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**UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION**

Wagramerstrasse 5
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**PHASING - OUT ODS AT
CHANGSHU REFRIGERATING EQUIPMENT WORKS**

**BAIXUE
PEOPLE'S REPUBLIC OF CHINA**

MP / CPR / 97 / 183

CONTRACT 98 / 018 (REDESIGN)



FINAL REPORT

JOB N° 980528

VARESE, SEPTEMBER 2001



sicplant international s.r.l.

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Job: CHANGSHU REFRIGERATING EQUIPMENT WORKS
- BAIXUE - REDESIGN - FINAL REPORT

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1. FOREWORD

This is the final report of the activities carried out on the basis of the contract signed with the

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANISATION
UNIDO

with reference

REQUEST No. CHINA P98/023

PROJECT No. CHINA MP/CPR/97/183

related to the model redesign according to the use
of isobutane in refrigerant circuit

CONTRACT No. 98/018

For the Chinese national counterpart:

CHANGSHU REFRIGERATING EQUIPMENT WORKS (BAIXUE)
149 HUA YUAN BANG ROAD
CHANGSHU
JIANGSU
PEOPLE'S REPUBLIC OF CHINA

The aim of the activities has been the provision of technical services, technical documentation and training of Baixue personnel for the conversion of 4 production lines, producing refrigerators and freezers, from the use of R12 to the use of R600a (isobutane).



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2. ACTIVITIES CARRIED-OUT

2.1 FIRST MISSION ON PROJECT AREA

After the contract acceptance a delegation of SICPLANT experts, composed by SICPLANT's team Leader and Refrigerator Designer, have paid the first mission (from September 14th to 18th 1999) on project area to check the situation, to collect data, drawings, information enough to proceed at home office in the further activities foreseen by the Terms of Reference.

With Mr. Feng Jian, Chief Engineer of Baixue, have been agreed the models to be redesigned:

1 commercial refrigerator + 1 commercial freezer

2.2 REDESIGN OF MANUFACTURING PROJECT

With the data collected on site and other drawings and information received later by Baixue a First Process Report has been prepared and sent to UNIDO on 26/11/98.

The report was composed by the following contents:

- data on original situation
- isobutane information
- isobutane storage and handling
- isobutane charging line
- new process and safety strategy
- equipment suggested for the modified process



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2.3 MODELS REDESIGN

On the basis of the technical data of the two selected models

- Commercial refrigerator BC 56
- Chest freezer BD/C - 190 G

A general redesign of the refrigerating system has been carried out using our calculation methods and personalized software.

The results of the calculations have been included in the Second Progress Report sent to UNIDO on 26/11/98.

The report was composed by the following contents:

- redesign of refrigerating circuit of BC 56
- redesign of refrigerating circuit of BD/C - 190 G
- training manual on thermodynamic calculation

On our laboratories the modification of the two appliances have been carried out and the results of such modifications have been evaluated by laboratory tests.

The results have been included in the Third Progress Report sent to UNIDO on 02/03/99 included the following tests for both the appliances:

- running test at 100% and thermostat control
- low starting voltage test
- research of the minimum starting point voltage
- pull-down test
- energy consumption

Following the Third Progress Report the Back Up (Zeroing) of thermodynamic calculation has been supplied to UNIDO on 20th May 1999.



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2.4 SECOND MISSION ON PROJECT AREA

From May 23rd to 28th 1999 the expert of SICPLANT has carried out a Training Course to explain to 7 specialists of Baixue the concepts and the calculations made in redesign the refrigerating circuit of the refrigerator and the freezer. Moreover SICPLANT expert has trained the Baixue specialists in redesign the refrigerating circuit of other 6 models of freezers and refrigerators i.e.:

BD/C 172 G
BD/C 155 G
BD/C 211 G
SD/C 388
BD/C 308
SC 382

At his return SICPLANT expert has drawn-up the report of all thermodynamic calculation of the 6 model and sent it on 22/06/99 directly to Baixue.

2.5 FIRST CERTIFICATION BY TÜV

TÜV SUDDEUTSCHLAND inspectors have carried-out a technical inspection to our laboratories on April 1999, they have also read and analyzed our First Progress Report and in July 1999 they have issued the Safety Certificate for both the two appliances.

TÜV specialists have also accepted the contents of our First Progress Report and have issued a report containing comments and recommendations to Baixue for the correct modification of the 4 production lines Original of the Safety Certificate and Copy of the Report have been sent to UNIDO on 30th July 1999.

*REMARK: From this moment, outside our control, the installation of the new equipment by the manufacturer and all the works to be executed by Baixue took a long time, until end May 2001.
As soon as UNIDO confirmed that everything was ready for the TÜV Final Inspection and for The Third Mission SICPLANT has organized the final activities.*



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2.6 THIRD MISSION ON PROJECT AREA

From July 15th to 20th 2001 two experts of SICPLANT have organized a Training Course in Baixue to train the local staff about the new Production Process using isobutane as refrigerant. Particular attention has been given to the safety aspects.

A training manual has been delivered to the participants (see copy in annex).

2.7 FINAL INSPECTION OF TÜV

On 19th and 20th July 2001 the Inspector of TÜV SUDDEUTSCHLAND has visited Baixue, has inspected the technical documentation and the modified lines and on 25th July as issued the Final Inspection Report and the corresponding Safety Certificate stating that the filling facilities and the safety equipment have been properly assembled and meet the European Safety Standard (see annex).