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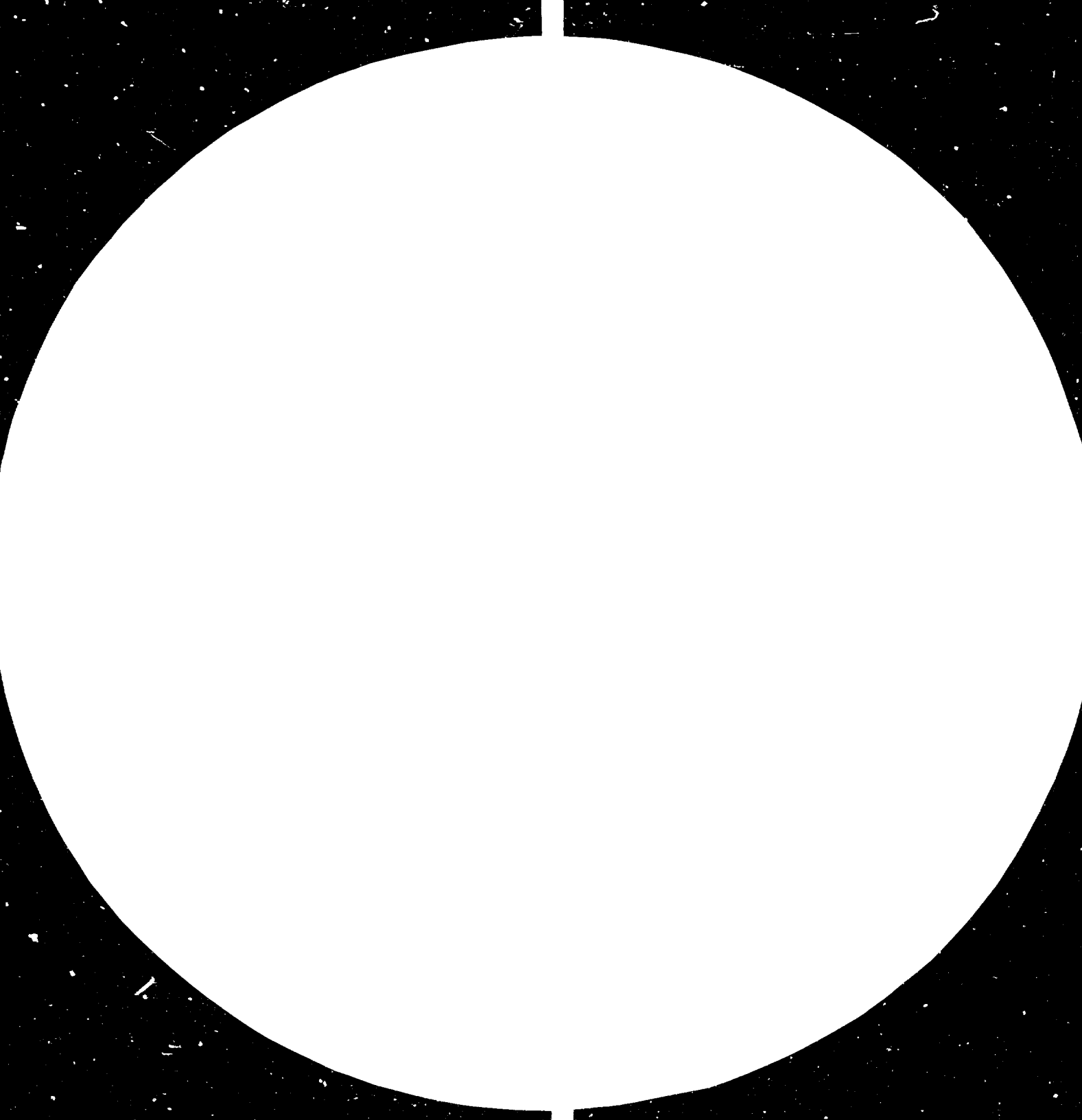
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4 JULY 1981

INSTITUTE FOR STANDARDIZATION AND QUALITY CONTROL  
DP/VIE/76/013/11-06  
VIETNAM

Final report : Air conditioning services and facilities for the  
Metrology and Testing Centre at Bien Hoa, Vietnam

Prepared for the Government of Vietnam by the United Nations  
Industrial Development Organization executing agency for the  
United Nations Development Programme.

Based on the work of and prepared by  
K. Wroblewski, consultant on the Establishment of  
Testing Laboratories

United Nations Industrial Development Organization  
V i e n n a

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This report has not been cleared with the United Nations Industrial  
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## INTRODUCTION

The purpose of Project is to assist the Government in strengthening and developing the quality control, standardization and metrology activities.

The expert was a member of a team of international experts attached to the Metrology and Testing Centre at Bien Hoa of the Institute for Standardization and Quality Control in Ho Chi Minh and, under the general guidance of the Chief Technical Adviser was responsible for the activities related to his field of specialization.

### I. OBJECTIVE AND DURATION OF THE MISSION

The objective was to provide advice and assistance to the national staff of the Metrology and Testing Centre (MTC) and specifically to :

- advise and assist in the planning and layout of the additional services and facilities of the testing laboratories,
- advise on and participate in installation of air conditioning systems of MTC and advise on its proper maintenance,
- assist in training the staff of MTC in the operation and management of the additional facilities of the MTC,
- issue the practical instructions within the sphere of competence.

The reporting period covers the whole duration of the mission in Vietnam which started on 5<sup>th</sup> May 1981 and ended on 5 July. The date of departure from Vietnam, after debriefing in UNDP-Office in Hanoi, 10<sup>th</sup> July 1981.

## II. IMPLEMENTATION OF PROJECT ACTIVITIES

### A. Work plan.

According to the preliminary report dated 22 May 1981 prepared by the Chief Technical Adviser and presented work plan (see Annex 3), installation of the air conditioning equipment in Metrology Laboratories was to be completed by the end of June 1981.

There is a delay in this item of the plan because the air conditioning equipment came from England last week.

One of four complete air conditioning systems delivered has been already installed and set in operation on 4<sup>th</sup> - 5<sup>th</sup> July.

Because of the above delay of the equipment delivery my mission in Ho-Chi-Minh City was extended by UNIDO and UNDP Office in Hanoi for two weeks.

It may be planned that the remaining air conditioning systems will be installed and set in motion by the National Staff, under the guidance of the Chief Technical Adviser, in a month, or six weeks.

### B. Installation of the air conditioning equipment.

- Before the air conditioning equipment was delivered the following preparatory works had been carried out on site during the period of my mission :
- a) the design of the air conditioning installation and positioning of the component items -
  - see Annex V - C , Drawing Nr. 1 " Air conditioning system installation lay - out " ;
- b) the design of the partition walls in the test rooms ;
- c) the design of the field supplied air circulation galvanized steel sheet ducts system ;
- d) installation of the main power supply line to the air conditioning system electric control panels from power source on site ;
- e) building adaptation works ;
- f) construction of the concrete foundations outside the building for air conditioning cooling units ;
- g) making and installation of the internal and external air recirculation ducts system for each air conditioning set (4 systems) ;
- h) installation of the indispensable water supply and drainage connecting lines for the steam humidifier ;

- When the air conditioning equipment came the total mobilization of the Institute Staff allowed the installation of the first air conditioning system within about a week.

In such situation, after the consultation with the Chief Technical Adviser, I decided not to leave the Institute at Bien Hoa though my contract with UNIDO expired on 3<sup>rd</sup> July, to be able to provide advice and assistance until the first new air conditioning system was set in operation.

Now the Staff of the Metrology and Testing Centre at Bien Hoa is well acquainted with the installation procedure and starting up the new system procedure and will be able, without my presence, to instal and set in motion next three air conditioning installations.

#### C. Installation, maintenance instructions

As the installation works of the first air conditioning system are already over and the system has been operating for one and a half day, first observations allow to formulate the below given instructions :

- a) the action of the cooling unit is normal but as it is working in the tropical climate and in full sun, the casing becomes too warm and the energy consumption will be too much increased. It is recommended that the light roofing above the cooling unit should be provided as soon as possible (not too low above the unit)
- b) to avoid too heavy heat load for the cooling unit the thermal insulation of the room ceiling and the room external wall should be installed as soon as possible. The insulation should be always kept in good technical condition.
- c) thermal insulation of the external ducts system should be covered with the effective vapor barrier as soon as possible. Careful maintenance is needed,
- d) the heater battery should be covered from outside with the demountable thermal insulation layer with the exception of the electric terminal box cover, which might be insulated too but the cover must be demountable separately with the insulation.
- e) after a successfull start up procedure of the steam humidifier, it is found that the actual steam output is less than the output setting, and the electrodes current is much less than the nominal value. (1 amp instead of 15 - 20 amp, )



With low conductivity feed water it is necessary for the humidifier to concentrate the solids in the steam cylinder and **there** by to raise the conductivity to the level required to achieve the full output.

The several hours of continuous operation should be allowed, and after that it should be rechecked. When the next air conditioning installation is ready to operate the next steam humidifier will be **tried**. If the symptoms are the same the supplier of the equipment should be consulted (water analysis indispensable).

#### D. TRAINING

The author has elaborated the "Counterpart Personnel Training Programme" covering the air conditioning equipment for the Metrology Laboratories installation operation and maintenance, - see Annex I -B.

The above programme has been fulfilled -

- there was a 5 days delay because the air conditioning equipment came from England last week.

The author issued the "Installation, operation and maintenance instructions" covering the air conditioning system - see Annex V -C.

III. ADDITIONAL SERVICES AND FACILITIES FOR THE TESTING LABORATORIES

4. Atmospheric conditions for test rooms at MTC Laboratories

Attention is drawn to the necessity of maintaining control of the atmosphere in the testing laboratories and of carefully specifying the conditions in which tests are to be performed.

Atmospheric conditions required for test rooms at MTC Laboratories are analyzed below :

1. Light industries Laboratory

a) Textile testing

Standard atmospheric conditions for test room according to :

- Vietnam Standard TCVN 1748 - 75  
    \*  $25 \pm 5^{\circ}\text{C}$  ,  $65 \pm 5\%$  r.h.
- British Standards Institution, BS Handbook 11-1974  
    Methods of test for textiles, BS 1051 1972  
    Physical tests     \*  $20 \pm 2^{\circ}\text{C}$  ,  $65 \pm 2\%$  r.h.
- Japanese Industrial Standard JISL 1073 - 1965  
    \*  $20 \pm 2^{\circ}\text{C}$      $65 \pm 2\%$  r.h.
- American Standard (U.S.A.) 1968  
    \*  $21.1 \pm 1.1^{\circ}\text{C}$  ,  $65 \pm 2\%$  r.h.
- UNIDO - Development and Transfer of Technology Series No 4  
    Manual on Instrumentation and Quality Control in the Textile  
    Industry , 1970  
    temperate     \*  $20 \pm 2^{\circ}\text{C}$       $65 \pm 2\%$  r.h.  
    tropical       \*  $27 \pm 2^{\circ}\text{C}$       $65 \pm 2\%$  r.h.

b) Paper testing

- TAPPI Standard Technical Association of the Pulp and Paper  
    Industries T 402 CS - 70  
    \*  $23 \pm 1^{\circ}\text{C}$  ,  $50 \pm 2\%$  r.h.

c) Leather testing

- USA Standard, Methods of Sampling and Testing, Federal Specification KK-L - 311 a 1953

Physical tests      + 23 ± 1°C      • 50 ± 4% r.h.

- Norm Francaise      NF G 52 - 001 1948

+ 20 ± 2%      65 ± 3% r.h.

- Indian Standards      IS 5868 1969

+ 27 ± 2%      65 ± 2% r.h.

d) Plastics

Federal Test Methods Std No 406 1961 USA

+ 23 ± 1.1°C      50 ± 4% r.h.

The specimens should be conditioned for not less than 24 hours before being tested and should be tested in the same atmosphere.

Samples may be conditioned by letting them stand in a room in which the temperature and relative humidity are controlled, or by placing them in a conditioning cabinet which is more rapid.

The best solution would be to have the rooms of the Laboratory fully air conditioned ; it is the most expensive solution too.

With the cost factor in mind it may be decided to use the above mentioned conditioning cabinets--samples drawn from this fully conditioned area may be tested immediately. In such case the actual room air conditions are to be measured and due allowance made for deviations from standard.

The room should be then air conditioned by means of a window - type air conditioning unit. In this case we may expect the following room atmospheric conditions in Ho Chi Minh City climate :

(1.1)

	temperature °C		relative humidity %	
	monthly average	Max	monthly aver.	Max
during the raining season	+ 24	+ 29	70	75
during the dry season	+ 26	+ 31	60	65

As standard laboratory room conditions the following could be proposed :

(1.2)      temperature      + 27 ± 2° C  
                 relative humidity      65 ± 2% r.h.

2. Chemical Products Laboratory and Food Technology Laboratory

The effective control of temperature and relative humidity is vital in these testing laboratories.

The atmosphere is affected by different factors like heat and vapor producing sources as electric ovens, electric heater plates, Bunsen burners, heated water baths, evaporation of fluids, thermostats which get warm etc.

Some more important items may be mentioned as follows :

- GCD Gas Chromatograph - heater 3 kw Pye Unicam Ltd ;
- Atomic Absorption Spectrophotometer working with acetylene flame - the flame may release as much as 3 kw in heat ;
- Flame Photometer approx. the same heat emission.

We should not expect more than max. 10 kw heat production in a room.

The full air conditioning system would be too expensive, but the laboratories should be equipped with the window type room air conditioning units. We may expect the room atmospheric conditions level mentioned in item 1 (1.1)

In special cases additional ventilation facilities should be designed as fume hoods, effective exhaust fans in ordinary, and if needed, in anti-explosive execution.

As standard atmospheric conditions the above give values in item 1 (1.2) might be assumed.

3. Metrology Laboratories

Specific atmospheric conditions required in the Metrology Laboratories, and especially a stable temperature level, will be maintained by the individual room automatic air conditioning systems which are just being installed on site .

The atmospheric conditions could be set as follows :

temperature	+ 22 ± 1 ° C
relative humidity	60 ± 10 % r.h.

4. Remaining Laboratories at MTC

Window type room air conditioning units should be operating.

The expected atmospheric conditions level will be as given in item 1 (1.1) , above.

B. Special ventilation facilities

The author has designed special ventilation facilities for two rooms belonging to the Chemical Laboratories.

1. the ether manipulation room

- exhaust ventilation installation in anti - explosive execution ;

2. the store of inflammable Chemical Solutions -

- cooling and ventilation installation in anti - explosive execution (temperature level max. + 30° C.)

C. State Metrology Centre localization problem.

Different aspects of this important problem should be taken into consideration before the final decision is taken.

It may be a question of localization in the North area of the Country -

- Institute for Standardization in Hanoi, or the South area - Institute for Standardization in Ho - Chi - Minh City.

The climate aspect has been analyzed by the author.

The climate data have been studied and the comparison of air temperatures and relative humidity at Hanoi and Ho-Chi-Minh city completed.

It is evident that the monthly average temperatures level differs much during all year in Hanoi area and is much more stable in Ho - Chi - Minh city :

Hanoi average monthly temperature for January 16,9° C  
for July 28,3° C

Ho-Chi-Minh city average monthly temperature for April 29° C  
for January 25,6° C

The average monthly air relative humidity level in Hanoi is always higher than in Ho - Chi - Minh city :

Hanoi	January	80°/o r.h.	
	March	88°/o r.h.	
Ho-Chi-Minh city	February	} 68°/o r.h.	
	March		
	September		64°/o r.h.

It should be recommended that the Metrology I<sup>st</sup> class stations should be kept in a more stable and less humid climate that is in the South of the Country.

IV. FINDINGS, CONCLUSIONS, RECOMMENDATIONS.

1. The author was kindly received by :  
Mr. VAN TINH Director of the Project,  
Deputy Director General of  
General Department for Standardization,  
Metrology and Quality Control in Hanoi  
  
Mr. NGUYEN HUU THIEN - Director of the Institute for  
Standardization (Centre III)  
in Ho Chi Minh City.  
  
Mr. NGUYEN VAN CHIEU - Secretary of the Project.
2. At the UNDP Office in Hanoi the author was welcomed by the Resident Representative and his Personnel.
3. High standard hotel accomodation, office room, transportation car, working facilities have been provided by the Hosts. Interesting tourist trips and free access to folklore shows were organized on free days.
4. Very good, enthusiastic cooperation offered by the National Staff together with friendliness, contributed to quick air conditioning equipment installation and setting it in operation.  
It is owing to this that the first set of air conditioning equipment is already operating.  
The above success could be yet not possible without the inestimable Personality of Director of the Institute Dr. NGUYEN HUU THIEN, and without my Counterparts with Dr. NGUYEN NGOC TRU in the first place.
5. The cooperation with the Chief Technical Adviser and work organization were perfect and it has helped very much in the progress of works,
6. The staff of the Metrology and Testing Centre at Bien Hoa, and especially my Counterparts are well acquainted with the installation procedure and starting up the new air conditioning system procedure and will be able to instal and set in motion next three air conditioning installations.
7. As the installation works of the first air conditioning system are already over and the system has been operating for a short time, first observations allow to formulate the additional instructions - see II-C .
8. It is recommended that the periodic service and maintance of the equipment should be performed at least for every two weeks.

9. From the climate point of view the future State Metrology Centre should be localized in the South of Vietnam in Ho-Chi-Minh City.
10. As the space is provided for future development of metrology activities in the modern building in Ho-Chi-Minh-City, where the main offices of the Institute are accommodated, it is recommended that the additional new air conditioning equipment should be installed, in cooperation with the United Nations, in the Metrology Laboratory rooms in this building.

The equipment should work with the one phase 220 V electric power supply.

It should be still more important if the state Metrology Centre would be localized in Ho-Chi-Minh City.

Annex . A. Air conditioning equipment  
provided by UNIDO

Item No.	Goods and/or services	Quantity	Unit	Unit price	Amount UK £
1.	Air conditioning system consisting of :				
1.1	Carlyle Single Packaged Units - Model 50 MHO24900, suitable for 360-440 volts 3 phase 50 Hz.	4	ea.		
1.2	Vapac Steam Humidifiers - Model V5 - Complete with room distribution unit. Suitable for 230 volts 1 Phase 50 Hz.	4	ea.		
1.3	Control Panels purpose.	4	ea.		
1.4	Duct-Mounted Type Electric Heaters. Suitable for 360/420 volts 3 phase 50 Hz.	4	ea.		
1.5	Perforated Ceiling Tiles complete with Angle Hangers Channel C Section Spring T Bars Clips Edge Channel Border-Wedges. Two rooms 5.5m x 6.6m	2	set		
1.6	Perforated Ceiling Tiles. ditto Two rooms 6.5m x 5.8m	2	set		
1.7	Spares:				
	Motor Compressor 360/420v 3 Phase, 50 Hz	1	ea.		
	Evaporator Fan Motor " " "	1	ea.		
	Condenser Fan Motor " " "	1	ea.		
	Compressor Contactor	1	ea.		
	Humidifier Bottles	10	ea.		
	RF 61 Single Stage Controller	2	ea.		
	Range Card-LZW 61.11 C-50°C	2	ea.		
	SEZ 61.33 3 Position Converter	2	ea.		
	ACL Step Controller 12 Step	2	ea.		
	Contactors	3	ea.		
	Complete Contactors	3	ea.		
	Fuses for Two Panels Complete	100	ea.		
	Fuse Carriers	6	ea.		
GRAND TOTAL FOB U.K. AIRPORT					20.046.00
AIRFREIGHT CHARGES					4.200.00
C + P HANOI SOCIALIST REPUBLIC OF VIETNAM					24.246.00



V. ANNEXES

