where:

Q_g = emission flow of flammable substance (m^3/h)

f = quality factor of the ventilation, which takes into account the presence of obstacles

LEL = lower explosive limit (kg/m^3)

k = safety factor applied to LEL

k=0.5 for secondary grade release

k=0.25 for primary grade release

C = air exchanges (h^{-1})

The criteria for the selection of the electrical equipment as a function of the area classification are given in the CEI EN 60079-14 standard (corresponding to the international standard IEC 79-14) and they have been followed in the inspection.

6.2 Storage tank

6.2.1 Classification of hazardous areas

The flanges, the seals of valves and pumps are sources of release of secondary grade. Also the relief valve can be considered a secondary grade release taking into account that the tank is nitrogen pressurized.

Since the tank is installed in open air, the ventilation is natural and a value of C = 100 (air changes per hour) can be assumed as specified by CEI EN 60079-10 standard.

For the evaluation of possible losses, useful data are reported in the API Publication N. 4589 "Fugitive Hydrocarbon Emissions from Oil and Gas Production Operations", which gives the results of a large experimental investigation on components of petrochemical plants.

The highest losses on onshore gas production sites have been measured on valves, with a value of 0.115 kg/h of emitted substance.

The value of V_Z results:

$$V_Z = \frac{0.116}{0.5 \times 0.0437 \times 100} = 0.053 \text{ m}^3$$

having considered

k = 0.5

C = 100 air changes/h

LEL of cyclopentane = 0.0437 kg/m^3

f = 1 since no substantial obstacle to the ventilation are present around the tank cabin.

Assuming the hazardous area has the shape of a sphere this volume would give rise to an hazardous zone of 0.23 m of radius around each source of release.

Taking into account an adequate safety margin (in consideration of the effect of wind, characteristics of the substance, uncertainties of the calculation procedure) a **zone 2 of 1.5 m around each source of release is defined.**

In the pit surrounding the tank the ventilation is limited by the presence of a wall about 0.5 m high.

In the pit therefore a zone 1 must be defined.

6.2.2 Selection of electrical equipment

The electrical apparatus present in this area are:

a) The motor driving the pump, manufacturer FIMM, type of protection EEx d IIB T4 (CESI certificate AD 81-119).
The motor is installed inside the pit, that is in an area classified as zone 1 and the type of protection is suitable for the zone of installation.

b) The level meter VEGA with type EL capacitive electrode, protected by a VEGA intrinsic safety barrier, type 145, code of protection EEx ia IIC T6, installed outside the hazardous area.
This equipment is installed in zone 2 and its type of protection is suitable for the zone of installation.

c) At the time of inspection a pressure switch (manufacturer OMS) was installed above the tank, that is in zone 2. This device is of normal type, not protected against the risk of explosion and it is therefore not suitable for the zone of installation. It was then requested to substitute it with a new one with suitable protection.
According to the OMS declaration Prot. 99/015269 annexed to this report the above mentioned pressure switch has been substituted by the pressure switch type SP 312-B2D/CI01, manufacturer Fantinelli, equipped with a Pepperl + Fuchs sensor type SJ2-N, with intrinsic safety protection type EEx ia IIC T6 (certificate PTB Nr. Ex-83/2022X).
The pressure switch is protected by a safety barrier Pepperl + Fuchs type KFD2 SR2 EX1W, code of protection [EEx ia] IIC (certificate PTB Nr. Ex-94.C.2086).
With these modifications the pressure switch is suitable for installation in zone 1 and 2 and can therefore operate safely in the tank area.

d) The other electrical equipment in the surrounding area (in particular two control panels outside the tank cabin) are installed in safe area and do not need protection against explosion risk.

6.3 Pentafoam unit

The Pentafoam cabin (1.2 x 2.5 x 2 m) is equipped with an artificial ventilation system composed of two independent fans and of a monitoring system of the cyclopentane vapours through two gas detectors placed inside the cabin.

The sources of emission are given by flanges and valves along the cyclopentane and mixture circuits and by the pump sealing.
The vent of the mixture tank is connected directly to the air ventilation output duct through a pipe.
These sources of emission originate secondary grade releases.

A 3,500 m^3/h fan is continuously working.
Should the cyclopentane concentration in the ambient exceed 15% of LEL (lower explosive limit), the second fan enters into operation so bringing the ventilation to 6,000 m^3/h.
Should 30 % of LEL be reached, the electrical power feed of the pump motors is switched off and the cyclopentane feeding is stopped.
A flow-meter controls ventilation continuity.

For the ventilation system dimensioning, a maximum poliol/cyclopentane mixture consumption of 250 Kg/h has been taken into account.
On this basis a maximum cyclopentane vapour emission of 3 Kg/h within the cabin has been estimated.
This value has been calculated assuming that, during the 250 dm^3 tank refilling operation, the same volume of cyclopentane vapour is being introduced into the cabin through the safety valve. This is a conservative assumption since, in fact, the tank contains a mixture of cyclopentane and nitrogen vapours and the valve vent is connected to the air outlet. This assumption therefore takes into account other minor losses which may occur inside the cabin.

The air flow necessary to maintain the cyclopentane concentration below 15 % of LEL is:

$24 \times 100 / M \times 0.15 \times LEL = 152\ m^3$ aria/Kg of cyclopentane

and therefore of $152 \times 3 = 456\ m^3/h$

where M = 70 (molecular weight of cyclopentane)
LEL = 1.5%

A 3,500 m^3/h air flow is therefore largely sufficient to guarantee that safety conditions are maintained inside the cabin under the above mentioned assumptions.

The ambient inside the Pentafoam cabin can therefore be defined as non-hazardous area, according to the definition of CEI EN 60079-10, due to artificial ventilation.

Within the cabin it is therefore allowed to install standard electrical equipment, not equipped with protection against explosion hazard.

The only exceptions are the fan motors and the gas detectors which must guarantee the safe operation also in case of hazardous gas concentration.
According to this criterion these equipment have been installed:

- fan motors (CEMP manufacturer) with type of protection EEx d IIB T4
- gas detectors (MSA manufacturer) with type of protection EEx d IIC T6.

The electrical equipment of the Pentafoam unit are therefore in accordance with the specifications of the standards for locations with risk of explosion mentioned at item 2.

It must be remarked that the ventilation in the Pentafoam unit must be kept continuously in operation, also during non-working hours, in order to avoid possible gas concentration inside the cabin which could result very dangerous at the start of service.

6.4 Cabinet foaming cabin

Three foaming fixtures are installed inside the cabinet foaming cabin, which has dimensions of 7.5 x 3.1 x 3.4(h) m, with large openings on the front and on the rear.
An artificial ventilation system is installed, consisting of two fans for each fixture, each fan ensuring an air flow of 3000 m^3/h.
The floor of the cabin has been covered by an antistatic cover.
According to the data provided by the manufacturer, the duration of a foaming cycle is 7 minutes (8.57 cycles /h per each fixture) with injection of 6 Kg of foam for each cycle, that is

8.57 x 6 x 3 = 154 kg foam/h.

The quantity of cyclopentane which evaporates during a foaming cycle is 5 g/Kg of foam (conservative figure).
It results an evaporation of

0.005 x 154 = 0.77 Kg of cyclopentane per hour

The air flow necessary to keep the cyclopentane concentration within 15% of LEL is:

0.77 x 152 = 117 m^3/h.

The ventilation system ensures a ventilation of 3,000 m^3/h in normal conditions.
This value has been established in order to take into account the efficiency of the ventilation and to guarantee an air speed sufficient to ensure vapour catching.
A flow-meter controls ventilation flow continuously.
The cabin is equipped with four gas detectors placed near to the floor (two in the front of the foaming area and two on the lateral walls).
If the cyclopentane concentration in the ambient exceed 15% of LEL (lower explosive limit), the second fan enters into operation so bringing the ventilation to 6,000 m^3/h.
Should 30 % of LEL be reached, the electrical power feed of the pump motors is switched off and the cyclopentane feeding is stopped.

It can be deduced that within the cabinet foaming cabin the cyclopentane concentration generally does not reach dangerous levels and the ambient can be defined as non-hazardous area.

Inside the cabin it is therefore allowed to install standard electrical equipment, not equipped with protection against explosion hazard.

The only exceptions are the fan motors and the gas detectors which must guarantee the safe operation also in case of hazardous gas concentration and are therefore of explosion-proof type.

The classification as non-hazardous area does not apply to the zone immediately near the injection head where a certain concentration of cyclopentane vapours may be present.
According to the data supplied by the customer, the maximum quantity of cyclopentane which evaporates during a foaming cycle in the cabinet foaming cabin is 30 g.
Considering the ventilation around the injection head and the fact that the cyclopentane vapours are heavier than air, it can be deduced that a significant concentration of cyclopentane is possible only in a very limited space around the injection head.
Taking into account a certain safety margin, it is reasonable to define a zone 1 with an extent of 0.5 m around the injection head.
In this zone the electrical devices must have a protection against explosion hazard suitable for zone 1 .

In the area of 0.5 m around the injection head only a proximity switch is installed. This apparatus is protected by an intrinsic safety barrier Pepperl & Fuchs, with type of protection [EEx ib] IIC and it is therefore suitable for the zone of installation.
The push-button board of the injection head is placed outside the hazardous area.

6.5 Door foaming cabin

Two foaming fixtures are installed inside the cabinet foaming cabin, which has dimensions of

4 x 2 x 2(h) m and is open on the front.

An artificial ventilation system is installed, consisting of two fans ,each fan ensuring an air flow of 3000 m^3/h.

The floor of the cabin has been covered by an antistatic cover.

According to the data provided by the manufacturer, the duration of a foaming cycle is about 5 minutes (12 cycles /h per each fixture) with injection of 1.5 Kg of foam for each cycle, that is

12 x 1.5 x 2 = 36 kg foam/h.

Since the quantity of cyclopentane which evaporates during a foaming cycle is 5 g/Kg of foam the vapours of cyclopentane produced are

0.005 x 35 = 0.18 Kg of cyclopentane per hour

The air flow necessary to keep the cyclopentane concentration within 15% of LEL is:

0.18 x 152 = 27.4 m^3/h.

The ventilation system ensures a ventilation of 3,000 m^3/h in normal conditions.

This value has been established in order to take into account the efficiency of the ventilation and to guarantee an air speed sufficient to ensure vapour catching.

The air flow can be increased to 6000 m^3/h in case of presence of gas concentration..

The cabin is equipped with two gas detectors placed near to the floor on the lateral walls.

The same safety operations described at the preceding paragraph are provided in case 15 % or 30 % of LEL is reached.

Taking into account these safety measures it can be deduced that within the door foaming cabin the cyclopentane concentration generally does not reach dangerous levels and the ambient can be defined as non-hazardous area.

Inside the cabin it is therefore allowed to install standard electrical equipment, not equipped with protection against explosion hazard.

The only exceptions are the fan motors and the gas detectors which must guarantee the safe operation also in case of hazardous gas concentration and are therefore of explosion-proof type.

The classification as non-hazardous area does not apply to the zone immediately near the injection head where a certain concentration of cyclopentane vapours may be present.
In this case the maximum quantity of cyclopentane which evaporates during a foaming cycle in the cabinet foaming cabin is 5 x 1.5 = 7.5 g.
Considering the ventilation around the injection head, also in this case it can be said that a significant concentration of cyclopentane is possible only in a very limited space around the injection head.
Taking into account a certain safety margin, it is reasonable to define a zone 1 with an extent of 0.5 m around the injection head.
In this zone the electrical devices must have a protection against explosion hazard suitable for zone 1 .

In the area of 0.5 m around the injection head only a proximity switch is installed. This apparatus is protected by an intrinsic safety barrier Pepperl & Fuchs, with type of protection [EEx ib] IIC and it is therefore suitable for the zone of installation.
The push-button board of the injection head is placed outside the hazardous area.

7. SUMMARY OF THE INSPECTION RESULTS

On the basis of the inspection made, taking into account the safety measures adopted and the modifications reported at item 6.2.2.c, it can be stated that the electrical installations of the OMS plant for the production and injection of expanded polyurethane in the HAMCO factory in Amman are provided with the protections against the risk of explosion required by international standards CEI-EN 60079-10 and CEI-EN 6007914 and can therefore be declared in compliance with their specifications.

DICHIARAZIONE

Con la presente la IMPiANTI O.M.S. dichiara di aver sostituito lo strumento per il controllo della minima pressione azoto, montato a bordo serbatoio di stoccaggio ciclopentano installato presso la sede dello stabilimento HAMCO con sede in Amman (Giordania), con uno strumento analogo in versione Exi e di aver inserito nel relativo circuito elettrico una barriera di separazione.

Strumento:	Manometro 0/2,5 bar con contatto induttivo di tipo namur DIN19324 montato sull'equipaggio mobile.
Modello:	**SP 312-B2D/CI01**
Costruttore:	Fantinelli s.r.l. - Solbiate Olona
Sensore:	Pepperl + Fuchs **SJ2-N** certificato Ex n° PTB-83/2022 X
Barriera di separ.:	Pepperl + Fuchs **KFD2 SR2 EX1W**

Verano Brianza 4/6/99

impianti OMS spa

PROT. n. 99/015269
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A

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Via Rubattino 54 - 20134 Milano, Italy - Ph. + 39 0221251 - Fax + 39 022125440

Via Sabbionetta 4, 20050 Verano Brianza (Milano)
tel 0362/983.1 Fax 0362/983217
Telex 335340 OMSVER I
e-mail: impianti.oms@omsgroup.it

Cap. Soc. L. 4.500.000.000
Sede Sociale Milano, Piazza Buonarroti 32
Registro Imprese Milano N. 259496
R.E.A. Milano N. 1218538
C.F. P.I. IT 08322500151 - N. Mecc. MI [illegible]

DESTINATARIO
[illegible]
P.O. BOX 926123
[illegible] AMMAN JORDANIA

CESSIONARIO INTESTAZIONE FATTURA

LUOGO DESTINAZIONE DELLA MERCE
C.S.

DOCUMENTO DI TRASPORTO (DPR 472 del 14/08/96)

NS. RIF.	VS. RIF.	DATA DOCUMENTO	NUMERO DOCUMENTO	PAG.
OR99000046	C.I. N.017/99AT-014/99AT	03/03/99	DT99000255	1

PARTITA IVA	PORTO	CAUSALE TRASPORTO
	C.I.F.	Uscite per garanzia

POS.	CODICE ARTICOLO	DESCRIZIONE	U.M.	QUANTITÀ CIFRE	QUANTITÀ LETTERE
		ORD OR99000046 V.RIF C.I. N.017/99AT-014/99AT DEL 19/01/99			
1	930600217	FINECORSA SIEMENS - TESTINA CON ROTELLA - IP67 - EN50041 MOD. 3SE3 120 1GW-Z-ALTE AUSFUHRUNG BESCHRIFTUNG ALTE	NR	1,00	A,ZZ
1	025060100	VALVOLA + POMPANTE DIS. HPR275 + HPR278	NR	1,00	A,ZZ
1	921200401	ELETTROVALVOLA 5/2 1/8" COMPLETA DI BOBINA 110V 50/60HZ E CONNETTORE	NR	1,00	A,ZZ
1	921200102	ELETTROVALVOLA VE 133CN 2 VIE 3/4" N.C. EV21H9KB180	NR	1,00	A,ZZ
1	134173031	PULEGGIA 260 H100	NR	1,00	A,ZZ
1	134173028	PULEGGIA 214 H100	NR	1,00	A,ZZ
1	920301807	CINGHIA DENTATA 420 H 100	NR	1,00	A,ZZ
1	920300719	BILANCIATORE BHD 65	NR	1,00	A,ZZ
1	930100104	LIVELLO ELET.CO CAPA.VO ALC100 ELC 10/C	NR	1,00	A,ZZ
1	930401704	BARRIERA MOD.145	NR	1,00	A,ZZ
1	930100212	LIVELLO EL21 EX0 CGBSSDXXKEX L=900 1"1/2 CON CERTIFICAZIONE PTB2097 PER ZONA 0,COMPLETO DI PREAMPLIFICATORE	NR	1,00	A,ZZ
1	930300701	CAVO RISCALDANTE 220V - LUNGHEZZA METRI 2 - 30W/m - COILILI lungh. 1000 - TEMPERATURA DI ESERCIZIO 150°C - art.CRF047010 RESISTOR	NR	1,00	A,ZZ
1	*	SET CASSETTA ATTREZZI	NR	1,00	A,ZZ
1	920100122	PRESSOSTATO 0-25 1 C. DN.100 831.2 1/2"	NR	1,00	A,ZZ
1	930401706	BARRIERA P&F A TRASFORMATORE ISOLATO USCITA A RELE' mod.KFD2-SR2-EX1W	NR	1,00	A,ZZ

TRASPORTO A CURA DEL VETTORE

DATA E ORA INIZIO TRASPORTO 03/03/99 13:00

FIRMA CONDUCENTE

VETTORE CORRIERE ROCCHI - VIA VARESE 8 - CERNUSCO S/N - MI

DATA E ORA DEL RITIRO 04/03/99 16,25

FIRMA VETTORE

VETTORE GSI PARISI

DATA E ORA DEL RITIRO

FIRMA VETTORE

ASPETTO ESTERIORE DEI BENI 1 CASE + 1 CARTON

PESO KG 65,2 ~~62,0~~

N. COLLI 2

FIRMA DESTINATARIO

ANNOTAZIONI / VARIAZIONI

ISO 9002
Cert. n. 0577

Impianti OMS spa
Via Sabbionetta, 4
20050 Verano Brianza (Milano) Italy
Tel. 0362/983.1
Fax (0362) 983217
e-mail: impianti.oms@omsgroup.it
internet:www.omsgroup.it

ISO 9002
Cert. n° 0577

OMS Group
Polyurethane Evolution

26/05/99

Verano Brianza,

Vs. rif.

Ns. rif.

HAMCO CO.
P.O.BOX 926123
11110 AMMAN

OGGETTO:

PROFORMA INVOICE N. 41/99

Q.TY	*Description*	*CODE*
01	MOTOR AS.3F POLES 4/8 KW 6.5/4.3 V380 HZ50	930201141
01	HOSE NYLAFLOW 620 3/8" CONNECTION 12S L=5000 MM	

- Value only for customs....USD. 110=
- Goods without value, under guarantee
- Goods rendered C.I.F. AMMAN AIRPORT

GOODS OF ITALIAN ORIGIN

N. 2 PACKAGES
1) CM. 64X52X55
2) CM. 48X34X11
TOTAL NET WEIGHT KG. 88=
TOTAL GROSS WEIGHT KG. 97.6
MARK: HAMCO CO.
11110 AMMAN (JORDAN)

CUSTOMS CODE: 84779010

074 MIL 88840662 074-88840662

Shipper's Name and Address	Shipper's Account Number	Not negotiable / Air Waybill / Issued by
IMPIANTI OMS SPA VIA SABBIONETTA, 4 20050 VERANO BRIANZA MI	CF IT08322500151	K L M C A R G O KLM ROYAL DUTCH AIRLINES PO BOX 7700 1117 ZL SCHIPHO THE NETHERLANDS

Copies 1, 2 and 3 of this Air Waybill are originals and have the same validity.

Consignee's Name and Address	Consignee's Account Number
HAMCO CO P.O. BOX 926123 11110 AMMAN JORDAN	

It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITION OF CONTRACT ON THE REVERSE HEREOF. ALL GOODS MAY BE CARRIED BY ANY OTHER MEANS INCLUDING ROAD OR ANY OTHER CARRIER UNLESS SPECIFIC CONTRARY INSTRUCTIONS ARE GIVEN HEREON BY THE SHIPPER, AND SHIPPER AGREES THAT THE SHIPMENT MAY BE CARRIED VIA INTERMEDIATE STOPPING PLACES WHICH THE CARRIER DEEMS APPROPRIATE. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIER'S LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required;

Le merci qui decritte sono accettate in apparente buono stato e condizione (eccezion fatta per i casi in cui è dichiarato altrimenti) per il trasporto in conformità alle CONDIZIONI DI CONTRATTO DESCRITTE SUL RETRO. TUTTE LE MERCI POSSONO ESSERE TRASPORTATE CON ALTRI MEZZI INCLUSO TRASPORTO DI SUPERFICIE O OGNI ALTRO VETTORE, A MENO CHE IL MITTENTE FORNISCA SPECIFICHE ISTRUZIONI CONTRARIE, E IL MITTENTE ACCETTA CHE LA SPEDIZIONE PUÒ ESSERE TRASPORTATA ATTRAVERSO QUEGLI SCALI INTERMEDI CHE IL VETTORE CONSIDERI OPPORTUNI. SI RICHIAMA L'ATTENZIONE DEL MITTENTE SULL'AVVISO CONCERNENTE LA LIMITAZIONE DI RESPONSABILITÀ DEL VETTORE. Il mittente può aumentare il limite di responsabilità del Vettore dichiarando un valore più elevato per il trasporto e pagando, ove richiesto, una tariffa addizionale.

Issuing Carrier's Agent Name and City	Accounting Information
AIR CARGO INTERNATIONAL SRL 02924860151 MILANO Tel.02 58011949 Tfx.58011917	"NON C.E.E. TRAFFIC" KLM REALI LINEE AEREE OLANDESI PALA ZZO RAFFAELLO VIA CASSANESE 2 MILANO OLTRE SEGRATE MI
Agent's IATA Code: 00 0 0000 000 0 — Account No.	NON VALE FATTURA AI FINI I.V.A.

Airport of Departure (Addr. of First Carrier) and Requested Routing	Codice Fiscale / Partita IVA del Mittente	Imprenditore	Non imprenditore	PF / SD
MILAN ITALY	IT08322500151	☐	☐	

to	By First Carrier (Routing and Destination)	to	by	to	by
AMS	KL	AMM	KL		

Currency	CHGS Code	WT/VAL PPD	WT/VAL COLL	Other PPD	Other COLL	Declared Value for Carriage	Declared Value for Customs
ITL		XX		XX		NVD	NCV

Airport of Destination	Flight/Date (For Carrier Use only)	Flight/Date	Amount of Insurance
AMMAN, GIORDANIA	KL415	020699	XXXXXXXXXXX

INSURANCE - If Carrier offers insurance, and such insurance is requested in accordance with conditions on reverse hereof, indicate amount to be insured in figures in box marked "amount of insurance".

ASSICURAZIONE - Qualora il Vettore offra una assicurazione e tale assicurazione sia richiesta in base alle condizioni indicate a tergo, indicare l'importo da assicurare in cifre nella casella "importo assicurato".

Handling Information

2 PARCELS MARKED AS ADDR.
DOGANA A CURA BETA TRANS ATT. PROFORMA INVOICE
PLS ADV CNEE IMM UPON ARRIVAL PHONE 00962/5/3650022 FAX 00962/5/3651893 SCL STATUS "C "

No of Pieces RCP	Gross Weight	Kg / lb	Rate Class / Commodity	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (incl. Dimensions or Volume)
2	97.60	K	Q	100.0	4.410	441.000	SPARE PARTS NATURA DELLA MERCE CON FORME AL DICHIARATO E QUARANTENA 24 ORE E FFETTUATA PRESSO I NOS TRI MAGAZZINI ** THANK YOU FOR SHIP PING WITH AIR CARGO IN TERNATIONAL **
2	97.60					441.000	

Prepaid	Weight Charge	Collect	Other Charges	IATA-C	PT-C	MISC-C	P.B.A. Fee
441.000				3620	9000	1460	

Valuation Charge	Insurance Premium

Tax

Total Other Charges Due Agent

Total Other Charges Due Carrier
14.080

Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations.

Il mittente dichiara che le indicazioni contenute sul fronte della LTA sono esatte, e che qualora una parte della spedizione contenga merci pericolose, tale parte è debitamente indicata ed è nelle condizioni richieste ai fini del trasporto per via aerea secondo le norme sulle Merci Pericolose.

IMPIANTI OMS SPA
Signature of Shipper or his Agent

Total Prepaid	Total Collect
455.080	

Currency Conversion Rates	CC Charges in Dest. Currency

F. DE GIAMPAULIS
As Agent of Carrier

JUN 01ST 99 MILANO
Executed on (Date) at (Place) Signature of Issuing Carrier or its Agent

For Carriers Use only at Destination	Charges at Destination	Total Collect Charges

051-99-00238-00 PD
074-88840662

I.V.A. NON IMPONIBILE - ART. 9 PRIMO COMMA D.P.R. 633/72 PRO QUOTA

ORIGINAL 3 (FOR SHIPPER)

Impianti OMS spa
Via Sabbionetta, 4
20050 Verano Brianza (Milano) Italy
Tel. 0362/983.1
Fax (0362) 983217
e-mail: impianti.oms@omsgroup.it
internet:www.omsgroup.it

ISO 9002
Cert. n° 0577

OMS Group
Polyurethane Evolution

11.06.1999

Verano Brianza,

Vs. rif.

Ns. rif.

HAMCO CO.
P.O. BOX 926123
11110 AMMAN, JORDAN

OGGETTO:

PROFORMA INVOICE NO. 046/99

Q.TY	*Description*	*CODE*
1	NON RETURN VALVE FPRI ¾"	920404019

- GOODS WITH NO COMMERCIAL VALUE, UNDER GUARANTEE
- VALUE FOR CUSTOMS PURPOSES ONLY USD 10

GOODS OF ITALIAN ORIGIN
NO. 1 CARTON CM 27X21X12
GROSS WEIGHT KG 0,2

MARK: HAMCO CO.
P.O. BOX 926123
11110 AMMAN, JORDAN

COD. BRUXELLES: 84779010

Impianti OMS S.p.A.
Via Sabbionetta, 4
20050 Verano Brianza (Mi) Italy

Phone Nr. 0362/9831
Fax Nr. 0362/983217
E-mail Impianti.oms@omsgroup.it

Telefax Ref. : 2161/99 MDO/pm

Date : 04.06.99

To : ***HAMCO***

Attention : MR. H. JABER

Fax Nr. :

Nr.Pages : 01

REF./SUBJECT : **YOUR FAX MESSAGE DTD.03.04.99 - CYCLOPENTANE LINE, FIRE ATTACK IN DOORS AREA**

IF THIS MESSAGE IS RECEIVED GARBLED OR NOT COMPLETE PLEASE CONTACT US ADVISING PAGE - NUMBER TO BE RESENT

We will forward you the non return valve.
As to the electric diagram we await the coming back of our technician on next week, in order for us to give you a preciser answer.
Concerning the doors foaming fixture you placed in the foaming area, as already written to you on 20.05.99, it is recommended to check whether the earthing has been carried out.
We do confirm: that kind of danger can be avoided carrying out a good hearhing of the fixture as it is shown in our handbooks. You should also replace the polythene film with some paper sheet that do not generate electrostatic charges.

Looking forward to hearing from you as soon as possible.

Best regards.
M. DELL'ORTO
IMPIANTI OMS SPA

impianti OMS spa

macchine per espansi poliuretanici

Servizio Tecnico N. -10 22-5
Technical Service No.

Data -11-05-93
Date

Tecnico Sannata
Technician

Cliente HAMCO
Customer

Comm. N.
Order No.

N. No.	Data Date	Ore viaggio Travel hours: Andata Go	Ritorno Back	Ore lavoro Working hours: A.M.	P.M.	Totale ore Total hours
1	5-5	10				10
2	6-5			6	5	11
3	7-5			5	5	10
4	8-5			5	5	10
5	9-5			5	5	10
6	10-5			5	5	10
7	11-5			5	5	10

MATERIALI PER INTERVENTO / *MATERIALS FOR INTERVENTION*

Descrizione Description	Quantità / Quantity Prel. Taken off	Mont. Assembled
12-5 10	10	5

Il magazziniere
The storeman

Descrizione intervento
Description of intervention

1 Assambling new SP transducer and LC tub control.
2 Assambling new pressure gauge EX in the pump CP line.
3 Assambling Heating of compressor vane in Rossi Pixture
4 Adjustament the Oleomatik head and piping.
5 Assambling the new parts broken in the pixtures
6 Dissassemble the duke and assambling new in the pentahpend.
7 training on the HAMCO tencil and foaming refrigerator and door.
The plant working in conformity specifics

Percorrenza Km. .....
Km. Journey

Spese Alloggio / Pranzi DINARI L. 850
Board / Lodging

Altre ..... L. .....
Others

Note / *Notes:*

Expressly and without reservation all the clauses of above mentioned order and of conditions on the back with particular reference to clauses N° 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 are accepted.
Regular invoice will follow.

Il tecnico
The Technician

Si accettano esplicitamente ed incondizionatamente tutte le clausole di cui all'ordine sopra steso ed alle condizioni retro indicate con particolare riferimento alle clausole N° 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10.

Segue regolare fattura.

Il Cliente
The Customer

H. Jaber / HAMCO

Via Sabbionetta, 4 - 20050 Verano Brianza (Milano) - Telef. 0362/983.1 - Telex 335340 OMSVER I
Capitale Sociale Lire 4.500.000.000 int. vers. - Telefax 0362/900581 - Partita I.V.A. n. 08322500151