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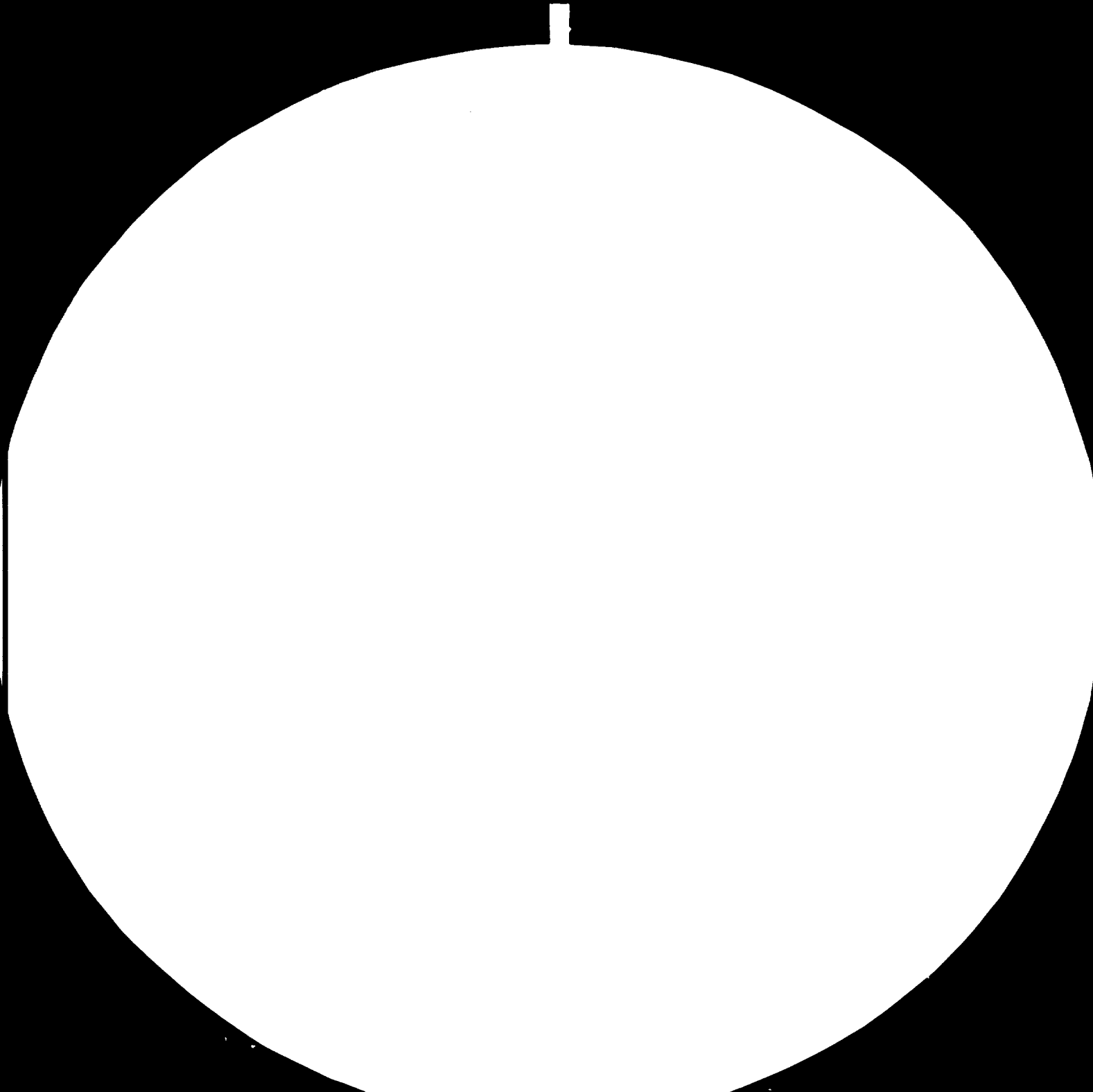
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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

10548

Restricted

31 March 1981

[Syria.] Consultant for establishing
engineering and laboratory
facilities in the area of
electrical engineering

DP/SYR/77/004/11-17/H/31.3.J

SYRIA

Prepared for the Industrial Testing Research and Deve-
lopment Centre by the United Nations Industrial Develop-
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Development Programme

Based on the work of Heinrich H. Bloebaum

United Nations Industrial Development
Organization, Vienna

This report has not been cleared with the United Nations
Industrial Development Organization which does not, there-
fore, necessarily share the views presented.

002011

I ABSTRACT

This report deals with the activities of Heinrich H. Bloebaum, Consultant in Engineering and Laboratory Facilities in Electrical Engineering, assigned under Project No. DP/SYR/77/004/11-17/H/31.3.J to the Industrial Testing, Research and Development Centre (ITRDC) between 10th January 1981 and 4th April 1981.

The activities of the Expert were carried out as per the Job Description given in Annexure 1 and the Work Plan thereunder given in Annexure 2 and the priorities of activities as per Annexure 3.

The Expert quickly found out that throughout Syria on many places and at many occasions precautions and safety rules very much are neglected. So it was decided to give first priority to testing in respect to electrical safety in general, which includes quality testing. Particular tests were started on electrical household appliances. Agreement was achieved, to collect samples from the factories and to test them. Ovens, heaters, boilers, transformers, voltage regulators and battery chargers of different kinds and makes were tested. Test reports were prepared. Safety, quality and performance was compared to the standards.

Only the most important clauses of the IEC-Recommendations were used. When necessary and when possible, recommendations for improvement of tested appliances were given.

For any other and for more tests no samples were available.

Due to several reasons, a steady, wide scale and accurate electrical testing cannot be achieved under present conditions.

Recommendations are given for to improve the situation.

The most serious problem is the lack of specialized manpower.

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II INTRODUCTION

1. Project Background

As ITRDC stands for testing, research and development in the fields of chemical, mechanical and electrical engineering it should clearly be pointed out that this report deals with development of facilities in relation to electrical testing only. For electrical research and development no qualified manpower is yet available.

The Expert was informed that the industry is requiring testing and development activities but the Centre can be fully used for this purpose after its electrical testing facilities are organized and sufficient manpower trained. As the locally manufactured products in most cases are very far behind international or common standards, it seems advisable to proceed by just adopting all the well known rules of manufacturing and testing.

This of course needs testing facilities but none for research or development.

2. Previous Experts and Equipment

For the purpose of electrical testing some previous experts have contributed a certain number of main topics.

A number of testing instruments has been purchased and is now available. Due to lack of sufficient manpower many of them are not being used. In some cases some simple items are missing.

Very special testing tools and instruments as required by IEC-Recommendations are not available. They must be purchased, when needed. The need might arise in the far future and any earlier purchase is not recommended. Instruments could be obsolete until then or IEC-Recommendations could be changed or Syria will adopt other, more simple rules.

3. Objectives of the Mission

Objectives as described in Job Description (Annexure 1) were carried out.

Special attention was given to testing of batteries, electrical cables, electrical household appliances and small motors.

Due to several reasons, as discussed later, testing of electrical household appliances was given first priority.

4. Present and Future Needs

A huge task is waiting for to be processed and many problems must be solved. On the other hand, little or nearly no specialized manpower for to cope with the problems is available at ITRDC.

Specialists cannot appear all in a sudden.

When visiting about ~~ten different factories and producers~~, the expert could not find even one reasonable specialist in the factories to talk with. Nobody expressed his technical problems, demands or wishes.

The present needs have been studied, and will be discussed under the respective chapters, especially under IV of this report.

Theoretically speaking, foreseeable needs might be located between zero and almost infinite.

Practically speaking, the expert dares no comment.

5. Cooperation of Experts

Unfortunately, the mission of the expert exactly took place at a period of time, when the Project Manager, Dr. Visvesvaraya, was absent. However, good cooperation and coordination with the other experts was achieved.

Especially with Mr. Meley, Expert for Instrument Repair and Maintenance, many technical problems were in common and one could help each other.

III RECOMMENDATIONS

1. Recommendations addressed to UNIDO

1.1 Experts

Several electrical experts were attached to the ITRDC within the last few years for short and long missions, They contributed according to their own personal experience, their individual views and other attitudes. Thus, no continuous line of progress was achieved. One expert started activities which were not followed by the others and so on.

For to achieve any reasonable results under the present circumstances, at least three electrical experts should be attached to ITRDC continuously, at least for a couple of years.

One engineer should have experience in testing and standardization, another in industrial production and maintenance. The third should be an allround technician or electrician.

1.2 Counterparts

The disposition of counterparts is a problem of ITRDC and will be discussed under para 2.2.1

However, training of counterparts by fellowships is supposed to be managed by UNIDO.

The expert knows about some German institutions, where counterparts from different countries are trained in classes and in laboratories by teachers, who know their problems and even know their projects. This seems to be a better procedure than sending the counterpart around on his own.

1.3 Equipment

Rather sophisticated instruments of all kinds are available at ITRDC. Some minor but essential items still are needed. It is rather difficult for the expert to order something through ITRDC because of the administrative procedures involved.

Technology is progressing and future experts will need some new developed instruments.

The process of purchasing should be organized as quick and as nonbureaucratic as possible by using telexes and airfreight.

In the opinion of the Expert no large scale equipment is necessary, until the real demand can be proven.

2. Recommendations addressed to ITRDC

2.1 Technical Recommendations

2.1.1 Review of Existing Facilities

As mentioned in other chapters, cables can be tested, all kinds of household appliances and similarly it should be possible, to test small motors and ballasts.

If routine tests can be organized in these fields, the present capability will be fully utilized within the next 2 or 3 years.

However, most of existing instruments like bridges, counters, transistor tester, oscilloscopes, wave generators are for advanced research purposes. They are not used until now and demand of their use will arise later.

2.1.2 Installation of Instrument in Laboratories

Most of the instruments which are neatly arranged in rows on benches should be kept in cupboards in order to protect instruments properly against dust, dirt and misuse. Only at continuous working conditions they should remain at the working benches.

As soon as an instrument is damaged or broken, immediate repair should be carried out. It should be the responsibility of the laboratory manager, to budget for this activity and to supervise maintenance and repair.

Boiling of water on gas burners in instrument rooms, even smoking in some areas, should be strictly forbidden. Humidity and combustion remainders easily can spoil precision instruments.

If instruments carry instructions for certain positioning conditions, these must be followed strictly. Precision instruments kept in vertical position can be damaged immediately, when it should be held in horizontal position only. Two instruments never should be joined together mechanically by using strong clamps between the electrical terminals. A general solution for keeping of instruments is described under 2.2.5

2.1.3 Type of New Facilities

Generally, most facilities are available.

Some tools and instruments were needed for tests according to IEC-Recommendations. The Expert prepared some constructional advice like technical drawings, which are not included to this report. Some of them were constructed in the workshop of ITRDC for instance as mentioned in the last three lines of para 3.2. Some others were too complicated for construction at ITRDC. Constructors or suppliers should be found.

Other special tools and instruments should be constructed according to IEC-Recommendations or purchased as soon as the demand arises.

2.1.4 Features of the Layout for New Electrical Engineering Laboratories

According to a general plan the drawing for the laboratory is already fixed. Internal dimensions are 17. m x 17.5m.

It is recommended to provide laboratory benches along the walls as drawn in figure 1.

Ordinary switching and distributing panels should be installed at points A.

Bench area B is supposed for preliminary cable testing. Area C is for testing of electrical household appliances. As soon as additional demand arises, more benches could be installed as shown by dotted lines (D, E, F).

The Store room should have built-in cupboards from wood, with glass windows and doors, as dust proof as possible.

2.1.5 Manuals of Instruments

As it happened, some manuals for the instruments were not available. As a general rule, one manual always should be kept near the instrument, because an user of instruments always should read the manuals carefully before using, unless or until he is fully informed by the instructions.

unless or until he is acquainted with it completely.

One other piece of the manual or a copy of it should be kept centrally, for instance in the library or in the instruments store as described under 2.2.5

2.1.6 Power Supply

Some endurance and life-time tests need continuous power supply without any interruptions. Most of the tests need an accurate or at least a stable voltage without oscillations. This is an inevitable condition for most of the tests in all sections of ITRDC.

The power is cut off very frequently and the emergency Diesel supply does not start immediately. The voltage generated is not stable, frequency is not accurate and there is a high content of distortions.

Negotiations with the suppliers of electricity should find a solution, where continuous supply of electrical power is guaranteed. A few number of cut-offs per year could be tolerated. However, several cut-offs per week are inadmissible.

If a sufficient solution cannot be reached, a system of Diesel-powered, battery-powered and electronically controlled aggregates is to be installed. This should be done centrally, for all appliances at ITRDC.

2.1.7 Maintenance of Technical Systems

As ITRDC is supposed to be an outstanding model for modern technical establishment, it should keep its own technical systems always in good order.

This indeed is not the fact.

Many technical utilities are damaged, broken or out of order.

Most of them are not maintained properly.

Specialized and trained persons should hold responsibilities for continuous function, maintenance and repair of all technical infrastructural devices under use at ITRDC.

If some persons have mastered these internal problems, their specialized help can be offered through ITRDC to any other institutions, which are facing the same problems.

The same recommendations as mentioned under 2.1.2 apply for the manuals of all technical systems used at ITRDC.

2.1.8 Standardization of Plugs and Sockets

In Syria, at ITRDC and even in one single laboratory room many different systems of sockets and plugs are used.

A Committee should be installed for to decide, which system is recommended throughout the country.

A system with earth-contact is recommended.

However, this inflicts virtually everything in the country, all new constructions and all old wirings.

The committee should take great care and their members should have top authority.

Plugs for differnt use (power, telephone, antennas etc.) should be all of differnt design and of such shape, that they never can be interchanged by mistake of the user.

2.1.9 Safety Campaign

As safety requirements are very much neglected in the whole country, a broad field of activities can be found for to be done by ITRDC in all sections.

Safety rules and test procedures must be applied for cars, cranes, elevators, boilers, for the total system of electrical installations, electrical appliances and so on.

At the present time a poster action in the corridors of ITRDC is describing dangers of war and other state emergencies, and how to behave at such events. These emergencies are supposed to be the exception from the normal situation. But other dangers do exist daily and everywhere, they obviously claim a high death toll throughout the country.

Similar poster actions could be started for all the other dangers and cases of emergency.

Some suggested action for the safety of electrical appliances is described in Annex 2. Similar actions can be adopted for many other dangerous things.

2.1.10 Electrical Earth in Laboratory

In the electrical laboratory the expert discovered a small voltage of about 10 V being existent at all sockets, when the circuit breakers were switched off. This might indicaty any wrong wiring or connections, or the central earth point is not sufficient.

The whole electrical system should be checked thoroughly. All plans and maps must be made available and be checked and compared.

As an example for workload problems, this technical matter should be assigned to one engineer of ITRDC staff. He can study the whole problem in all labs of ITRDC. Whenever he got the experience, ITRDC could offer similar service to all government buildings.

It is a fact, that wiring systems in most of the buildings are against many common standards and almost entirely are unsafe.

2.2 Administrative Recommendations

2.2.1 Counterparts

At the present situation only one counterpart is working with the expert. The counterpart has got his normal workload but with some difficulties it was achieved, that he is free for continuous cooperation with the expert. However, after the expert has gone, the counterpart most probably will turn back to his former duties and the workload which was started by the expert cannot be continued.

And as a matter of fact, this one counterpart is a generalized engineer. He really has to deal with every electrical matters, which arise at ITRDC. However, specialists are needed for the different fields, each one being responsible for a few subjects only.

For to achieve reasonable results, at least 5 specialized engineers should work in the different fields. If no such specialists are available, young university graduates must be found, trained and further educated, and this needs years.

It strictly should be avoided, that people have got a special training, provided by UNIDO go for work in other fields

It is recommended granting fellowships only to those people, who already have fulfilled their military duties and services.

2.2.2 Discipline

Electrical laboratories are supposed to be very dangerous locations for innocent people. Open apparatuses are in operation and high voltage terminals are freely touchable.

No other persons than authorized personnel should enter the laboratories.

Warning lights and high danger zones must be established and put into operation, whenever necessary.

Laboratories never should be left open, when nobody is in.

No tea time for friends from other departments should be allowed in laboratories and of course, no children are admitted.

The administration should establish general laboratory rules, which apply for all laboratories and workshops.

2.2.3 Storekeeping

The system of storekeeping should be thoroughly revised. Until now electrical parts were kept in chemical stores and were just found by chance or after heavy searchings.

The store should be centralized with different sections. Stores should be kept open continuously or at fixed times. Until now storekeepers always keep the keys when they are out for any reason and the stores then are not attainable.

2.2.4 Tools Store

It is advisable, to establish a general tools store at ITRDC. All authorized persons can get the needed tools from the tools store. Simple tools like screwdrivers, hammers and pliers could be given for continuous use. Other specialized tools are to be given for periods of special use only. These periods of time could be just minutes or hours, but sometimes years depending on demand.

2.2.5 Instruments Store

Although something about proper keeping of instruments is said under 2.1.1, which is supposed to be an immediate action for electrical laboratories, some general remarks may give recommendations for the future.

It seems advisable, to establish a general instruments store for all instruments of electrical, mechanical and chemical kind. Some similar procedures and rules like described under 2.2.3 and 2.2.4 are applicable. Simple instruments like meters, multimeters and gauges can be given to authorized people for continuous use. Some other specialized instruments and apparatus can be located to the laboratories continuously, when the

demand applies for that.

2.2.7 Sampling

For the testing as described under 3.4.1, 3.4.2 and 3.4.4 the samples were collected by a governmental decree from the producers.

This was quite sufficient for the first action. However, with such procedures manufacturers always can prepare selected and carefully checked samples for testing, which should pretend good results.

Additional samples must be bought by random from shops in Damascus and even from shops far away up country. (Some producers like to sell their bad pieces far away in rural areas.).

Funds should be provided for to buy samples.

2.2.8 Arab Cooperation

All Arab countries have the same problem of translating English textbooks into Arabic language.

As long as no official Syrian Standards are prepared, some similar translations of other countries should be used.

The expert found by chance some Arab Standards describing test facilities in Arab language. As the technicians in the laboratory cannot handle papers written in English, they could very useful take necessary information from any Arab papers, just for the matter of understanding technical things.

Better use of any other translation from other Arab countries is recommended. Furthermore, cooperation between similar institutions in other Arab countries is highly recommended. Responsible persons should be appointed to such duties.

IV ACTIVITIES

3. Subjects of Work

3.1 Priorities

The Expert firstly had to find the problems by visiting the factories.

It was not possible, to visit the producers of kWh-meters and to get samples of them. It was said, these are military factories and off limits to the expert.

It was not possible to arrange visits to Lattakia. As the battery problem seemed to be small, however the administrative and transportation matters (car and driver absent from Centre for at least two days) were difficult, the expert abandoned his desire for any large scale trip to Aleppo or Lattakia.

The Expert found electrical boilers, heaters and ovens for sale in shops, which obviously were very much below safety standards or safety requirements. Sampling and examining them was chosen as first priority.

By the order of the Ministry of Industry and with the help of the Damascus Industrial Management it was achieved, to get free samples from the private owned factories.

This sampling procedure surprisingly was arranged in an easy, quick and nonbureaucratic manner.

It is sufficient for time being But for general sampling a
procedure

like mentioned under 2.2.7 must be provided.

Additionally to the schedule, a visit to a producer of electrical plugs and sockets, switches and fittings was arranged and samples were taken.

Other tasks like a survey at the Cement Factory in Adra were carried out, whenever requested.

3.2 Electrical Cables

Testing of electrical cables at ITRDC has been done previously as reported in final report of Mr. Koettgen (DP/SYR/72/00/11-02) in 1975. On pages 30 to 31 the situation with BARADA cable is described which is still the same and needs no repetition.

As confirmed by the counterpart, ITRDC is able to test cables. No such tests were repeated again.

A visit to BARADA Cable Factory was performed on 22.1.81. The findings were not very encouraging. As described in Annex 4 the procedures, facilities, quality, safety precautions etc. are below standards. The report, translated into Arab language was submitted to the manager of the factory. Answer was received on 24.4.81 which was too late for being discussed in this report. 3.

Some further recommendations can be given. According to the disclosures, given by an Indian advisor to the factory and who was met later, all quality control devices for the manufacturing line are purchased already, but still kept in the stores.

They should be installed and used as soon as possible.

A detailed list of equipments and a layout plan for testing of cables according to IEC-Recommendations 227, 228, 245 and 540 was prepared. One copy of a "Proposal for a Laboratory for Testing of Electrical Cables According to the most Relevant IEC-Recommendations" was provided for use at ITRDC.

A missing tool, the indentation device according to IEC-Publication 540 was manufactured upon request of the expert in the workshop of ITRDC with very satisfactory result.

3.3 Small Batteries

Visits to Lattakia were not possible and no demand for testing was seen. The following clearly should be pointed out.

Batteries are always produced under licenses from well known companies. It is known from international experience, that in most cases batteries are very much above standards and the companies never apply for tests. It seems not to be necessary, to prepare or to do testing of batteries at ITDC.

Complaints about the quality of batteries in almost every cases are due to an overtime of storage. However, this is not a problem of testing. Batteries should be marked with the respective date of manufacturing for to avoid any quarreling.

3.4 Electrical Household Appliances

3.4.1 Boilers, Cookers, Ovens

It was found out by inspection, that most of these electrical appliances are of very poor design and workmanship. They are completely unsafe, dangerous and against all standards and rules of safety.

Two reports about typical examples are shown under Annexes 5 and 6. In the opinion of the expert sales of such devices strictly should be prohibited.

The expert was asked to give technical advice on how to improve the design and construction of the heavily criticized electrical ovens. Such direct advice on improvement is completely out of reach. Design, construction and fabrication of the ovens is of such a low level, that improvement only can be done by changing almost everything. For to do that, a team of highly specialized mechanical engineers is needed. Small changes would highly increase the costs but could not much improve quality and safety performance.

The only recommendation to be given is, to manufacture by license from a well known foreign company.

As a matter of fact, this is done by the manufacturer of plugs and sockets like described under 3.4.4

Results are amazingly encouraging, however this process needs a high amount of initial investments for tools and machinery.

Ovens, boilers and cookers of the kind as in Annexes 5 and 6 needed no tests, they failed by inspection.

Other appliances had to be tested by electrical methods. As no Syrian Standard is available for rules about electrical safety, the IEC-Recommendations were used. However, these recommendations are much too strict and stringent for to practice them in Syria.

The expert provided an excerpt from the IEC-Recommendation with all clauses mentioned, which are applicable for tests at ITRDC, Annex 7. All further tests are to be performed according to these recommendations.

In spite of the failures, it seems to be rather difficult to stop any sales or use at once. A certain procedure of actions is recommended by the expert as described under Annex 8^{9a}.

Only one of all the different heating appliances was sufficiently designed. It failed at tests, however it can easily be changed to safe compliance, as described under Annex 9.

3.4.2 Household Transformers

Two different kinds of household transformers are on sale in Syria and have been tested. 110/220 V or 220/110 V transformers are used for to adapt all electrical appliances to the two different supply lines of 110 V and 220 V respectively.

Voltage stabilizers either manually or automatically operated are in use for maintaining stable voltages for proper use of sensitive electrical household utilities like television sets etc.

It was found out, that design, performance, quality and safety were on different levels from very poor to quite good.

Testing was achieved similar to Annex 7.

In most cases of tested transformers it was possible, to give recommendations. Two typical test reports are shown as in Annex 10.

These test reports were written as preliminary drafts. Uniform headings and chapters should be used for the future and for the translations into Arab language.

3.4.3 Refrigerators

Testing of refrigerators already has been performed by a previous expert. The company was visited by the expert and a report was forwarded to ITRDC. No urgent action is required.

3.4.4 Plugs, Sockets, Switches and Fittings

A visit to the producer who works under license of Italian brand WIMAR shows that good quality of products can be achieved.

Compared to all other factories this one was really outstanding in every respect. The production process took place in clean and modern fabrication halls, works were organized properly and not chaotic, like on many other places. People were working with great discipline exactly according to industrialized standards.

A report has been prepared for ITRDC.

Further action is required as under 2.1.8

3.5 Miscellaneous

3.5.1 Adra Cement Factory

The expert was requested to give recommendations about the repair of a rotary transformer at Adra Cement Factory. Report and follow-up action were prepared.

3.5.2 Diesel Engine at ITRDC

As the main supply of ITRDC frequently breaks down, the emergency Diesel engine is supposed to take over the electrical supply. However, this engine often was out of order, sometimes due to battery problems. A comment was handed over to Mr. Trad.

All recommendations as under 2.1.4 apply.

3.5.4 Fire Alarm at ITRDC

The expert was asked to look into the not working fire alarm. However, as no manual and no description of circuits was available, any searching through the apparatus and through the dozens of connecting lines would be a highly time consuming procedure. Manuals should be requested from the supplier or from the producer.

Para 2.1.5 and 2.1.7 of this report does apply.

3.5.5 Electronic Kits

A certain number of electronic kits were ordered by a previous expert. These kits are to be assembled and the expert started the procedures. However, no suitable soldering tin was available and the total action has been postponed.

4. Difficulties Encountered

4.1 Technical Difficulties

Real technical problems were only a few. (For instance, the present condition of power supply as described under 2.1.6) However, every task needed high time-consuming procedures. Samples were not immediately on hand. Measurement instruments have not been maintained properly. Nearly all of the multimeters were out of function, but needed replacement of fuses and batteries only. Some instruments not even had the proper mains plug. Some items never were installed before. Proper tools and simple items like power rheostats, thermocouples, batteries, fuses, thin soldering tin, sufficient number of test cords, etc., were not available immediately and searching actions took plenty of time.

Thus, much of the time of the expert had to be spent (sometimes wasted) with very ordinary and simple activities, very much below his capability and qualifications.

V ACKNOWLEDGEMENTS

The author wants to express his sincere thanks to all members of staff at ITRDC.

Thanks to Mr. Mohammed Hisham Sharafli, Director General, to Mr. Kamal Sunbuli, Head of Engineering Division, and to Mr. Trad Trad, Chief of the Electrical Section and counterpart of the expert, for all their cooperation and assistance.

Guidance and assistance given by Dr. A.S. Salem, SIDFA, in the absence of Dr. Visvesvaraya, Project Manager, has been very much appreciated.

List of Annexes

<u>Annex</u>	<u>Title</u>
1	Job Description
2	Safety and Quality of Electrical Household Appliances
3	Suggested Work Plan
4	Report about Factory Visit to BARADA - Cable Factory
5	Test Report "Quick Koffee"
6	Test Report "General Oven"
7	General Requirements for Tests
8	Figure 1 : Layout of Electrical Laboratory
9	Test Report "Electric Room Heater"
10 a	Test Report "Voltage Stabilizer"
10 b	Test Report "Battery Charger"

UNITED NATIONS



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO

5 September 1980

PROJECT IN THE SYRIAN ARAB REPUBLIC

INTERNAL

JOB DESCRIPTION

DP/SYR/77/004/11-17/H/31.3.J

Post title Consultant for establishing engineering and laboratory facilities
in the area of electrical engineering

Duration Three months

Date required As soon as possible

Duty station Damascus, with possible travel within the country

Duties In co-operation with the Industrial Research and Development Centre
and local specialists and under the leadership of the Project
Manager, the expert will assist in creating facilities required to
make the Centre capable of dealing with present and foreseeable tests
which may have to be carried out in the area of electrical engineering
with special reference to the testing of batteries, electrical
cables, household electrical appliances and small motors. More
specifically, the expert is expected to:

1. Study the present and future needs of the Centre in the area of
electrical engineering as relevant to industrial development
in the country;
2. Advise which of the existing facilities should be used, and to
what extent, for tests in the area of electrical engineering;
3. List the type of new facilities needed, giving technical
specifications for the purposes of equipment selection;

..../..

4. Work out a layout for facilities with reference to new plans for the engineering block of laboratories and provide detailed guidance for the installation and operation of equipment;
5. Advise on what facilities exist and should be built up at industrial or plant level.

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 action which might be taken.

QUALIFICATIONS

Qualified Electrical Engineer with considerable experience in the establishment of laboratory facilities and with specialised knowledge of equipment selection for electrical engineering and layout of laboratory facilities

LANGUAGE

English; Arabic an asset

BACKGROUND
INFORMATION

The industrial development in the country is regarded as the spearhead of the country's development programme. Despite the rapid growth of industry in recent years, the manufacturing sector of the COUNTRY is confronted with various problems among which are inadequacy of manufacturing standards and efficient quality control, the low level of technology and the shortage of managerial and technical skills. To assist the Government in its industrial development efforts, UNDP has been providing the country with assistance in the form of small and large scale projects. The strengthening of the Industrial Testing, Research and Development Centre (ITRDC) is assisted by a major UNDP project and serves as an autonomous body under the aegis of the Ministry of Industry. The project is intended to assist the Government in strengthening the Centre and its activities covering applied metrology, testing, applied research, design development and such diverse industrial services as industrial information services, standardisation and quality control, project evaluation, feasibility and pre-feasibility studies, system design and project engineering. The Centre is also expected to advise and assist the Government on technical and industrial economic aspects in the preparation of the programmes for industrial development and provide consultancy services.

END OF REPORT ON THE MISSION

John V. ...

To Mr. Trad, from H. Bloebaum, Date: 7.02.81

Ref.: Safety and Quality of Electrical Household Appliances

It was found out by the expert, that shops in Damascus offer electrical household appliances, which in no way fulfill any requirements concerning human safety or any standards whatsoever.

Especially heating devices like cookers, ovens and boilers are manufactured in such a way, that careless or innocent people when using these appliances directly or indirectly can touch the live terminals, get electrical shocks which can be deadly in worse circumstances.

These appliances seem to be manufactured in Syria, however some of them carry labels indicating for instance Spain as the country of origin.

In Discussions with Mr. Trad and Mr. Bloebaum at the Damascus Industrial Management (Chamber of Industry) on 4.2.81 it was agreed, that immediate actions should be taken against sales, manufacturing or importing of such goods.

The following procedure is recommended:

- 1) At least one sample of such suspicious appliances should be provided either by buying it in shops or by any other means.
- 2) The appliances should be inspected and additionally tested, whenever necessary.
- 3) Reports about the findings are to be prepared.
- 4) A certain number of categories for electrical appliances should be defined, which indicate, whether the items strictly should be banned from the public market, should be tolerated or recommended.

As for an example, 4 classes should indicate

- class 1 : good and safe, recommended
- class 2 : not totally good and safe, however tolerated
- class 3 : dangerous and of bad quality, not recommended
- class 4 : absolutely dangerous, prohibited.

This kind of classification should be preliminary and is supposed to be an urgent emergency action.

On the long run, safety standards similar to the IEC - or VDE - Recommendations should be used and each item should undergo type tests with the result of either passed or not passed.

- 5) A committee should be established, which should specify all rules and procedures in this matter. Members of the committee should be delegated from manufacturers, importers, ministries and ITRDC.
- 6) Governmental authorities should prohibit sales, manufacturing and importing of the appliances, not conforming to the agreed standards.
- 7) All manufacturers and importers should be invited for discussions about safety and quality of their products. General informations, guidelines, recommendations and even training of the staff should be offered by ITRDC.
- 8) The public should be informed about possible dangers, resulting from the use of worse or faulty electrical appliances. This could be done by exhibitions, films, pictures and photographs or posters.
- 9) Official statistics should be checked for to find out the number of fatal accidents caused by electrical shocks.

Statistics should be checked for the number of fire hazards, caused by faulty or unsafe electrical appliances.

If none such statistics are existent or available, immediate actions should provide all informations.

Suggested work-plan for the duration of 10 weeks
beginning 18.1.81, ending 2.4.81
concerning Mr. Bloebaum (UNIDO Expert)
and his counterparts
Dipl.-Ing. Trad and Ing. Nourj

1. week: visits to electrical companies in Damascus:
 - cable company
 - kWh-meters and batteries company
 - household-transformer company (500 W, 110/220 V, 50 Hz
 - refrigerator company
2. and
3. week: quality control of samples mainly:
 - kWh-meters and transformers and typical technical reports.
4. and
5. week: Lattakia electrical companies
 - electrical motor factory, motors $\frac{1}{2}, \frac{1}{3}$ kW/220V, used for washing machines
 - ballasts 20, 40, 65 W / 220V
 - (2 day-visit
 - typical technical reports.
6. week: Operation and application of the following electrical test equipment: H.V. cable tester, x-y-recorder, H.V. oil tester.
7. week: Arrangements in the electrical and mechanical workshop (the new building) and dealing with the broken electrical appliances in the ITRC such as:
 - fire-alarm,
 - clock-system, etc.
8. week: Assembling and introduction of teaching aids from Italy.
9. week: Miscellaneous
10. week: Report

Sambula

Report about Factory Visit to BARADA Cable on 22.01.81
done by Mr. Bloebaum and Mr. Trad.

General talks at the beginning and the end of the visit were held with the General Director of the factory, Mr. Bassam Abu Nabut. However, due to the absence or unavailability of the relevant persons, no discussions about technical matters could be held with any kind of production engineers.

The findings of the expert are listed as follows :

- 1) The total capacity of the machinery was in working condition only to a small extent, perhaps 20 to 30 %. All other machinery seemed to be out of order for unknown reasons.
- 2) Absolutely no quality control seemed to be provided and as evidently could be seen :
 - 2.1) No routine tests of any diameter measurements took place;
 - 2.2) No high voltage breaking down test at the production line was ever established;
 - 2.3) It was clearly visible, that at the cooling process of sheath the cable did not run properly through the cooling water. The cable was only half immersed by water, thus exposed to an unequal cooling procedure;
 - 2.4) It was clearly visible, that some tape armoring of cable was poorly manufactured and of bad quality. However, this cable was sheathed with the final cover of insulation, thus making the poor armoring invisible.
- 3) The test laboratory was in disorder to a high extent, especially in respect to standards of human safety :
 - 3.1) The head of that department or obviously the man responsible for the operation of high voltage tests was an old veteran of the company with no knowledge of electrical engineering and no knowledge of the high dangers which could result from it.
 - 3.2) The test area was freely attainable for everybody without

- any barricading device or any safety precautions.
- 3.3) The panel voltmeter of the voltage control was broken and out of order;
 - 3.4) The leading out cable from the high voltage room to the test area was incorrectly arranged. Instead of having highly insulated leading devices, the high voltage cable was simply arranged between wall and metallic window without any protection. In the event of any damage to the cable, the window and all adjacent parts could carry the high potential which is a danger to all persons coming into contact with parts of it;
 - 3.5) Similar danger exists with the high voltage cable, which is now just spread freely on the ground. Any sharp device can damage the insulation, anybody can step on it and again, this is a danger to life.
 - 3.6) As a matter of fact, two fatal accidents occurred 4 months before and one occurred a year before. More general safety requirements are necessary;
 - 3.7) Generally, all measurement instruments were in very bad conditions and exact measurements could not be expected.
- 4.) As a direct result of some of these facts a high percentage of materials in all stages of production was spoiled and the quality of the cables did not fulfill the requirements of the standards.
- 5.) Some strange observations were found just by chance:
- 5.1) Some workmen operated an open fire using wood and other waste materials just for the purpose of warming. This should be strictly forbidden.
 - 5.2) An electrician was seen, who hammered with his combination pliers a useless relay switch into pieces for to remove it. He should learn, that this obviously is completely a wrong procedure.
 - 5.3) The footpaths through the halls of the factory were often blocked by materials of different kinds. In the event of any emergencies or hazards no quick and safe walking or running area is provided.
 - 5.4) For construction purposes, a deep hole was dug without any precaution for bypassers. Anybody could break his neck,

when falling in.

- 5.5) Workmen purposely cut out of action some safety devices, this is supposed to be a very careless procedure and strictly should be forbidden.
- 5.6) As a general, no warning signs as a precaution against dangers ever were established.

The recommendations derived from the findings shortly will be as follows :

- 1) To implement better quality control.
This mainly means establishment of facilities for continuous measurement and recording of diameters at the extruders and registration of HV-breakdowns immediately after the process of production.
As the production engineers mainly are interested in maintaining high quantities and high production numbers, the post of a quality engineer must be established. He should be fully ~~ixix~~ independent and responsible to the management only, thus being able to look for good quality only and to find solutions for improvement of quality in all stages of manufacturing.
- 2) To establish a better testing laboratory with qualified engineers working in it, with sufficient facilities for better maintenance of equipment and with better precautions.
- 3) The establishment of a post for a safety engineer is highly recommended. Again, he should be fully independent and responsible to the management only. He should look for and should improve safety throughout the factory. He should establish safety measures and safety rules, he should train all workmen in this respect.
- 4) As a general, the employed workmen should be trained properly for better understanding of what they are dealing with.
- 5) Obviously it is necessary, that production engineers, testing engineers, quality engineer and safety engineer should have a proper training or experience gained from recognized cable factories and test houses abroad. If trained people are not available, fellowships must be granted.

H. Bloebaum, Expert at ITRDC, Damascus

9.2.61

Test report about electrical appliance: QUICK KOFFEE

Manufacturer: Zuheir Kaza, Aleppo Hamidiye, Tel.: 42798, POB. 3559

This device, which is sold in shops in Damascus needs no testing. Even by inspection it is obviously seen, that it is highly dangerous to the user.

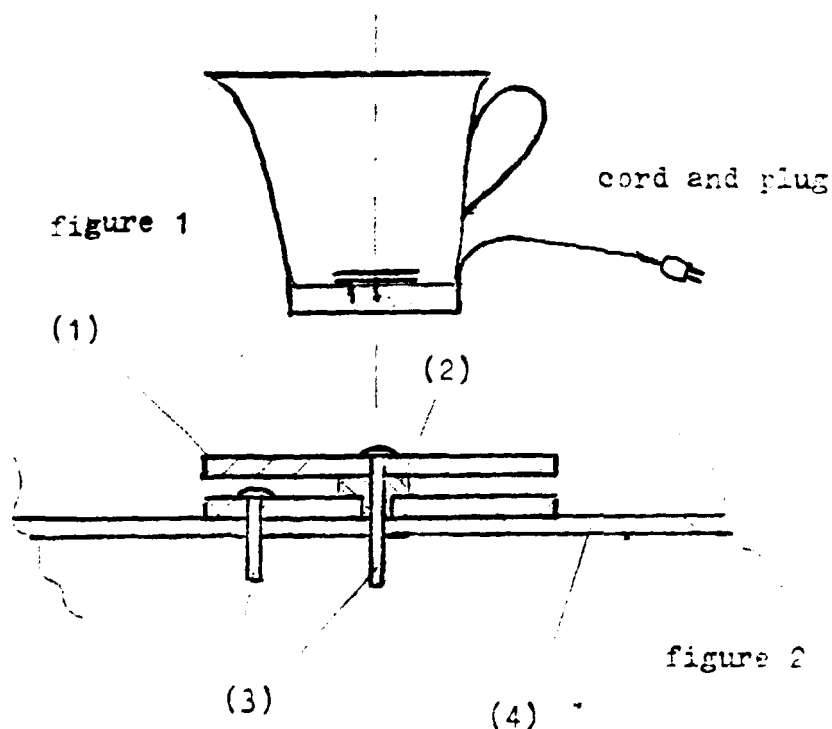
Construction:

The Quick Koffee boiling device is a plastic mug, which contains a heating device on its bottom, figure 1.

Figure 2 shows the enlarged part of the bottom with the heating system. It simply is a condenser, where the water is an electrolyte and thus heated.

The two plates of the condenser (1) are separated by an insulating ring (2) and fixed by two screws (3) at the plastic bottom of the mug (4).

The two screws (3) are connected to the electrical cord and a plug.



The Quick Koffe device is to be classified as completely unsafe, dangerous and of no quality for the following reasons:

- 1) The live parts of the appliance is directly attainable for instance by a spoon and even the fluid filled into the mug carries the live potential of the condensor.
The user directly is exposed to electrical shocks.
- 2) A spoon or any metallic device inserted into the mug can directly produce a short circuit.
- 3) Any pressure applied to the upper part of the condensor (1) can cause a permanent short circuit.
- 4) Any additives filled into the mug (salt, sugar or milk powder) can produce a short circuit or burning.

Conclusions :

The device is a high danger for the user and is of very bad quality. Manufacturing, sales and use of it should be forbidden.

As the operating principle is against all standards, no recommendations for improvement can be given.

H. Bloebaum, Expert at ITRDC, Damascus

11.2.81

Test Report about electrical appliance GENERAL OVEN

In order to start testing activities an oven was provided by a member of staff. The oven was used and damaged to a certain extent. Similar kinds of this oven are produced in Syria and are sold in shops.

Construction:

The General Oven consists of two metallic bowls of similar construction, both placed together, when in working condition, as shown in figure 1. Both of the bowls contain the heating elements for upper and lower heat.

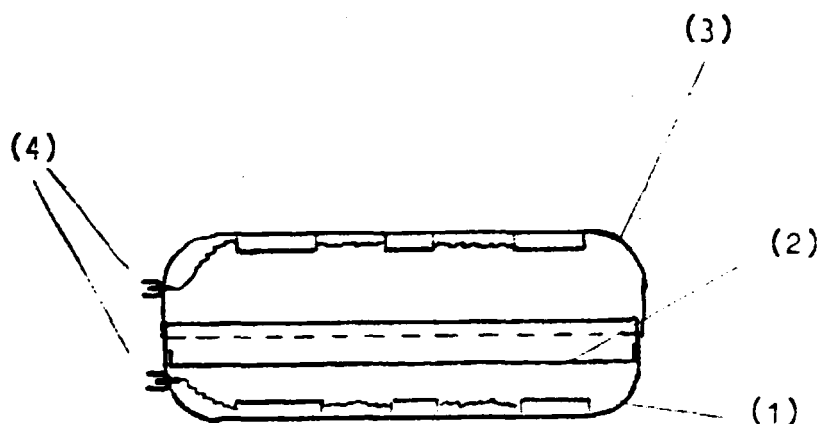


figure 1

The lower bowl (1) is covered with a metallic plate (2), which is supposed to be the bottom of the furnace chamber and which protects the user from the live electric parts. However, the plate is not fixed to the bowl.

The upper bowl has no protection at all. The hot wires and the inside terminals (4) are freely accessible and touchable.

The top view of both of the bowls is shown in figure 2.

The metallic bowl (1) contains the heating wire (2), which is insulated and mechanically guided by five ceramic plates (3). These plates are fixed to the bowl by one screw each. The heating wire is connected on both of its ends to an instrument plug connector (4).

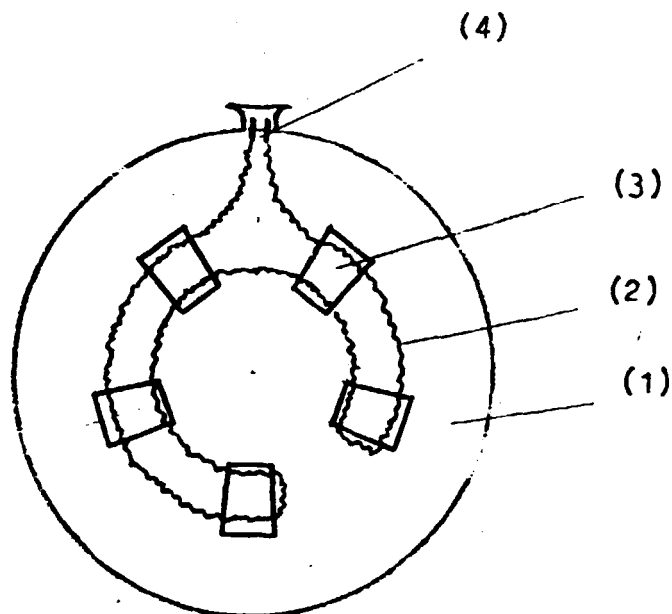


figure 2

Results of inspection:

The oven does not fulfill the minimum requirements for safety and quality.

Especially the following clauses of IEC-Publication 335-1 are severely violated:

Clause 7 Marking

The oven has not got the appropriate marking.

Clause 8 Protection against electric shock

The upper part of the oven is not so constructed and enclosed that there is adequate protection against accidental contact with live parts.

The inside terminals (4) of figures 1 and 2 can easily be touched.

The bottom plate (2) is not fixed to the lower bowl (1) (see figure 1).

Any displacement of the plate makes the inside terminals (4) accessible, thus not having adequate protection against accidental contact with live parts.

Clause 22.9 (Construction)

Handles are not fixed in a reliable manner. They did work loose in normal use.

Clause 22.26 (Construction)

The glowing wires are not supported in a way, that in case of rupture, the heating conductor cannot come into contact with accessible metal parts. Broken wires of the upper bowl will be accessible directly.

Broken wires of the lower bowl will come into contact with the metallic bowl.

Clause 22.29 (Construction)

The metal bolts used on the heating wire are not resistant to corrosion. As a matter of fact, the wires of this particular appliance were broken at these bolts.

Clause 22.30 (Construction)

Sagging of heating conductors can make accessible metal parts, the bottom of the lower bowl, alive.

Clause 23.3 (Internal wiring)

The ceramic insulators on heating wires are not fixed in a way, that they cannot change their position. They are easily turnable.

Conclusions:

This device is dangerous and unsafe to a very high degree. According to the comments of the user, failures happened quite often, the distribution of heat was not satisfactory. Quality and safety of the appliance is absolutely insufficient. The use of the appliance is not recommended.

General Requirements for Tests on Electric Ovens

The following requirements are extracted from IEC Publication Nr. 335-1 for the tests on electric ovens collected from Syrian manufacturers.

3. General requirement

Appliances shall be so designed and constructed that in normal use they function reliably so as to cause no danger to persons or surroundings, even in the event of such careless use as may occur in normal services.

Compliance is checked by carrying out the following tests specified.

7. Marking

7.1 Appliances shall be marked with:

- rated voltage in Volts
- rated frequency in Hertz
- rated input in Watts or Kilowatts
- makers name, trade mark
- makers model or type reference

Compliance is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit. After all the tests of this recommendation, the marking shall be easily legible; it shall not be easily possible to remove marking plates and they shall show no curling.

8. Protection against electric shock

8.1 Appliances shall be so constructed and enclosed that there is adequate protection against accidental contact with live parts. This requirement applies for all position of the appliance when it is wired and operated as in normal use, even after opening of lids and doors and removal of detachable parts.

The insulating properties of lacquer, enamel, ordinary paper, cotton, oxide film on metal parts, beads and sealing compounds shall not be

relied upon to give the required protection against accidental contact with live parts.

The enclosure of the appliance shall have no openings giving access to live parts other than openings for the use and working of the appliance. If such openings are provided, there shall be sufficient protection against contact with live parts.

Compliance is checked by inspection.

22. Construction

22.1 The classification of appliances to their degree of protection against electric shock shall be prescribed in the particular requirements.

22.8 Appliances shall be so constructed that their electrical insulation cannot be affected by water which might condense on cold surfaces, or by liquid which might leak from containers, hoses, couplings and the like which are parts of the appliance.

22.9 Handles, knobs, grips, levers and the like shall be fixed in a reliable manner so that they will not work loose in normal use if this might result in a hazard.

22.25 Handles shall be so constructed that, when gripped as in normal use, accidental contact between the operator's hand and parts having a temperature rise exceeding the value allowed for handles which, in normal use, are held for short periods only, is unlikely.

22.26 Open heating elements which glow visibly in normal use, shall be so supported that, in case of rupture, the heating conductor cannot come into contact with accessible metal parts.

Compliance is checked by inspection, after cutting the heating conductor in the most unfavourable place.

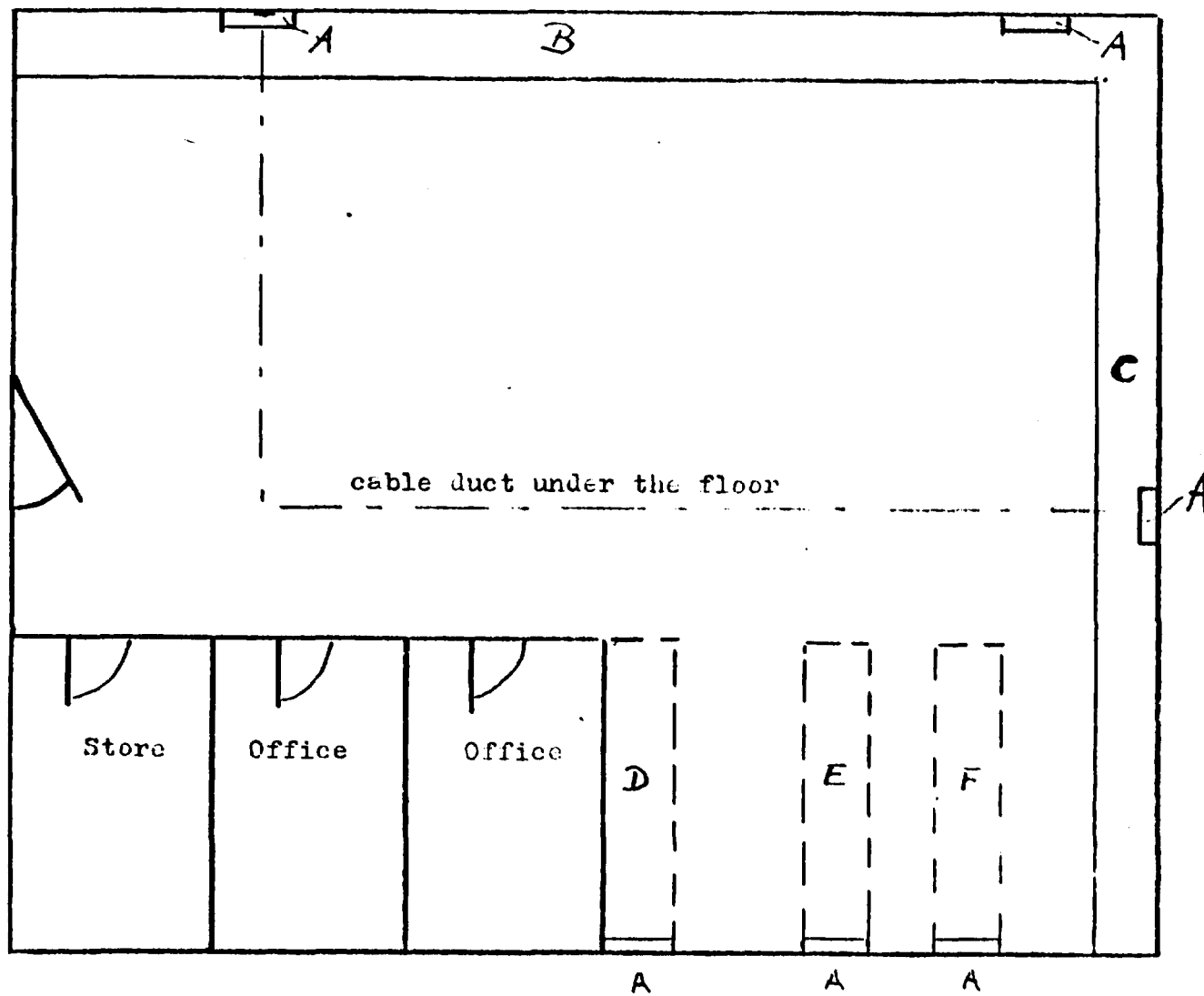
22.29 Metal bolts or the like which are used on heating elements shall be resistant to corrosion under normal conditions of use.

22.30 Appliances shall be so constructed that sagging of heating conductors cannot make accessible metal parts live.

Compliance is checked by inspection

23.3 Beads and similar ceramic insulators on live wires shall be so fixed or supported that they cannot change their position; they shall not rest on sharp edges or sharp corners. If beads are inside flexible metal conduits, they shall be contained within an insulating sleeve, unless the conduit cannot move in normal use.

Compliance is checked by inspection and by manual test.



ANNEX 3

Figure 1 Layout of Electrical Laboratory

Scale 1 : 100 approx.

Test Report 19.3.81

Subject of Testing: Electric room heater

Manufacturer: Jamal Al Khary

Label: Type 2 HK 8ø 1000 W Reg. Trade Mark 22ø V

Electra Made in SAR

Result of Inspection : The label is attached as a sticker, which can get lost. The constructional design and outfit is very good.

Results of Tests :

Leakage test and high voltage test were carried out and found to be satisfactory.

The heater does not fulfill requirements of clause 8.1 of IEC Recommendation 335-1, Protection against electric shock.

The bars of the protection grid are of such a distance to each other, that the applied test finger can touch the heating elements.

The applied test probe cannot touch the heating elements, however, not both of the poles can be disconnected by the switches.

Remarks and Recommendations :

Compared to other appliances, this device is quite safe and of good performance.

However, it does not fulfill clause 8.1.

Requirements easily can be achieved, if either the distance between the bars of the protecting grid is made so small, that the test finger cannot enter through, or if both of the switches are so constructed, that they can disconnect both poles of the supply line.

TEST REPORT

1.3.81

Voltage Stabilizer

ABDUL RAHMAN CHEICKHA & Sons
Electrical Equipments Factory
Damascus PCBox 4118 Syria

V_i 220 \pm 25 %
 V_o 220 \pm 1,5 %
3 kVA, 1 Phase, 50 - 60 Hz

One item of voltage stabilizer supplied by the producer was tested at ITRDC.

It was found out, that the electrical performance is well according to the specifications. The total finishing is good compared to other Syrian-made electrical appliances. However some constructional details do not fulfill standard requirements according to IEC-Publication Nr. 335-1, but could easily be altered.

1. Performance

The output voltage of the stabilizer was measured against variations of the input voltage within the range of -25% ... 220V ... +25%. The load conditions were a) no load, b) half load c) full load, d) 10% overload.

The curves are shown in figure 1).

Performance of the voltage stabilizer is within the limits of 1,5%. The stabilizer was operated for three hours with an input voltage of 275 V, which is +25% of nominal voltage at overload condition 3300 VA. No failure occurred. Only the main transformer heated to approximately 80°C. (Exact measurements were not possible due to damaged pick-ups of temperature measuring device.)

2. Marking

The marking was correct according to clause 7.1 of IEC Publication Nr. 335-1.

However, no technical bulletin, no general description, no plans of electrical circuits were available.

3. Leakage Current

According to clause 13.2 of IEC Publication 335-1 the leakage current was measured and found to be 0.05 mA, which is much below the limit.

4. Insulation Test

Due to the absence of a special transformer with a center tap, as required in clause 13.3 (figure 7, page 136 of IEC 335-1) this particular test could not be done properly.

However, with a non-destructive high voltage tester a 1000 V AC source was supplied between the main terminals and the body.

No break-down occurred within 1 minute.

At 2000 V a break-down occurred immediately after applying the voltage. It was finally checked, that the break-down took place in the main transformer.

It is recommended, to improve the insulation of this transformer.

5. Constructional Recommendations

By inspection the following details were not found fulfilling the requirements of standards and recommendations are given as follows.

5.1 Input and output terminals

The terminals do not fulfill the requirements for protection against electrical shock as in clause 8.1 of IEC 335-1.

The terminals should either be covered or be placed under the housing. Alternatively, safe plugs and sockets could be provided.

5.2 Switches

No switching facilities are provided. It is recommended, to install switches for input and output.

5.3 Creepage and Clearance distances

Clause 29.1 of IEC 335-1 applies to distances between live terminals inside the apparatus.

It was found out, that four terminals are too close to the terminals of the small transformers. By means of easy and simple changes of construction any dangers caused by the small distances could be prevented.

6. Other recommendations

A short part of a thick cable was found inside the apparatus, a washer and some tin remainders.

There is no need to say, that metallic parts inside can produce short circuits or just failures of the appliance.

Each piece of voltage stabilizer in the final stage of production should thoroughly be inspected for those remainders as well as for fixed and tightened screws.

For proper operation and for mainenance, service and repair an operational handbook should be provided with each apparatus,

Test Report 12.3.81

Subject of testing : Battery charger with no sufficient markings. Input 220 V, output 12 V, 30 A.

Manufacturer: Abdūl Rahman Al Sheickha

1. Construction:

The constructional design complies with the IEC-Recommendations with the exception, that the mains plug is not of the correct type. However, compared to other appliances which were under test, this failure has no significant meaning.

However, a proper name and marking should be provided.

As the maximum current of 30 A is in the middle of the scale, another instrument with full scale deflection of 30 A should be used.

2. Tests

Leak test and high voltage test were carried out and found to be satisfactory.

The output was connected to a resistive load and the charging relais did not operate.

When the output was connected to a battery, the relais operated properly, but only at correct battery voltage of 12 V. Below 12 V the relais began oscillating at about 10 V and below 10 V the relais switched off.

3. Remarks

It was found out, that the supply of the relais is achieved from the battery side and not from the feeding side of the rectifier. This is quite inconvenient and insufficient for the following reasons:

- 3.1 The device can not operate, when any resistive load is connected.
- 3.2 The device cannot charge batteries, when the terminal voltage is below 10 V. This means, it cannot charge batteries, which are completely empty or completely discharged.
- 3.3 The device would discharge batteries, when they remain connected and the main supply is switched off.

