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ASSISTANCE TO THE MAURITIUS STANDARDS BUREAU,

~~MAURITIUS~~

EP/MAR/75/008.

Technical reports: Paint testing and other activities

Prepared for the Government of Mauritius
by the United Nations Industrial Development Organisation,
executing agency for the United Nations Development Programme

29 JUN 1978

Based on the work of A. B. Koslowski, expert in paint testing

United Nations Industrial Development Organisation
Vienna

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ABSTRACT

The expert was assigned for four months (1 November 1977 to 2 March 1978) as paint testing technical expert to the Mauritius Standards Bureau. The expert's mission formed part of the larger project "Assistance to the Mauritius Standards Bureau" (DP/MAR/75/008). The present mission forms a part of the consultant services provided by UNIDO in this phase of the project.

All the equipment ordered in the past by the Government and UNIDO arrived before the expert's mission, but installation work in one room has not been completed and purchasing of additional equipment was necessary. Nevertheless, during mission, the expert was able to put existing equipment into operation and to train counterpart in paint testing. Comparative testing of emulsion paints manufactured in Mauritius was almost fully completed as a part of training and testing programme and four basic standards in paints and paint testing were drafted.

The expert's other activities involved general corrosion protection (drafting three standards on hot-dip galvanizing) and chemical training, testing and standardization programme completed by drafting five standards in basic consumer products (soaps, detergents, toothpastes).

The report contains several recommendations and guidelines for following-up testing and standardization activities in these three fields.

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INTRODUCTION

This is the report of a mission forming part of the project "Assistance to the Mauritius Standards Bureau" (DP/MAR/75/003*). The parent project, which was requested by the Government of Mauritius, was approved by the United Nations Industrial Development Programme (UNDP) on 8 December 1976. The United Nations Industrial Development Organisation (UNIDO) is the executing agency.

The expert was sent on a short mission of four months, from 2 November 1977 to 1 March 1978, as a technical expert in paint testing to the Mauritius Standards Bureau. According to the job description (see Appendix X) the expert was expected to assist the Government of Mauritius in developing and strengthening the paint testing activities of the MSB. Specifically, the expert was expected.

- (a) to organize and operate the paint testing laboratory of the MSB,
- (b) to train local counterparts in paint testing,
- (c) to assist in drafting local standards for paints,
- (d) to assist MSB with advise in other physical and chemical testing activities in which the expert may have useful experience (fungal test, corrosion protection, testing of plastics, rubber, etc).

The report describes the expert's activities in paint, corrosion protection and chemical training, testing and standardization.

*) The report is a separate description of expert's findings, activities and recommendations but as paint, corrosion protection and chemical laboratories are only a part of the project activities it may be advantageous to read the report in conjunction with Dr Thulin's previous reports to consultant missions of 7.03.76 - 22.05.76, 1.02.77 - 15.04.77 and 17.09.77 - 26.02.78.

On the basis of Dr Thulin's report of 1 February to 15 April 1977 UNIDO technical report DP/ID/SER.A/107 of 13 May 1977 was prepared for the Government of Mauritius which describes all details of the project.

1. INITIAL SITUATION IN THE PAINT LABORATORY

Following the recommendations of the Standards Bureau Adviser, it was found that the paint laboratory has been located on the ground floor of the Bureau building in rooms 3, 5 and 6. In room 3, which is shared with the textile laboratory, the salt-spray chamber and the carbon-arc weatherometer equipment were installed. The xenotest, which is used mostly for testing textiles but may also be employed for accelerated paint testing and determination of fastness to light of pigmented coatings, was installed later in the same room.

The other instruments for paint testing, bought both from the UNDP and the Government funds, were located in room 5 (so-called wet testing room had not been equipped on the expert's arrival as recommended in Dr Thulin's report).

The equipment, with a few exceptions, had been installed and connected to the electrical, water and sewage systems.

Mr J. Perbhoo, a chemical engineer, was the expert's counterpart as regards paint activities, but no technician was employed during the expert's mission.

2. IMMEDIATE FINDINGS AND RECOMMENDATIONS

To start testing activities in the paint laboratory some immediate recommendations were formulated, which involved:

- (a) Installation work to equip room 6 for liquid paint testing, application and drying (conditioning);
- (b) Procurement of test panels made of suitable materials;
- (c) Purchasing of auxiliary materials (solvents, brushes, rollers, chemicals etc);
- (d) Purchasing of books, journals and additional standards;
- (e) Purchasing of additional equipment;

(f) Finding a close contact with paint manufacturers and consumers to establish the range and structure of paint production, possibilities and range of testing and standardization as well as priorities in the MSB paint laboratory activities.

(a) Installation

As the permission to locate spray-hood outside of the MSB building was not obtained the arrangement in Room 6 was modified to install laboratory dry-spray booth in this room. Scaffolding system for test panels was designed, purchased and installed. Benches covered with stainless steel sheets and shelves were installed and connected to water and sewage systems. Outputs of extractor and inlet fans were calculated to ensure 5-6 air exchanges in the room per hour ($500-600\text{m}^3/\text{hour}$). An analysis of the climatic conditions was carried out on the basis of meteorological data given in Dr Thulin's report and from the textile laboratory records. The standard test conditions for paint testing were consequently established as $25 \pm 2^\circ\text{C}$ and $75 \pm 5\% \text{RH}$. These test conditions were later confirmed by the technical committee on protective coatings (meeting in December). It was also found that there are great daily variations in humidity up to 18% RH. Wooden frames to support test panels in vertical, inclined or horizontal positions were designed and appropriate type of a spray-booth selected.

To complete installation work it is necessary:

- to install two extractor fans in upper window corners (each fan having output $300\text{m}^3/\text{h}$) as it was agreed with the supplier (Doger de Speville),
- to install an air filter and inlet fan (Searl Bush type - supplied by Doger de Speville) together with an opening in the external wall,

- to install a dry spray-booth to be supplied by the True Brothers (England) - see Appendix III,
- to install instruments for the measurement of temperature and humidity,
- to install testing equipment (and auxiliary materials) as listed in Appendix I; the list of equipment to be installed in room 5 is given in Appendix II; both lists involve existing instruments and equipment to be purchased as specified in Appendix III,
- to install an air-conditioning unit (21-25°C, 65-75% RH) in Room 5,
- to improve ventilation in Room 3.

(b) Test Panels

The selection of test panels was made on the basis of general practice, ISO recommendations (ISO 1514 - 1973) and construction materials most frequently used in Mauritius. For example, instead of generally recommended wood and gypsum plaster panels, hot dip galvanised sheets and asbestos-cement panels were selected as typical for the country. The latter should follow ASTM requirements (density 1.6-1.7 G/Cm³, water absorption below 21%). The basic test panels dimensions and materials that should be readily available in the paint laboratory are listed below.

<u>Material</u>	<u>Thickness(mm)</u>	<u>dimensions(mm)</u>
Mild (low carbon) steel	0.7-1.0	100 x 150
Aluminium(Al 99.9)	0.7-1.0	100 x 150
tin plated steel	0.3-0.4	75 x 100
glass	4.0-6.0	150 x 100 300 x 100

<u>Material</u>	<u>Thickness(mm)</u>	<u>dimensions (mm)</u>
Hot dip galva- nised steel sheet (also corrugated)	0.6-1.2	150 x 100 300 x 100
Asbestos cement (according to ASTM)	3.0-5.0	150 x 100 300 x 100 300 x 300

Most materials have been purchased on the local market. Some of them should be cut to proper dimensions. The number of test panels required for the nearest year activity in the paint laboratory is as follows:

-	Number of test panels
- glass panels	100
- asbestos cement	200
- hot dip galvanised	150
- tin plated steel	50
- aluminium	75
- mild steel	150

Mild steel panels after cutting, rounding edges and corners should be kept in anticorrosion mineral oil to avoid pitting corrosion.

Galvanized, aluminium and tin plate should be protected against direct action of water and highly humid air by wrapping in waxed paper or filter paper (for short period of time).

Other more detailed requirements for test panels are given in the draft standard MS 102: Part A3. For outdoor exposure testing involving also fungal testing, larger panels 100 x 300 and 300 x 300 mm should be used.

(c) Auxiliary materials

The following auxiliary materials have been ordered (mostly delivered) and should be kept at hand in the paint laboratory:

- Solvents in the amount of 5-10L each (white spirit, toluene, benzene, acetone, n-butyl alcohol, ethanol, ethylene glycol monobutyl ether, cyclohexanone, ethyl acetate, kerosene, xylene, amyl acetate, ethyl ether, petroleum ether 40-60°),
- rollers (150, 250 mm, in width),
- brushes (2.5, 5.0 and 10 cm in width),
- soft-hair (camel) brushes,
- Moresst hiding power charts (500 cards)
- Moresst polyester films (200 films)
- standard oil having viscosity 10 to 15 cP at 25°C for calibration of viscometers,
- spatulas, paddles -(different sizes suitable for 1 and 4 litres containers),
- 1.0-1.2mm carborundum grit for vacu-blast cleaning equipment (200 kg),
- potassium dichromate for cleaning glassware and chromating of aluminium test panels,
- silicon carbide abrasive paper of grain size 220 and 320 (200 sheets A4 each type),
- glassware typical for paint laboratory (glass jars, Dean and stark flasks, condensers and receivers).
- cotton wool, rags, etc.

(d) Books, Journals, Standards

A list of more important books on paint materials and coatings was prepared (Appendix IV). Those encircled should be ordered and particularly The Gardner and Sward Paint Manual. A list of more important journals on the same subject is given in Appendix V. Two journals (Paintindia and Paint Manufacture) have been ordered. For information purposes a list of suppliers of equipment for paint laboratories (Appendix VI) was also prepared and almost all catalogues collected. This will enable

the MSE to advise paint manufacturers and consumers in the country on the possible sources of supply to follow standards requirements.

Additional standards (AS, SABS and especially English translations of DIN) should be ordered (in the field of paint testing) as well as ASTM standard set of photographs for assessment of fungal test results.

(e) Additional equipment

A list of additional equipment required for the paint laboratory was prepared (Appendix III). The requisitions have been forwarded to UNIDO for further action.

The suitability of Erichsen instrument (UNO82) originally purchased for the mechanical laboratory, should be examined for cupping test for paints (MS 102: Part E2) and eventually the machine should be installed in Room 5.

For certain tests (pigment content, coarse particles, etc.) equipment and glassware installed in the Chemical Laboratory (centrifuge, balances, distillation apparatus, ovens, etc.) can be used.

(f) Paint manufacturers in Mauritius

There are five paint manufacturers in Mauritius (Mauvilac, Mauroco, Blanche-Birger, Mauritius Paints and Mahebourg Paints) and visits were arranged to each of them to become acquainted with the manufacturing equipment, range of products, testing facilities, etc. One of them (Mahebourg Paints Ltd) produces only so-called lime paints while Mauroco Ltd manufactures mainly bituminous materials for roads, parkings, etc. The biggest paint manufacturer in Mauritius is Mauvilac Co. Ltd offering also the widest range of products.

The production is based on foreign licences and all raw materials are imported from well-known manufacturers. Equipment is rather simple, as no sophisticated manufacturing processes are required for such products as emulsion paints but modern. From the above points of view, the basic conditions to manufacture good quality paints are fulfilled.

It was not possible to obtain figures on the paints production in Mauritius and their import. However, from the visits to each factory and the equipment installed it can be deduced that after excluding lime and bituminous materials the total paint production is about 3,200,000 litres/year, i.e. approximately 4,000 - 4,500 thousands kg/year. Assuming the average price is equivalent to most frequently manufactured product (emulsion paints), i.e. 14 rupees/litre the total value of paints manufactured in Mauritius is about 45 million rupees/year. One has also to add the value of the import to obtain the value of products consumed each year in the country. The above calculation is based on the personal assessment of the expert and the prices prevailing in December, 1977.

It was also found that, 50-60% of paint production consists of emulsion paints. Therefore, in testing and standardization activities of the paint laboratory at the MSB, the highest attention has been given to emulsion paints. Testing facilities at the paint manufacturers' laboratories were found insufficient to follow the requirements of future standards and an effort should be made to equip gradually these laboratories as new standards will be established.

A meeting of the technical committee on protective coatings, involving representatives of all the above paint manufacturers as well as paint consumers was organized in December 1977 to discuss the above problems and two first draft standards on emulsion paints.

It was also proposed to increase the number of representatives of the paint consumers in the committee. This should involve an additional representative of the Ministry of Works, and representatives of the architects society and a shipyard painting shop.

3. TRAINING AND TESTING

As it was mentioned before, the equipment in the paint laboratory was installed. A few re-arrangements only and the connection of the weatherometer and the salt spray chamber to the de-ionizer were necessary. Before putting into operation, each instrument was again inspected and tested on blank samples. Training was carried out on the basis of the urgent requirement for testing and standardization of emulsion paints manufactured in Mauritius. Two, one-gallon samples, of the emulsion paints manufactured by Blanche-Birger, Maurco, Mauritius paints and Mauvilac were collected directly from the factories' warehouses and a testing chart based on the requirements of prepared draft standard (MS 104: 1978 "Emulsion paints for exterior use") was developed. Comparative testing of four above points was then carried out using the available equipment. The results are shown in Appendix VII (Table 1). It was not possible to include the results of fungal test and outdoor exposure as the duration of these two tests is 6 and 18 months, respectively. However, accelerated testing using the carbon-arc artificial weatherometer programmed according to MS 102: 1978: Part F2 (draft standard) has been started. It is not recommended to present the results of comparative testing to the paint manufacturers before appropriate Mauritius Standards have been fully established.

The above activities can be regarded only as the first stage of training limited the short-time of expert's stay, the one type of paints being tested (no solvent paints were tested due to the lack of safety precautions in Room 6)

and available equipment. It is recommended to arrange a second stage of training abroad (within the project follow-up scheme) and the third stage of training at the MSB after finishing all the installation work in Room 6 and the delivery of additional equipment. This third stage of training should be connected with the next arrival of UNIDO paint expert as there are still four man/months available in the project budget in this field. It is absolutely necessary to employ a full-time technician before the third stage of training.

4. PAINT STANDARDIZATION

Taking into consideration the total paint production in Mauritius and the variety of products manufactured, efforts of previous experts to establish paint standards and complaints about quality of paints, it was decided to prepare a number of standards on paint products and their testing. It was assumed that first two standards should cover terminology and test methods to create basis for standards covering ready mixed products. As both terminology and methods of testing are covered by a number of national and also IEO standards cooperation was established with the British Standards Institution and permission obtained to adopt British Standards. This permission involves also other than paint testing and terminology standards but is extremely useful in the case of the latter as above-mentioned British Standards are internationally recognized and are the basis of the majority of ISO Standards on paint testing.

The Mauritius Draft Standard MS101:1978 "Glossary of paint terms" is in general a simplified form of BS 2015:1965 and covers approximately 80 basic definitions which enables to find a common language betw on paint manufacturers and consumers when describing product, its behaviour, properties and testing. Approval of this standard is expected on the next meeting of the technical committee on protective coatings and masters of photographs showing paint coatings

failure will be delivered by the British Standards Institution soon, so that this standard can be established in Mauritius in 1978.

The Draft Standard MS 102:1978 "Methods of test for paints" is based mostly on ISO standards but about 10 parts had to be drafted additionally to include testing other properties typical for Mauritius. This is a very comprehensive standard, over 100 pages, but from now on reference can be made to this standard in other paint standards on ready-mixed paints. Additionally, this standard will enable paint manufacturers to equip themselves gradually with necessary testing facilities. Test methods specified in this standard are listed in Appendix VIII.

The preparation of above two standards enabled drafting two other standards, i.e. MS 103:1978 "Emulsion paints for interior use" and MS 104:1978 "Emulsion paints for exterior use". As it was mentioned in section 3f, (these standards cover 50-60% of total paint production in Mauritius. Therefore, attention was given in the course of preparation of these standards to introduce available methods of testing and equipment as both products are widely used by individual consumers. The draft standards MS 103 and MS 104 were discussed on the technical committee meeting in December 1977 and then approved on the next committee meeting in February. Approval of MS 101 and MS 102 is expected at the beginning of March. All four standards, should then be passed to the Standards Council for final approval and public announcement.

The paint laboratory is sufficiently equipped to follow the requirements of both standards on emulsion paints as regards the laboratory testing (see Appendix VII). However, there are no facilities enabling long-term outdoor tests such as resistance to fungal growth and outdoor exposure. Both tests can be accelerated in laboratory conditions but require considerable experience, expensive equipment and the results are never as reliable as those obtained under natural climatic conditions. On the other hand, their importance is not only limited to emulsion paints but involve all paint and organic coating materials as well as anticorrosion metallic

materials. Therefore, it is strongly recommended to establish in Mauritius at least two outdoor exposure stations. The one may be located on the roof of the MSB building aiming mostly at outdoor exposure durability of paint coatings and general corrosion protection examinations. The second should be located in the area of "High-Plateau" characterized by considerable rainfall and suitable conditions for fungal growth. Taking into consideration necessity of regarding such meteorological data as temperature, humidity, rainfall, wind speed, etc. the most suitable place would be the area of meteorological station in Vacoas.

As regards the conduct of fungal test cooperation was initiated with the Pathology Laboratory (Mr Ricuad) of Mauritius Sugar Industry Research Institute (MSIRI) and the assessment of results should be based on photographic prints recommended by ASTM D5274-76. These prints have been ordered. The detailed procedure on the conduct of outdoor exposure testing is given in the Draft Standard MS 102:1978 Part F4 "Notes for guidance on the conduct of natural tests". The inclination of test panels should be 45° facing north.

The next paint standardization activity should be concentrated on the following subjects.

- primers for galvanized steel (etch primer-two-component, calcium o-plumbate and zinc chromate)
- red lead primer for structural steel,
- high-gloss enamel for general use.

The above-listed materials are used most frequently, next to emulsion paints. There is a considerable production of bituminous materials in Mauritius. They are used mainly for roads and parkings area but as the methods for their testing are very similar to the methods of testing of paints, preparation of standards on these materials should be taken into account.

It was also found that there is a lack of sufficient knowledge in paints selection and application. Therefore it is recommended, apart from standards, to prepare codes of practice.

In the first stage such codes of practice should involve painting of buildings, painting of galvanised steel and inspection of paint work.

It is also recommended to increase the number of representatives of paint consumers in technical committee on protective coatings.

5. CORROSION PROTECTION

There are two main causes of severe atmospheric corrosion of metals (steelwork) - atmospheric pollution and high relative humidity, characteristic for tropical countries (German Standard DIN 50019 defines tropical climates as those having a monthly average temperature exceeding 20°C together with a monthly average relative humidity exceeding 80%). Atmospheric pollution is caused either by the products of combustion or by sea salts near the coast. Both atmospheric pollution and high humidity are causes of abnormally high corrosion rate. It is rather difficult to assess corrosion aggressiveness of the Mauritius atmosphere without preliminary exposure of test samples. However, one can expect very high corrosion aggressiveness in a narrow strip (not more than 500 - 2000m) along the coast and medium high corrosion rate, characteristic for subtropical countries, inland.

It would be also considered that loss of gloss and chalking, due to high solar radiation, occur in Mauritius more rapidly than in European countries and mould growth is common in certain areas (high plateau) of country. The latter affects mainly decorative aspect of the paint system but sometimes may also impair its protective value.

It results from the above that particular attention should be paid to the protection of harbour installations and other structural steelwork erected close to the coast. In this case, it should be remembered that ordinary paint coatings will not protect steel adequately even when applied to a blast-cleaned surface. The best, but still only partially satisfactory results, can be obtained from high build coal tar pitch/epoxide paint systems or bitumen coatings with

a dry film thickness of at least 500 nm in all cases. But the recommended solution is to use zinc or aluminium coating beneath the paint system. Zinc coatings (hot dip galvanizing) are more useful inland while aluminium coatings (especially sprayed ones) should be preferred in the area of salt-laden breeze. The paint system should consist of a pretreatment primer (etch primer), a good zinc chromate primer and at least two coats of aluminium or micaceous iron oxide paints. In the case of roofing and wall cladding, resistant and highly decorative coatings can be obtained by the usage of coil-coated galvanized steel sheets.

Apart from the narrow strip along the coast, paint systems would provide satisfactory protection of structural steel provided repainting is carried out every 4-5 years and the paint system is applied on a well-prepared (grit-blasted) surface. As this is a rather expensive operation, preference should be given to zinc coatings applied usually by the hot dip galvanizing process. However, to obtain durability of the order of 25-30 years, galvanized steel should also be painted.

As galvanized steel is already quite extensively used in the country and import of this product, especially in the form of corrugated sheets, is considerable, it was decided that priority in standardization in this field should be given to hot dip galvanized steel. As a result three draft standards were prepared entitled as follows:

- MS 118:1978 "Hot dip galvanizing of steel and iron articles-
Guiding principles and general requirements"
- MS 119:1978 "Hot dip galvanized plain steel sheet-General
requirements"
- MS 120:1978 "Hot dip galvanized corrugated steel sheet
for general purposes."

The first standard (MS 118) is directed to the two existing galvanizing shops in Mauritius and importers of galvanized steel and iron articles. It specifies minimum zinc coating thickness, methods of testing and outlines general principles of the process. In this aspect the standard is closer to the code of practice.

The second standard (MS 119) is directly for importers and consumers as there is no steel sheet or coil galvanizing plant in Mauritius. However this product is quite often used in the country and one of the local firms applied for the erection of corrugation plant based on imported galvanized plain sheet. The standard specifies basic requirements both for the base metal and the zinc coating (in metric units) and also the minimum thickness of zinc coating taking into account the climatic conditions in Mauritius. The third standard (MS 120) deals only with galvanized corrugated steel sheet used for such general purposes as roofing, siding and tankmaking. This kind of product is most frequently used in the country. However, the product is imported from many countries and it was necessary to standardize again the thicknesses of the zinc coating as well as pitch and depth of corrugation, and dimensions of sheets for building purposes.

All the above three draft standards have been prepared and should be discussed on the joint meeting of technical committees on protective coatings and construction materials. Special consideration in discussion should be given to rationalization of thickness of the base metal taking into consideration certain precautions that may be connected with building requirements in cyclone areas (fasteners, overlapping, etc.)

It is recommended that the next standard in this field should be prepared for various fasteners. This is extremely important to specify the requirements for fasteners as these are usually the weak points of structure. Moreover, unprotected fasteners in contact with large areas of galvanized steel undergo very rapid corrosion as the whole corrosion current is concentrated on small fasteners (anodic areas) instead of large areas of sheet (cathodic ones). In reverse, corrosion of fasteners decreases considerably their mechanical strength.

In this respect, zinc coatings are again the best protection for fasteners and there is one modern electroplating shop (at the factory manufacturing water taps) that could easily apply electroplated zinc coatings on most fasteners used in the country. For larger fasteners used, for example, for steel structures, hot dip galvanizing, sherardizing, metal spraying or even zinc-rich paints might be suitable and economical method of protection.

Testing of metal coatings may be carried out in the MSB paint laboratory using salt-spray and humidity chambers and also at the outdoor exposure stations mentioned in section 5. Special consideration should be given to the usage of such finished product as galvanized and painted steel in coil-coating lines. This product combines both durability and highly decorative appearance, particularly important factors on external wall and roof cladding. While it may be considered as advantageous to open corrugation facilities in Mauritius, it is not recommended to erect galvanizing plant for plain steel sheets as this product can be economically and good quality manufactured only on big coil-coating lines having output above 30,000 tons/year.

6. CHEMICAL TESTING AND STANDARDIZATION

There were several important reasons to start the activities of the chemical laboratory at the Mauritius Standards Bureau. On one hand the list of products to be urgently standardized developed in September 1977 after consultation with the Ministry of Commerce and Industry and later also with the National Consumers Council involved several products requiring chemical testing and analysis. On the other hand, there were available testing facilities (laboratories, equipment, some glassware and chemicals), counterpart chemist (Mr R. Gopaul) was appointed at the end of December 1977, an assistant technician was available, results obtained from foreign laboratory on testing soaps and detergent were unclear and no foreign expert was available or to arrive in a short period of time.

Priority has been given to testing and standardization of commonly used products such as soaps, detergent and toothpaste.

Simultaneously, it was proposed to create a new technical committee on chemical and related products which would be able to deal in future also with food and dairy products. This was approved by the Standards Council and the first meeting of new committee was held in February 1978. The technical committee (TC 8) on chemical and related products may form subcommittees to deal with various specific products. The main role of subcommittees will be preparation of draft standards. It is recommended to include manufacturers of particular products into the subcommittees.

After some preliminary testing of soaps and detergents, the main purpose of which was to verify results obtained in the British laboratory (H. Stanger) and to select most suitable methods of testing, five draft standards were prepared to start activity in this field and to prepare material for discussion at the technical committee meeting. These draft standards involved:

MS 111:1978 "Synthetic laundry detergent powder for household use"

MS 112:1978 "Toilet soap"

MS 113:1978 "Hard laundry soap - pure type"

MS 114:1978 "Hard laundry soap - built type"

MS 115:1978 "Toothpastes".

Cooperation with the manufacturers of detergent and soaps was established and in fact the draft standard on detergent powder was agreed. All the three draft standards on soaps were preliminary discussed. As there is no special competition in manufacturing these types of products in Mauritius, it is recommended to establish close cooperation with the manufacturer in case of every product to be standardized. On the other hand, these standards should also involve quite important amounts of products which are imported.

The draft standard on toothpaste is a specific one as special consideration has to be given to health and even toxicity requirements. Therefore, specified methods of testing are rather sophisticated and it is recommended that certain analysis such as heavy metals content and abrasive properties should be carried out by officially authorized foreign laboratories. This will probably be the case for other products to be standardized in the future, too.

The draft standards MS 111 and MS 112 were discussed and approved on the first meeting of technical committee on chemical and related products, approval of three others is expected on the second meeting.

The above described testing and standardization activities connected with building a comprehensive stock of chemicals and glassware are only the starting point for the chemical laboratory. There is a considerable variety of other products to be standardized (including food and dairy products), and this laboratory will also deal with chemical aspects of analysis of such products as metal coatings paints, rubber, plastics, etc. Therefore, the Government action to appoint foreign expert in chemical analysis is urgently required. The expert is expected to have considerable experience in general chemistry, food and dairy products but also modern methods of physico-chemical analysis including gas chromatography, polarography, atomic absorption spectroscopy, etc.

The list of all draft standards prepared by the expert during mission is given in Appendix IX for follow-up purposes.

7. RECOMMENDATIONS

It is recommended to the Mauritius Standards Bureau:

- (a) To complete all installation work in the paint laboratory rooms and other purchasing on local and foreign markets as specified in detail in sections 3a to 3d of the report.
- (b) To purchase additional equipment (from UNIDO funds)
- (c) To employ a full-time technician in the paint laboratory and additional technician in the chemical laboratory.

- (d) To secure training facilities for chemical engineer chemist responsible for the paint and chemical laboratories (within project fellowship funds).
- (e) To continue standardization activity for paints so that the four draft standards already prepared and discussed could be established in 1978.
- (f) To start testing and standardization of other ready-mixed paints with particular attention paid to those listed in section 4.
- (g) To continue standardization activity in the field of galvanized materials by joint action of technical committees on protective coatings and construction materials.
- (h) To start drafting standard on zinc-coated fasteners for galvanized steel sheets and structures.
- (i) To establish two outdoor exposure stations in Reduit and Vacoas for testing paints and other anticorrosion materials. Testing procedure should involve resistance to fungal growth in Vacoas station.
- (j) To recommend to the Ministry of Commerce and Industry that attention should be given to the adequate corrosion protection of new investments in the country with particular attention to harbours installations and those located close to the coast.
- (k) To continue testing and standardization activity for consumer products, in cooperation with the National Consumers Council. To pass remaining draft standards on soaps, and toothpaste through the technical committee to establish them in 1978.
- (l) To start testing and standardization activity for other chemical and related products as listed on the planning chart in September 1977.
- (n) Foreign expert in chemical and food analysis and standardization is urgently required.

(n) To continue cooperation with the British Standards Institution in view of their willingness to give permission for free adoption of British Standards. However, the adoption should be made carefully taking into considerations local conditions and requirements.

The work plan for paint laboratory is given in Appendix XI and for chemical laboratory in Appendix XII.

List of testing equipment and auxiliary materials to be installed in Room 6 (existing and to be purchased)

Inventory or requisition number	Name of instrument (equipment)	Installation requirements
UN 045 A, B, C, D	Ford flow cups	thermostated
UN 047	Wet film thickness gauge	-
UN 048	Pfund cryptometer	-
UN 051	Storner viscometer	thermostated, 220V/50H2, single phase
G 1024 A, B, C	Film applicators	-
G 1022	Grindometer	-
	Weight per gallon cup	-
78/2	Laboratory dry spray-booth	masonry opening, exhaust ducting, 380/50H2 three phase, flameproof motor
-	Compressor	80-100 psi, 2500 l/min
-	Spray-gun	compressor, air filter and regulator
-	Paint brushes	-
-	Paint rollers	-
78/6-11,12	Sag index applicator	-
78/6-13	ICI paint film spinner	220v/50H2, single phase
-	Paint sieves	220v/50H2, single phase for shaker
78/8	Sampling equipment to hold 500 and 1000 ml samples	-
-	Spatulas	-
-	Mechanical stirrer	220v/50H2, single phase
78/5	ICI Cone and plate viscometer	220v/50H2, single phase (thermostat built-in)
78/4	Portable blast-cleaning unit	Compressed air 60 psi. 1/2 inch line up to unit
-	Test panels, solvents, etc.	-
UN 078	Pensky Martens cup	gas supply

List of testing equipment to be installed at
Room 5 (existing and to be purchased)

Inventory or requisition number	Name of instrument (equipment)	Installation requirements
UN 014	Dry thickness meter (Elcometer type)	-
UN 046	Mandrel bending set	-
UN 049	Scratch hardness tester	-
UN 050	Ball jet shaft	-
UN 052	Taber abrasion tester	220v/50Hz, single phase (through transformer)
G 1003	Cross-cut adhesion tester	-
G 1021	Washability and wet abrasion tester	220v/50Hz, single phase
G 1001 A,B,C	Glossmeter with three heads (20°, 60°, 85°)	220v/50Hz, single phase)
G 1023	Drying-time tester with Ballotini	-
78/1-7	Reflectometer	220v/50Hz, single phase
78/1-1,2,3	Munsell book of colour	-
78/1,4,5,6	Colour-booth matching	220v/50Hz, single phase
78/2-1-6	Leptoscope 2011 thickness meter (electromagnetic)	220v/50Hz, single phase (also battery operated)
78/6-1,2	ICI, temp. viscosity calculators	-
78/6-3	Tubular impact tester	-
78/6-4,5	Scratch resistance tester	-
78/6-6	Conical bend tester	-
78/6-7,8	Hardness rocker	-
78/6-10	Payne permeability cup	-
78/7-1	Paint inspection gauge	220v/50Hz, single phase
78/7-22	Roughness gauge	-
-	Analytical balance	220v/50Hz, single phase
-	Dean and stark apparatus	water/oil bath

APPENDIX III

List of additional equipment for the paint laboratory

This appendix reproduces copies of the requisitions forwarded to UNIDO numbered 78/1 to 78/8 for the paint laboratory for follow-up purposes. A few other instruments for this laboratory (analytical balance, sieves with shaker and mechanical stirrer) are included in other UNIDO and Government requisitions for the chemical laboratory (general purposes).

In addition, an air compressor with a pressure-levelling vessel should be procured by the Government, if possible from the local market. The compressor should deliver min. 2000 l/min of compressed air at a pressure of 80-100 psi (5.6-7.0 kgf/cm²). The compressor will be used to operate the portable cleaning unit (req. no. 78/4) and a spray gun.



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

PAGE 1 OF 1

REQUISITION NUMBER 78/1

Activity Code

MISPI No.

Date 10 February 1978

LOCAL PURCHASE REQUESTED []
BY EQUIPMENT PURCHASE []

MAURITIUS STANDARDS BUREAU

Title of Project

S.A. Thulin *S.A. Thulin*

Project Manager/Requesting Officer

Project Number DP/MAR/75/008

Sub-Contracts 21-

Expendable Equipment 41- 0

Non-Expendable Equipment 42- 0

Premises 43- 0

Check appropriate box

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC: Received Returned

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
1	1	ea	Glossy Finish Collection type CR- 4A	415
2	1	ea	Supplementary 80- Hue colors type CR- 4B	44.50
3	1	ea	Matte Finisg Collection type CR - 4B	335
4	1	ea	Macbeth Color Matcher model BDX-324, Executive(portable)	825
			Gardner cat no. CR-E3B -- 2 for 230 V 50 Hz complete with incandoescent and north sky illumination lamps	
5	2	sets	Spare lamps for above for incandescent illumination	10
6	1	set	Spare lamps for above for north sky illumination	20
7	1	ea	Complete Colorgard digital reflectometer system for 230 V 50 Hz mains, Gardner Cat No. RG-4501-B	1055
8	5	ea	Spare lamps for above type CR-7200	11
			Estimated air freight	300
			Supplier: Gardner Laboratory	
			Box 5728 (telox No. 089-417)	
			5521 Landy Lane	
			Bethesda, MD 20014, USA	
			TOTAL	2016

SPECIAL INSTRUCTIONS:

Ship Via Air To: Resident Representative of United Nations Development Programme
 For: Mauritius Standards Bureau



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

PAGE 1 OF 1

REQUISITION NUMBER 78/2

Activity Code

MISPI No.

Date 10 February 1978

LOCAL PURCHASE REQUESTED [] HEADQUARTERS PURCHASE [x]

MAURITIUS STANDARDS BUREAU Title of Project S.A. Thulin Project Manager/Requesting Officer

Project Number DP/MAR/75/003 Sub-Contracts [] 21- [] Expendable Equipment [] 41- 0 1 Non-Expendable Equipment [x] 42- 0 1 Premises [] 43- 0 1 Check appropriate box

CLEARER (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC Received Returned

Table with 5 columns: Item, Quantity, Unit, Description, Specifications, Catalogue Number, Reference to Project Document Component, Est. Cost in US dollars. Includes items like Dispo Spray Booth, fan outlet guard, flame proof motor, Dispo filter rolls, and Spare manometer.

SPECIAL INSTRUCTIONS:

Ship Via Surface To: Resident Representative of United Nations Development Programme.

For: MAURITIUS STANDARDS BUREAU



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (ICD/PAC)

REQUISITION NUMBER 78/ Activity Code MISPI No. Date 10 February

LOCAL PURCHASE REQUESTED HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU Title of Project S.A. Thulin Project Manager/Requesting Officer

Project Number DP/MAR/75/008 Sub-Contracts Expendable Equipment Non-Expendable Equipment Premises

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

ICD/PAC Received Returned

Table with 5 columns: Item, Quantity, Unit, Description, Specifications, Catalogue Number, Reference to Project Document Component, Estimated in US\$

SPECIAL INSTRUCTIONS:

Ship Via To: Resident Representative of United Nations Development Program

For: MAURITIUS STANDARDS BUREAU

July 1975

Target Date:



UNIDO

REQUISITION FOR
EQUIPMENT/SUPPLIES/PUBLICATIONS
OR CONTRACTUAL SERVICE
(IOD/PAC)

PAGE 1 OF 1

REQUISITION NUMBER 78/4

Activity Code

MISPI No.

Date 10 February 1978

LOCAL PURCHASE REQUESTED
HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU
Title of Project
S.A. Thulin *S.A. Thulin*
Project Manager/Requesting Officer

Project Number DP/EAR/75/003
Sub-Contracts 21-
Expendable Equipment: 41- 0 1
Non-Expendable Equipment 42- 0 1
Premises 43- 0 1
Check appropriate box

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC: Received Returned

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Est. cost in US dollars
1	1	ea	Portable blast cleaner type Bluetomatic complete with dust container and accessories including 2 sets of available sizes of air jets and nozzles	400
2	200 kg		Aluminium oxide grid, 40 mesh	200
			Estimated sea freight	250
			Supplier: Centralbolaget for Kemiska industrier Kustelundsgatan Vasterljung S-15014 Vagnharad Sweden	
			TOTAL	850

SPECIAL INSTRUCTIONS:

Ship Via Surface - To: Resident Representative of United Nations Development Programmes
NAIC

For: MAURITIUS STANDARDS BUREAU



UNIDO

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REQUISITION FOR
EQUIPMENT/SUPPLIES/PUBLICATIONS
OR CONTRACTUAL SERVICE
(IOD/PAC)

PAGE 1 OF 1
REQUISITION NUMBER 78/
Activity Code
MISPI No. 1
Date 10 February 73

LOCAL PURCHASE REQUESTED
HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU
Title of Project
S.A. Thulin *S.A. Thulin*
Project Manager/Requesting Officer

Project Number
Sub-Contracts 21-
Expendable Equipment 42-
Non-Expendable Equipment 42-
Premises 43-
Check appropriate

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC: Received Returned

Item	Quantity	Unit	Description, Specifications, Catalogue Number, Reference to Project Document Component	Estimated cost in US dollars
1	1	ea	ICI cone and plate viscometer with standard viscosity range of 0 - 10 poises 0 - 10 poises at 10 000 sec ⁻¹ with three settable temperatures 20, 25 and 30 °C ± 0.2 °C	1000
2	2	ea	Spare cones for above	110
			Estimated air freight	15
			Supplier: Research Equipment(London) Ltd 64 Wellington Road Hampton Hill Middlesex TW 12 1JX United Kingdom	
			TOTAL	1232

SPECIAL INSTRUCTIONS:

Ship Via ~~Surface~~ Air To: Resident Representative of United Nations Development Program

For: MAURITIUS STANDARDS BUREAU

Transit Date: July 1973



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

PAGE 1 OF 1 REQUISITION NUMBER 78/6 Activity Code MISPI No. Date 10 February 1978

LOCAL PURCHASE REQUESTED HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU Title of Project S.A. Thulin Project Manager/Requesting Officer

Project Number DP/MAR/78/003 Sub Contracts Expendable Equipment Non-Expendable Equipment Premises

CLEARED (SUBST. OFFICE) Name Section Date

CERTIFIED (FIMS) Name Section Date

IOD/PAC Received Returned

Table with 5 columns: Item, Quantity, Unit, Description, Specifications, Catalogue Number, Reference to Project Document Component, Est. cost in US dollars. Rows include items like ICI temperature viscosity calculator, Tubular impact tester, Hand operated scratch tester, etc.

SPECIAL INSTRUCTIONS:

Supplier: Sheen Instruments(Sale) Ltd

Sheendale Road Richmond Surrey TW9 2JL United Kingdom

Ship Via Air To: Resident Representative of United Nations Development Programme

MAURITIUS STANDARDS BUREAU

For: (blank lines for recipient details)



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

PAGE 1 OF 1 REQUISITION NUMBER 78/ Activity Code MISPI No. Date 10 February 1973

LOCAL PURCHASE REQUESTED HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU Title of Project S.A. Thulin Project Manager/Requesting Officer

Project Number DP/MAR/78/008 Sub-Contracts Expendable Equipment Non-Expendable Equipment Premises

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC: Received Returned

Table with 5 columns: Item, Quantity, Unit, Description, Specifications, Catalogue Number, Reference to Project Document Component, Estimated in US dollars. Includes items like Paint inspection gauge and Roughness gauge.

SPECIAL INSTRUCTIONS:

Ship Via Special parcel post air To: Resident Representative of United Nations Development Program

For: MAURITIUS STANDARDS BUREAU

Transit Date: July 1973



UNIDO

REQUISITION FOR EQUIPMENT/SUPPLIES/PUBLICATIONS OR CONTRACTUAL SERVICE (IOD/PAC)

PAGE 1 OF 1 REQUISITION NUMBER 78/ Activity Code MISPI No. Date 10 February

LOCAL PURCHASE REQUESTED HEADQUARTERS PURCHASE

MAURITIUS STANDARDS BUREAU Title of Project S.A. Tholin Project Manager/Requesting Officer

Project Number DP/MA7/75/ Sub Contracts Expendable Equipment Non-Expendable Equipment Premises

CLEARED (SUBST. OFFICE): Name Section Date

CERTIFIED (FIMS): Name Section Date

IOD/PAC: Received Returned

Table with 5 columns: Item, Quantity, Unit, Description, Specifications, Catalogue Number, Reference to Project Document Component, Est. cost in US dollars. Includes items for sampling tools and estimated air freight.

SPECIAL INSTRUCTIONS:

Ship Via Air To: Resident Representative of United Nations Development Program For: MAURITIUS STANDARDS BUREAU Target Date: July 1973

APPENDIX IV

List of some important books on paints and corrosion protection

No.	Author	Title	Editor
①	Martens	Emulsion and water soluble paints and coatings	Reinhold
2.	Heaton	Outlines of paint technology	C. Griffin & Co.
3.	Chatfield	The science of surface coatings	Ernest Benn
4.	Blon	Organic coatings in theory and practice	Gleaver-Hane Press
5.	Seymour	Hot organic coatings	Reinhold
6.	Singer	Fundamentals of Paints Varnish and Lacquer Technology	American Paint Journal Co.
7.	Gordon	Paint and Varnish manual	Interscience
8.	Drinberg, Gurevich, Tikhonin	Technology of non-metallic coatings	Pergamon
⑨	Champetier, Rabate	Chimie des Peintures, Vernis et Pigments, Tome I and II	Dunod
10.	Tatton, Drew	Industrial Paint application	Newness
11.		Paint Technology Manuals	Chapman and Hall
12.	Zahn	Scientific Paint Evaluation	Research Press Inc.
13.	Kappelmeier	Chemical analysis of resin-based coating materials	Interscience
14.	Littlewood	Gas Chromatography	Academic Press
⑮	Gardner, Sward	Physical and Chemical examination: paints, varnishes lacquers and colours, 13th ed	Maryland Gardner laboratory Inc. 1973.
16.	Bragdon	Film formation. Film properties and film deterioration	Interscience
⑰	Bryson	Paint faults and remedies	Scientific surveys
⑱	Hess	Paint film defects	Chapman and Hall
19.	Golding	Polymer and resins-their Chemistry and engineering	Van Nostrand
20.	Davidson, Sittig	Water-soluble resins	Reinhold
⑳	Chatfield	Paint and varnish production	George Newnes

No.	Author	Title	Editors
22.	Patten	Paint flow and pigment dispersion	Interscience
23.	Mysels	Introduction to colloid chemistry	Interscience
24.	Doolittle	Technology of solvents and plasticizers	Chapman and Hall
25.	Adanson	Physical chemistry of surfaces	Interscience
26.	Durrans	Solvents	Chapman and Hall
27.	Gunstone	Introduction to the chemistry of fats and fatty acids	Chapman and Hall
28.	Eckey	Vegetable Fats and oil	Reinhold
29.	Mills	Drying oil technology	Pergamon
30.	Bockenoegen	Analysis and characterisation of oils, fats and fat products	John Wiley & Sons
31.	Dinsdale, Moore	Viscosity and its measurement	Chapman and Hall
32.	Lawrence	Painting from A to Z	Sutherland Publishing Co.
33.	Tubb, Hood	Commercial painting	Macdonald
34.	Martinson, Sister	Industrial painting-the engineering approach	Reinhold
35.	Letsky	Industrial finishes	Chapman and Hall
36.	Tysall	Industrial paints: Basic technology	Pergamon
37.	Greathouse wessel	Deterioration of Materials	Reinhold
38.	Maurin	Manuel d'Anticorrosion, Tome I and II	Edition Eyrolles
39.	Fancutt, Hudson	Protective painting of Iron	Chapman and Hall, also Dunod
40.	Shroir	Corrosion and corrosion protection (Vols.I and II)	
41.	Unlig	The corrosion handbook	John Wiley & Sons
42.	Banov	Paints and coatings handbook	Structural Publications
43.	Bidlack, Fasig	Paint and Varnish products manual	John Wiley & Sons
44.	Blanc	La peinture industrielle	Dunod
45.	-	Tropical exposure of paint	Port Huencome, California, Naval Civil Engineering Laboratory, USA.

No.	Author	Title	Editor
46.	-	Peintures sur zinc(leaflet)	Centre Technique du zinc, Paris
47.	Chanpetier, Rabate	Physique des peintures, vernis et pigments, Vol.1-2	Dunod
48.	Crown	Examination of paints and pigments	C.C. Thomas, London
49.	-	Emulsion Paint Problems: Causes and cures(leaflet)	Vinyl Products Ltd., London
50.	Fisk	Advanced paint chemistry for students of the paint and printing ink industries	Hill, London
51.	-	Physical chemistry of paints	Hill, London
52.	Gower	Plastic paint	E. FM Spon Ltd., London
53.	Harvey	Paint finishing in industry 2nd ed.	International Publications service, New York
54.	-	Education and training in paint industry	Butterworth and Co. Ltd., London
55.	-	Technology of paints, varnishes and lacquers	Reinhold
56.	Myers, Long	Treatise on coatings Vol. 1, 2 and 3	Dekker, New York
57.	Oil and Colour Chemists Assoc.	Paint technology manual 8 parts	OCCA. London
58.	Stanners	Painted metallic coatings on steel structure (leaflet)	BISRA, London
59.	-	Protecting steel with zinc dust paints(leaflet)	ZDA. London.

APPENDIX V

List of technical journals on paint coatings
and corrosion protection

<u>Title</u>	<u>Publisher</u>
1. American Painting Contractor monthly	American Paint Journal Co. 2911, Washington Avenue, St Louis, Missouri 63103, U.S.A.
(2) Australian Paint Journal monthly	Bell Publications, P.O. Box 4850, Sydney, Australia.
3. Canadian Paint and Finishing monthly	Maclean - Hunter Publishing Co. Ltd., 481, University Avenue, Toronto 2, Ontario, Canada.
4. Chimie des Peintures monthly	Chimie des Peintures, 49, Square Marie Louise, 1040 Brussels, Belgium.
(5) Corrosion Prevention and Control bimonthly	Corrosion Prevention and Control 11a Gloucester Road, London SW7, England.
6. Corrosion: Traitements, Protec- tion, finition monthly	Societe de productions documentaires, 80, route de Saint-Cloud, 92500 Rueil, France
7. Double liaison monthly	Les Presses Continentales, 40, rue de Cherche - Midi, 75006 Paris, France.
8. Industrial Finishing and Surface Coatings monthly	Wheatland Journals Ltd., 157 Nagden Lane, Watford WD1 8LW, England.
9. Journal of Paint Technology monthly	Federation of Societies for Paint Technology, 121 South Broad Street, Philadelphia, Pennsylvania 19107, U.S.A.
(10) Paintindia monthly	Colour Publications Private Ltd., 126 A Dhurwadi, Off. Dr Nariman Road, Bombay 25, India.
(11) Paint Manufacture monthly	Morgan-Grampian Ltd., 30, Claderwood Street, Woolwich, London SW 18, England.

12. **Pigment and Resin Technology**
monthly
Sawell Publications Ltd.,
4, Ludgate Circus,
London EC4M 7LE,
England.
13. **Peintures, Pigments, Vernis**
monthly
Society de productions
documentaires
80, Route de Saint-Cloud,
92500 Rueil France.
14. **World Surface Coating Abstracts**
monthly
Research Association of
British Paint, Colour and
Varnish Manufacturers,
Paint Research Station,
Waldegrave Road,
Teddington, Middlesex.

APPENDIX VI

List of laboratory equipment and testing apparatus
suppliers for paint and corrosion protection testing

1. Elcometer Instruments Ltd.,
Fairfield Road, Droylsden,
Manchester, England.
2. Research Equipment (London) Ltd.,
64, Wellington Road,
Hampton Hill,
Middlesex, England.
3. Sheen Instruments (Sales) Ltd.,
9, Sheppard Road,
Richmond, Surrey,
England.
4. Shanhope - Seta Ltd.,
Park Close, Englefield Green,
Egham, Surrey,
England.
5. Erichson GmbH,
Honor Sundwig/Westf.,
Germany.
6. Atlas Electric Devices Co. Inc.
4114 N. Ravenswood Avenue,
Chicago 13, Illinois, U.S.A.
7. Gallenkamp A and Co. Ltd.,
P.O. Box 290,
Technico House, Christopher Street,
London EC2, England.
8. Gardner Laboratories, Inc.,
Bethesda,
Maryland 20014,
U.S.A.

APPENDIX VII

TESTING CHART AND RESULTS OF COMPARATIVE TESTING OF EMULSION PAINTS

Type of paint: exterior - white	Date of delivery: December, 1977			
Supplier: Mauvillac Mauritius Mauroco Blanche Birger	Sample number			
Standard requirement	I	II	III	IV
Nil or slight	Nil	Nil	Nil	Nil
Nil or slight	1	1	1	1
Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil
Nil	Nil	Nil	Nil	Nil
	2	1	3	3
min. 50% by weight	44	43.5	47	46
max. 1% on 75 um sieve	-	-	-	p
200 - 375 grams (82 - 102 ku)	400 g or 104 ku	225 g or 106 ku	400 g or 104 ku	Jhixotro pic
Nil or slight	1	0	1	1
No signs of instability of emulsion after 12 hours	0	0	0	1
± 5% of specified	1.405	1.415	1.351	1.318
5 to 8.5	7.35	7.45	7.3	6.8
no change	-	-	-	-
No offensive odour and pass the requirements on dilution, application and recoating	-	-	-	-
to pass the test	0	0	0	0
to pass the test	-	-	-	-
to pass the test	-	-	-	-
to pass the test	0	0	0	0
max. 15 minutes	0	0	0	0
max. 3 hours	0	0	0	0
smooth and matt (flat or egg-shell gloss)	0	0	0	0
close match to specified	white	white	white	white
one month in the dark	2	1	1	3
very slight change in colour after 100 hours	0	0	0	0

Ministry of Commerce and Industry	
Mauritius Standards Bureau	Defect Code: 0 - no defect
	1 - very slight
Paint Laboratory	2 - Slight
	3 - Definite
Emulsion paint testing	4 - Bad
	5 - test discontinued
Property to be tested	
Condition in container	Water separation
	Settlement
	Irritating or offensive odour
	Lumps or skins
	Granulation
	Aeration
Non-volatile content	
Coarse particles and foreign matter	
Consistency	
Dilution stability	Foaming
	Stability
Density	
pH	
Storage stability	12 months
	2 months at 50°G
Application properties	Brushes
	Spraying
	Roller application
Recoating properties	
Drying time	Surface dry
	Hard dry
Finish	
Colour	
Resistance to yellowing and darkening	
Fastness to light	

APPENDIX VII Contd

Wet hiding power (capacity)	pfund cryptometer
Water drop test	
Resistance to wet rubbing	

min 10 m ² /litre	8	8	8	8
30 minutes without blistering, swelling, wrinkling or marked softening	0	4	0	0
100 rubs without mechanical damage	0	0	0	0

MAURITIUS STANDARD 102:1978
METHODS OF TEST FOR PAINTS

GROUP A: Tests on liquid paints

- Part A1 Sampling
- Part A2 Examination and preparation of samples for testing
- Part A3 Standard panels for testing
- Part A4 Notes for guidance on paint application
- Part A5 Determination of volatile and non-volatile matter
- Part A6 Determination of coarse particles in pigments, pastes and paints
- Part A7 Determination of consistency using the Storrer Viscometer
- Part A8 Determination of flow time by use a flow cup
- Part A9 Reducibility and dilution stability
- Part A10 Determination of density
- Part A11 Condition in container
- Part A12 Storage stability (filled container)
- Part A13 Determination of fineness of grind
- Part A14 Determination of the danger classification by flash point- Closed cup method
- Part A15 Determination of flashpoint - Closed cup method
- Part A16 Skinning (partially filled container)

GROUP B: Tests involving chemical examination of liquid paints and dried paints films

- Part B1 Determination of water by the Dean and Stark method
- Part B2 Determination of pigment content (ordinary centrifuge)

GROUP C: Tests associated with paint film formation

- Part C1 Surface drying time - Ballotini method
- Part C2 Brushing properties
- Part C3 Spraying properties
- Part C4 Properties when applied by roller
- Part C5 Recoating properties
- Part C6 Determination of film thickness

GROUP D: Optical tests on paint films

- Part D1 Colour comparison
- Part D2 Measurement of specular gloss of nonmetallic paint films
- Part D3 Comparison of contrast ratio (hioling power) of paints of the same type and colour.

GROUP E: Mechanical tests on paint films

- Part E1 Cross-cut test
- Part E2 Cupping test
- Part E3 Bend test
- Part E4 Scratch test
- Part E5 Film hardness by pencil test

GROUP F: Durability tests on paint films

- Part F1 Determination of light fastness of paints for interior use
- Part F2 Resistance to artificial weathering (enclosed carbon arc)
- Part F3 Resistance to yellowing and darkening
- Part F4 Notes for guidance on the conduct of natural tests
- Part F5 Determination of resistance to water - water immersion method.

APPENDIX IX

List of draft standard prepared by the
expert for follow-up purposes

1. MS 101:1978 "Glossary of paint terms"
2. MS 102:1978 "Methods of test for paints"
(see Appendix IX)
3. MS 103:1978 "Emulsion paints for interior use"
4. MS 104:1978 "Emulsion paints for exterior use"
5. MS 111:1978 "Synthetic laundry detergent powder for
household use"
6. MS 112:1978 "Toilet soap"
7. MS 113:1978 "Hand laundry soap - pure type"
8. MS 114:1978 "Hand laundry soap - built type"
9. MS 115:1978 "Toothpastes"
10. MS 118:1978 "Hot dip galvanizing of steel and iron
articles - Guiding principles and general
requirements"
11. MS 119:1978 "Hot dip galvanized plain steel sheet-General
requirements"
12. MS 120:1978 "Hot dip galvanized corrugated steel sheet
for general purposes"

JOB DESCRIPTION
DP/MAR/75/008/11-02/A/31.3.A

POST TITLE Expert in Testing Paints and Varnishes

DURATION Six months

DATE REQUIRED September 1977

DUTY STATION Reduit

PURPOSE OF PROJECT To assist in the organization and operation of the paints testing laboratories of the Mauritius Standards Bureau (MSB)

DUTIES The expert will be attached to the Mauritius Standards Bureau of the Ministry of Commerce and Industry and specifically will be expected to:

1. Organize and operate the paint testing laboratories of the MSB.
2. Train local counterparts in testing of paints.
3. Assist in drafting local standards for paints.
4. Assist MSB with advice in other physical and chemical testing activities in which the expert may have useful experience. Such fields cover fungal tests, corrosion protection, testing of plastics, rubber, etc.

The expert will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government on further actions which might be taken.

QUALIFICATIONS University degree in chemical engineering, chemistry or physics with extensive experience in testing of paints. Experience of standardization of paints and physical and chemical testing of polymers in general an asset.

LANGUAGE English and/or French

**BACKGROUND
INFORMATION**

The MSB was established in April 1975 through the Standards Act. The Bureau is responsible for drafting local standards based on foreign and international standards and will operate a certification scheme. The MSB will carry out most of the testing in its own laboratories.

Paints, mainly emulsion paints and primers, are locally manufactured or imported and must be resistant to the high humidity and fungal conditions prevailing in Mauritius. The MSB testing laboratories for paints consist of one room for sample preparation and drying and one room for tests on dried samples. There is also a carbon-arc apparatus for artificial weathering tests and a corrosion test facility. The paint laboratory is installed but not yet operating.

WORK PLAN FOR MR. BIRDHOOD IN CHARGE OF
PAINT LABORATORY

A. Installation work, purchases, etc.

1. To complete installation work in Room 6 with the particular attention to extractor fans and air inlet filter fan from Deger de Speville and dry laboratory spray-booth from True Brothers in England. Two openings will be necessary in the external wall and removal of double door system as well as exhaust ducting system should be designed, made and installed after arrival of the spray booth. Air compressor with a pressure vessel to feed spray gun and Educto-O-ratic cleaning unit should be installed outside of the room 6. Details are given in section 2a of the report.
2. To complete purchasing and cutting of the test panels according to indications given in section 2b.
3. To complete purchasing of auxiliary materials as specified in section 2c.
4. To follow-up purchasing of books, journals, additional standards as listed in Appendices IV, V and section 2d. Important items are the Gardner and Sward Paint Manual and photographic prints of ASTM D 3274-76.
5. To follow-up purchasing of additional equipment as specified in requisition forms in Appendix III.
6. To install wooden shelf for the 3-5L aspirator bottle at the washability equipment in Room 5.
7. To repair front panel of the water reservoir of the salt spray chamber in Room 3.
8. To follow-up making wooden supporting racks for test panels in Room 6.
9. To make good connection between de-ionizer unit and weatherometer.

B. Training, testing

1. To train a newly-appointed technician in paint application and testing, to explain to him details of operation of testing equipment.
2. To continue testing of emulsion paints following test chart and standard requirements MS 103 and MS 104.
3. To organize outdoor exposure station on the roof of the MSB building as specified in MS 102: Part F5; at first supporting racks should be ordered following the diagrams given in above standard.
4. To get permission for organizing outdoor exposure station in Curepipe or Vacoas on the area of meteorological stations with the particular attention paid to fungal tests; in this respect close cooperation with Mr Ricaud, Chief of Pathology Laboratory of the MSIRI is recommended.
5. To start accelerated testing of emulsion paints using carbon-arc weatherometer following MS 102 Part F3 recommendations.
6. After finishing the installation work in Room 6 to start testing of solvent-based paints. In the first stage, testing of red lead based primers manufactured in Mauritius should be initiated following requirements of the draft standard MS 121:1978 "Red lead based primers"
7. To become familiar with the existing chemical analysis facilities (spectrophotometry, polarography, etc) in contact with Mr Gopaul.

C. Standardization

1. To continue duties as a secretary of the technical committee on protective coatings in close cooperation with the newly-elected chairman of the committee, Mr Rochery of Ministry of Works
2. To organize next technical committee meeting at the beginning of March (1978) to obtain approval of the draft standards MS 101 "Glossary of paint terms" and MS 102 "Methods of tests for paints". Copies of MS 101 should be sent min. 10 days before the meeting,

3. In cooperation with Mr Dossa to follow-up three draft standards (MS 118, MS 119 and MS 120) on galvanized steel. As approval of these standards will be required both by construction materials and protective coatings committees it will be necessary to organize next meeting of the technical committee about 20 March 1978.
4. To complete draft standard MS 121 "Red lead-based primers" and to organize next committee meeting in April 1978 to discuss and to approve the draft.
5. To prepare, in cooperation with the technical committee the standardization programme for the next 6 months following recommendations given in section 4. An attempt should be made to start drafting code of practice on painting of buildings.

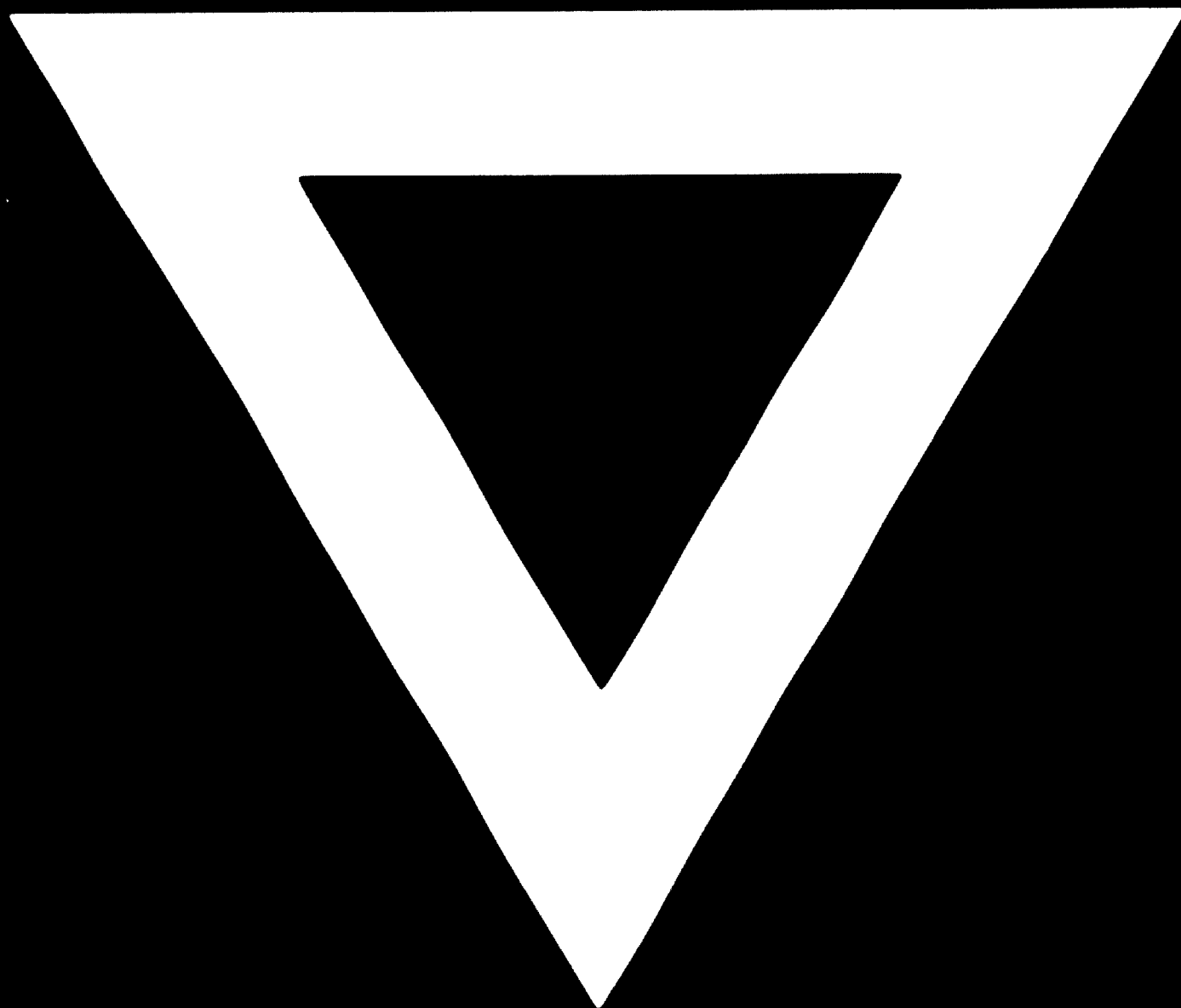
WORK PLAN FOR THE
CHEMICAL LABORATORY

This work plan involves an intermediate period up to the arrival of UNIDO chemical and food expert.

1. To follow-up purchasing of additional chemicals and glassware as listed for the chemical laboratory with particular attention to testing soaps, detergents and other chemical products.
2. To continue testing of soaps, detergents and toothpaste manufactured in Mauritius in comparison with foreign products (imported) following the requirements of draft standards MS 111, MS 112, MS 113, MS 114, MS 115.
3. To start duties as a secretary of the technical committee on chemical and related products in close cooperation with the chairman of the committee; the opening meeting of this newly-created committee was held on 14th February 1978.
4. To organize next technical committee meeting at the beginning of March to obtain approval of the above mentioned draft standards.
5. To prepare, in cooperation with the technical committee and National Consumers Council standardization programme for 1978.
6. To continue close cooperation with the manufacturers of consumers products in Mauritius.
7. To become familiar with the existing chemical analysis facilities (spectrophotometry, polarography, etc) as well as the expected ones (gas chromatography) in contact with Mr Porbhoo.
8. To start, study in the food testing and standardization programme to prepare for the UNIDO expert arrival.



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