



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

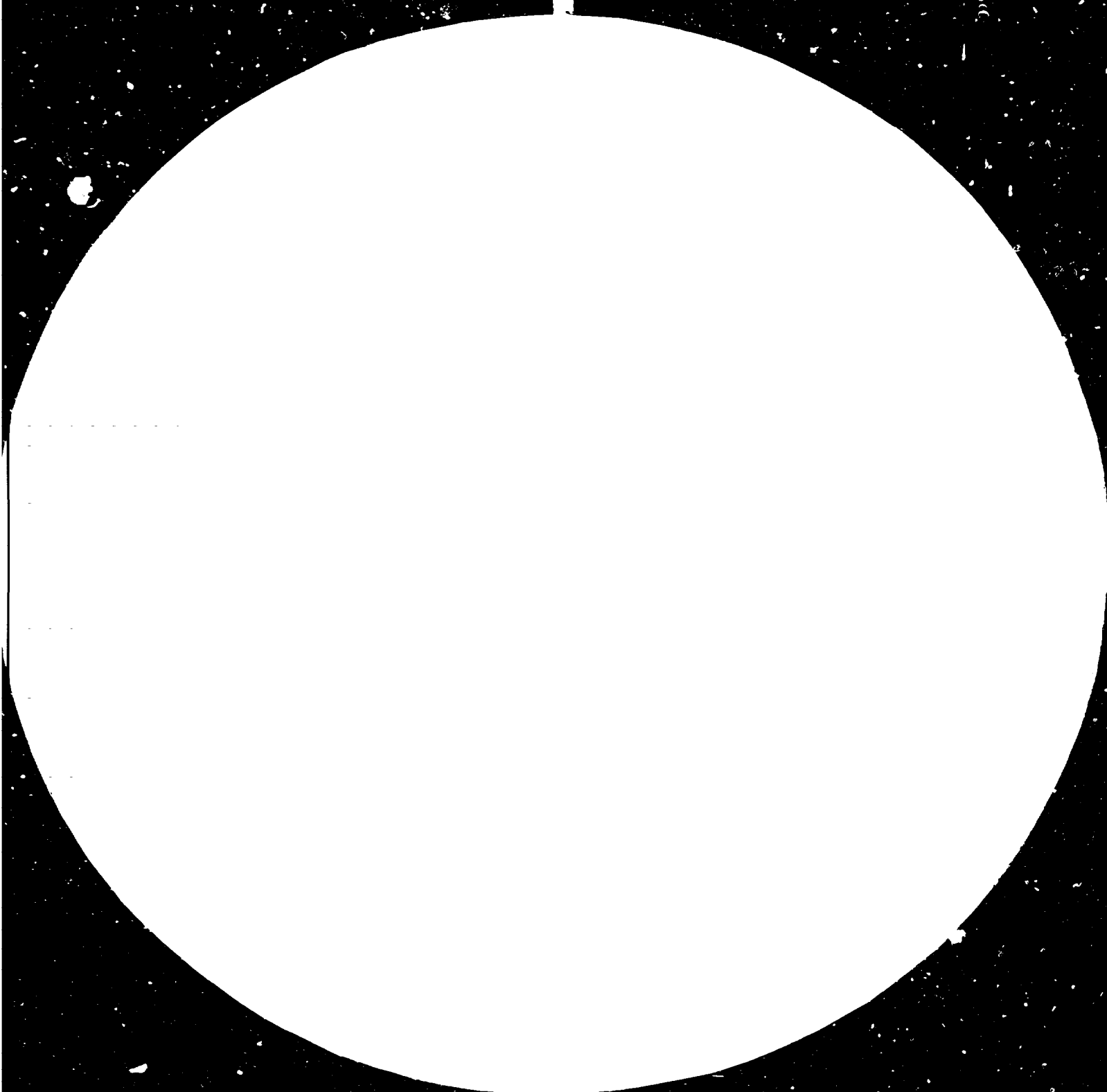
## FAIR USE POLICY

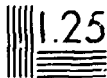
Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)





28



32



36



Resolution Test Chart (NBS 1963-A)

Resolution Test Chart (NBS 1963-A)

Resolution Test Chart (NBS 1963-A)

Resolution Test Chart (NBS 1963-A)

Resolution Test Chart (NBS 1963-A)

RESTRICTED

12307

DP/ID/SER.A/425  
25 February 1983  
English

INSTITUTE FOR TROPICAL TECHNOLOGY

DP/VIE/76/010

VIETNAM

Technical Report: Reviewing tropicalization of manufacturing  
facilities, equipment and instruments\*

Prepared for the Government of Vietnam  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Manfred Rätzsch,  
expert in tropicalization

United Nations Industrial Development Organization  
Vienna

\* This document has been reproduced without formal editing

V.83-52749

TABLE OF CONTENTS

|                           | <u>PAGE</u> |
|---------------------------|-------------|
| DUTIES .....              | 1           |
| INTRODUCTION .....        | 1           |
| RESULTS OF WORK .....     | 2           |
| RECOMMENDATIONS . . . . . | 5           |
| ANNEX .....               | 6           |

### DUTIES

At the briefing of the delegated expert, which took place in Vienna on November 1st-2nd 1982, the requirements for activities and targets of the mission to Vietnam were elaborated as follows:

1. Consult and assist the Project Director and Deputy Director of the Institute for Technical Tropicalization of the National Research Centre of Vietnam (ITTV) in developing applications, standards, procedures, sets and training programmes for the following:
  - a) development of eposey type and alkyd resins, impregnants, electrical insulating materials etc.
  - b) polymers and vehicles to prepare paints (coatings and adhesive materials)
  
2. Preparing a final report on the results of the mission and recommendations for further action which might be undertaken.  
(See Job Description DP/VIE/76/010/1104A/31.9.B)

### INTRODUCTION

As a result of the visits to the laboratories of the ITTV in Hanoi and Ho-Chi-Ming-City, to the Polytechnicum, Hanoi, to the Institute for Industrial Chemistry, Hanoi, to the Center for Standardization in Ho-Chi-Minh-City and the chemical factory Viet Tri, and as a result of the seminars and training programmes it is possible to describe, in this report, the special climatic conditions in the S.R.V. The effect of these conditions on the resistances of the electrical initiating materials and coatings were discussed. It is not necessary to describe the climatic conditions in the different parts of the S.R.V., the situation in the ITTV and in the other research institutes and the universities as well as in the chemical and processing factories, because they have already been described in detail in the Final Report on Project No: SI/VIE/78/801 from December 1979.

To date there have been no essential changes, with the exception of the planned increase of instruments and collaborators.

RESULTS OF THE WORK

The problems mentioned under a) and b) of Duties, particularly under the aspect of using domestic raw materials, were discussed in detail and the working concepts were specified. However, not all questions could be answered satisfactorily. Therefore, it is recommended that more Vietnamese experts be delegated to stay in specialised institutes of other countries and to invite specialists from other countries to contribute to the deliberation of special questions relating to S.R.V.

On the request of the Vietnamese the expert lectured on special trends in chemistry, physics, processing and application of high polymer materials. A list showing the titles of these lectures and the places where they were held are enclosed as Annex 1.

There is no doubt about the necessity for a high level of research in the field of tropicalization since the country has many deficiencies as a result of corrosion.

From this point of view the expert supports the extension of the ITTV which is planned up to 1985. (From 135 co-workers at the moment to 180; for an area of approximately 3,000 sq. m.)

The expert discovered that in two parts of the ITTV the Vietnamese scientists work very intensively to obtain information, that all the new instruments work and great efforts are being made towards their development.

Although the expert saw many new instruments their actual numbers are still insufficient as yet. It is necessary to complete the laboratories and pilot plants as they are foreseen in the plan up to 1985.

The supply of spare parts, chemicals and other specialities is insufficient. These are necessary to guarantee a high service life of the instruments.

It is also necessary to help the Vietnamese scientists by supplying trade literature.

The ITTV can support the Vietnamese trade organizations through the preparation and control of imports to Vietnam. There are many examples of cases where the imported materials, instruments and so on do not have the quality required for tropical conditions, because the suppliers did not have sufficient information.

The ITTV is in a position to train Vietnamese experts for the tropical peculiarities in buying, servicing, maintaining and repairing of electronic, electrical, technical equipment and of buildings.

After his visit to the chemical factory in Viet Tri, the expert is of the opinion that for the development of modern chemical industries in the R.S.V. not all technical equipment, electrical and electronic installations, analytical and other instruments are suitable for tropical conditions. This would be too expensive and no seller can give a guarantee extending for many years.

He recommends:

1. Housing all the highly sensitive equipment in closed, climatically regulated rooms or in tight containers where it is possible to reduce the cooler content of the air to a lower level.
2. The yearly general repair of the plant will be done in the "dry winter" time.
3. Electrical equipment for pumps or ventilations must also be capsuled.
4. All the other technical equipment must be protected against direct sunlight since all polymeric materials such as lacquer or packing materials are very sensitive against UV-Beam.
5. Use polymeric concrete and other new materials for stands, trestles, tops and caps of machines instead of the corrosive steel.

By paying attention to all these points the plants could have a longer service life and it would be possible to re-finance the higher expenditures.

Such measures would also make use of other factories. In this way the research work of the ITTV could concentrate on the main points which would not be possible in any other way:



- : Protection of all-steel constructions against corrosion with special lacquers.
- : Protection of all electrical equipment with special coatings and plastic materials.
- : Protection of metallic and plastic pipes
- : Development of special polymeric materials for packing and for insulation of electrical equipment with higher temperatures as it is necessary in non-tropical territories.

There is a good agreement between the expert and the Project Director and Deputy Director of the ITTV on the development of the Institute.

1. The direction of work is concentrated on domestic raw materials. Their modification is necessary in order to supply polymeric materials which are suitable for application in the industry to reduce corrosion. Investigations are also underway into the reasons for the mechanism of the corrosion process. This means not only the corrosion with UV-beam, water, oxygen, ions which are found in sea water, it also means the biologically stimulated corrosion and the results of all these influences.
2. All investigations for the mechanism of metallic corrosion must be undertaken in collaboration with other institutes within the field in other countries, especially with institutions in the USSR and GDR because there is no closed theoretical concept for this programme under European conditions as yet. It is necessary for the ITTV to investigate the influence of anti-corrosion materials and inhibitors in the process of corrosion.
3. With the further development of the ITTV it is necessary to investigate the physics, chemistry and physical chemistry of the processes in the surfaces of the boundary between the metal and the first organic layer and between the different layers of the lacquers. These results are very important in the investigation of all combinations between organic layers and coatings and adhesives and in all polymer composite materials.

4. Composite polymers with hydrophobic anorganic materials are a good selection and it is possible to substitute these material metals in some cases. The filling and strengthening of polymers with anorganic highly dispersed materials in the future is an interesting field for investigation in the ITTV. The polymer bases, which plays an important role in the programme until 1985, are the duroplastics and the natural rubbers.
5. Very important for all coatings, adhesives, packing materials and plastics is the investigations for suitable stabilisers to inhibit the UV and oxidation reactions of fungicides and to inhibit further corrosion of metals under tropical conditions. In these investigations it is also necessary to look at the effect of the results of all these different stabilisers.

RECOMMENDATIONS TO BE ELABORATED UPON IN UNDP FOR S.R.V

1. The Vietnamese party makes recommendations for the planning extension in organising buildings or rooms and experts.
2. The Vietnamese party prepares the proposed supplementary investigations in the longterm planning of the ITTV.
3. The Vietnamese party trains experts for these new investigations and names experts for longterm training in other countries.
4. UNIDO supports the development of the ITTV in purchasing instruments, spare parts, chemicals and other specialities.
5. UNIDO supports the ITTV by organizing and financing the delegation of Vietnamese experts in special laboratories all over the world and by arranging for experts of other countries to visit the ITTV under recommendation of the Project Director.
6. UNIDO supports the ITTV by supplying trade literature.

ANNEX 1

| <u>No.</u> | <u>Titles of Lectures</u>  | <u>Place</u>                                      | <u>Date (present)</u>   |
|------------|--|---|-------------------------|
| 1.         | Development of quantity and quality of polymers all over the world and in GDR.   | ITTV (1)<br>Hanoi                                 | 6.11.82<br>(about 60)   |
| 2.         | Progressive development for chemical modification of polymers  | Polytechnicum<br>Hanoi                            | 11.11.82<br>(about 90)  |
| 3.         | Negative and positive results to produce Photo-prints, Typ-prints and photosensitive coatings  | Committee for<br>Science and<br>Technics<br>Hanoi | 15.11.82<br>(about 100) |
| 4.         | Photoinitiated polymerisation and copolymerisation under the influence of the charge-transfer-complex between the monomers and the solvents. The application of the received polymers. | " " "   | 15.11.82<br>(about 80)  |
| 5.         | Trends of polymer materials, particularly of the thermal reversible polymers and of filled polymers.   | ITTV (2)<br>Ho-Chi-Minh-<br>City                  | 19.11.82<br>(about 120) |
| 6.         | Relation between structure and quality of polymer materials  | University of<br>Hanoi                            | 24.11.82                |



