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Final Report

Report of activities 1-11 of Work time schedule, terms of Reference according to the UNIDO Contract no.97/223 and UNIDO Contract MP/CPR/95/127-Redesign, Testing and Test Evaluation of five(5) models.

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1. Summary

The redesign of five models:BCD-238,BCD-181,BCD-188,BCD-260 and BCD-210 to the isobutane(R600a) as stipulated in the contract has been carried out and the converted models have been tested by Kiling. During the evaluation of the converted models Kiling has rendered assistance to UNIDO and DMR.

2. Conversion of five models by Kiling

In August 1997 Kiling has started the conversion of above mentioned five models to isobutane(R600a).

The redesign based on the following documents and standards:

- . Guide for refrigerant conversion of refrigerators and freezers to alternative refrigerant isobutane(R600a). (from DMR).
- . Safety strategy(from DMR).
- .GB-Norm(P.R.China).

For testing and analysis in labor 5 prototypes of each model have been made.

During redesign and manufacture it was proved that all necessary components such as compressor, isobutane, dry filter etc were available in China.

3. Testing of five converted models by Kiling

The testing of model BCD-238B has lasted from January to March 1998, the testing of models BCD-181B, BCD-188B and BCD-260B has lasted from February to March 1998 and the testing of model BCD-210B has lasted from September to October 1998.

The testing has been carried out by Kiling according to the following documents and standards:

- . Pilot conversion of DKK for model BCD-238 (from DKK).
- . GB-Norm(P.R.China)

At testing Kiling has compared the converted models(R600a as refrigerant) with the original models(R12 as refrigerant) and the parameters with the refrigerant R12 has been reached with refrigerant isobutane also. In comparison with R12 the energy consumption at the ambient temperature of 25°C for the converted models has a noticeable reducing. Take the model BCD-238B for example, after conversion to the isobutane(R600a) working coefficient, energy consumption, average power presents a remarkable improvement (See table and diagram).

4. Test evaluation of five converted models

In July 1998 DKK has sent via fax its assessment of the test reports of models BCD-238B, BCD-181B, BCD-188B and BCD-260B to Kiling. In November 1998 Kiling has received from DKK the assessment of the test report of model BCD-210B.

During the visit at Kiling the representative from DKK has discussed with the staff of Kiling the conversion and the test results.

Based on the assessment reports from DKK the conversion to isobutane by Kiling of all five(5) models will be estimated as successful.

5. Submit of Progress reports

- a. On 16 August 1998 Kiling has submitted via courier to UNIDO the progress report no.1 concerning the redesign of model

BCD-238B and the progress report no.2 concerning the redesign of models BCD-181B,BCD-188B,BCD-260B.

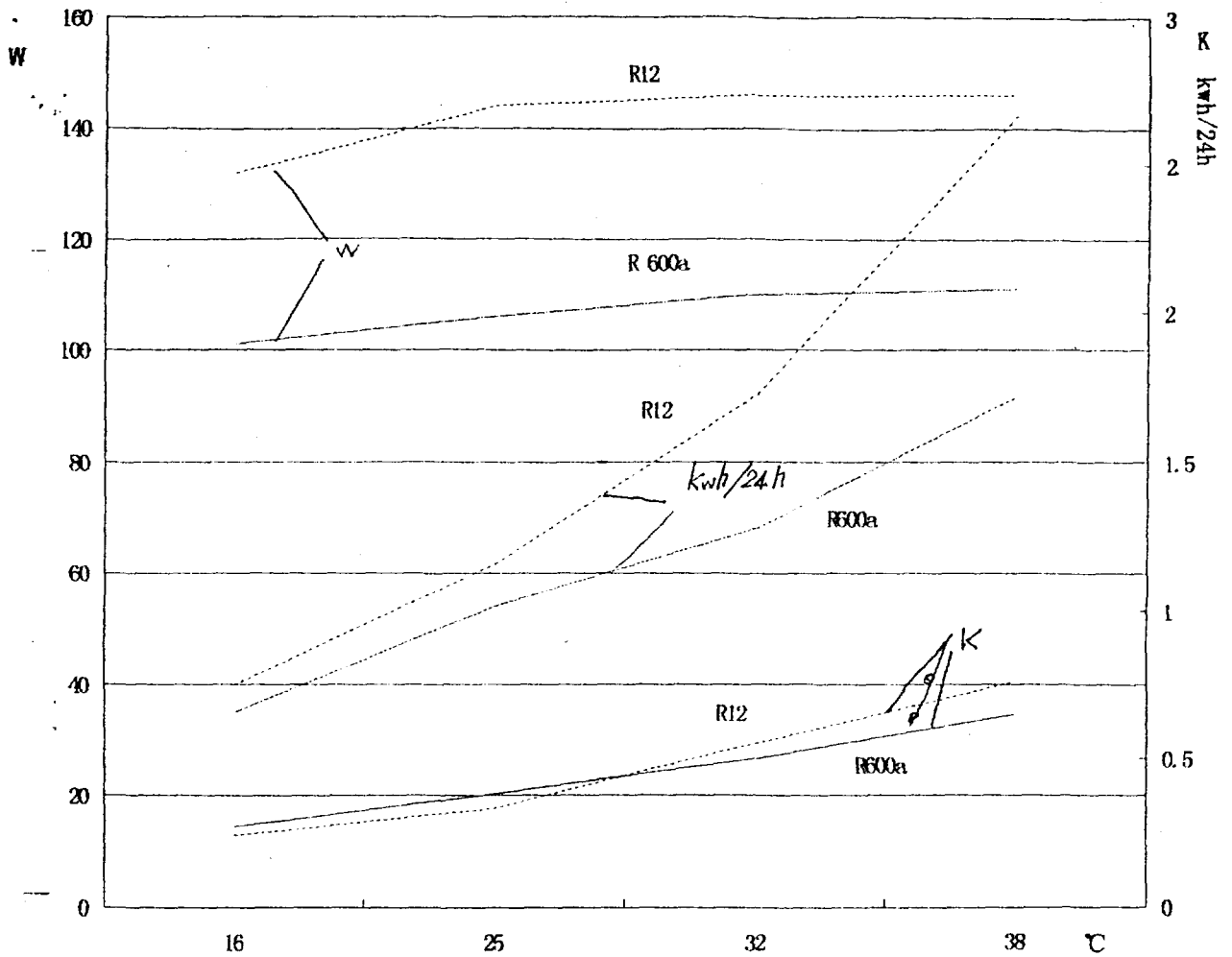
b.This final report covering the work performed at the work site comprises also the progress report for the redesign of the last model BCD-210B as progress report no.3.

6. Table and Diagram

a. Table: Comparison between R600a and R12 regarding the refrigerant properties of model BCD-238B

ambient temperature 环境温 度 °C	working coefficient 工作系数 K		energy consumption 耗电量 kwh/24h		average power 平均功率 W		T _m °C		T _h °C	
	R600a	R12	R600a	R12	R600a	R12	R600a	R12	R600a	R12
16	0.27	0.24	0.656	0.749	101	132	4.0	2.0	-18.2	-17.3
25	0.38	0.33	1.014	1.156	106	144	2.3	1.8	-18.1	-17.9
32	0.50	0.55	1.277	1.724	110	146	2.7	2.1	-18.3	-17.7
38	0.65	0.76	1.717	2.667	111	146	4.1	2.9	-17.4	-17.5

b. Diagram: Comparison between R600a and R12 regarding the refrigeration properties of model BCD-23EB



Hangzhou Kailan Refrigeration Co.



Hangzhou, 10.12.1998