Need for Standardization

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There are now few countries in the world without a standardization activity. Developing countries as well pay great attention to establish efficiently working standards organizations. The technique of standardization is to collect and coordinate the knowledge and experience already available and to endeavour to systematize and present what is necessary for the technical and commercial activities of a country. Thus experts are invited to participate in different technical committees dealing with standardization and to do research work leading to comparatively cheap working standard methods. The saving to the nation obtained from this is on a large scale.

Medium scale Light industries are cropping up in Ethiopia quite frequently. Hence the need for a standards institution that will determine the quality of products of industry as well as of agriculture. To benefit the people, agricultural produce as well as finished products have to be up to a certain national standards. Similarly, if our export commodities are expected to bring us higher earnings, they must meet internationally recognized standards. Otherwise the return will be meagre as competition in this present age is a factor affecting the economic independence of many nations.

Introduction

In most industrialized countries standardization started 50 to 60 years ago. The work was described as industrial standardization and concerned mainly dimensions of mechanical products. Since then standardization has been found to be a necessity for almost all countries and the scope has widened. The role of standardization as a means of increasing productivity in developing countries is more and more understood and this has led repeatedly to the setting up of new national standards institutions.

The activity can comprise terminology, basic standards, dimensions, variety reduction, quality and test methods. From this it is clear that any field or branch and description can be concerned so that the term industrial standardization is not wide enough.

Preparations for the start of an Ethiopian Standards Institution have been made during the last year. So far the activity has come under the Ministry of Commerce, Industry & Tourism, under the name Standards Section, but legal steps are being taken to transform this section into an autonomous institution. Legislation, however, is a time-consuming affair.

Already Ethiopia has through the Standards Section become the 68th member of the International Organization for Standardization, ISO. As the aim of standardization is to create common rules over as wider areas as possible the need for international cooperation is obvious. ISO has established about 2,000 documents to be followed in national work.

The different levels of standardization are the international, regional, national, branch and company ones. At all levels specific local rules should be avoided and efforts made to introduce already existing practices from other markets.

The keenly needed increase in the export value of Ethiopian produce can to a certain degree be obtained by accepting ISO standards. For example, grading of hides according to ISO would mean that the hides will fetch the common world-market-price and not as now a lower one.

Organization

As plans are, the governing body of the future Ethiopian Standards Institution, ESI, will be a Council comprising nine members representing different ministries and some organizations in the private sector. This is the policy-making body and the only one that will have the right to approve Ethiopian Standards.

The technical work will be guided by committees on science, social activities and safety, documentation and printing, building and civil engineering, mechanical engineering, electrical engineering, chemical engineering, agriculture, textiles, and packaging.

The staff engineers of ESI will do all the preparatory work for meetings, etc. It is, however, impossible for the institution to have its own expertise for all problems that may arise. A flexible committee structure with expert members is therefore foreseen.

In most cases the standards will be voluntary, in some few cases compulsory. The draft order gives the ESI the right to stablish compulsory standards when safety, public health or fundamental export products are concerned.

Before a standard proposal can be approved it shall have been made known through newspapers and other media and the public invited to comment upon it.

The aim of standardization is to save money. This can be done in many different ways. Basic rules will guide draughtsmen, laboratory personnel, etc. This means better use of qualified working time. Standards for products mean rationalized production and sale, as fewer varieties will, in the long run, lead to more economical purchasing of material and the security that a standardized product is always asked for . The examples can be multiplied.

The ESI will have its standards mark comprising the letters ES. This can be applied to products which when tested according to rules agreed upon are found to meet the requirements of the standards.

In the research work for the preparation of a standard, laboratory work is often needed. The same is true for the marking procedure. The number of laboratories available in Ethiopia is surprisingly great and none seems to be overloaded with work. The ESI will therefore use these facilities.

As standardization to a very large extent is desk work, it is relatively cheap. There are very few general rules for standardization. Some few basic ones must, however, be established from the beginning: use of ISO recommendations whenever possible, use of the modern metric system, use of the SI-system and application of preferred numbers when series are concerned.

Already these rules will give answers to many questions discussed here, e.g. uncertainty has existed regarding the shape and dimensions of test specimens for steel and concrete.

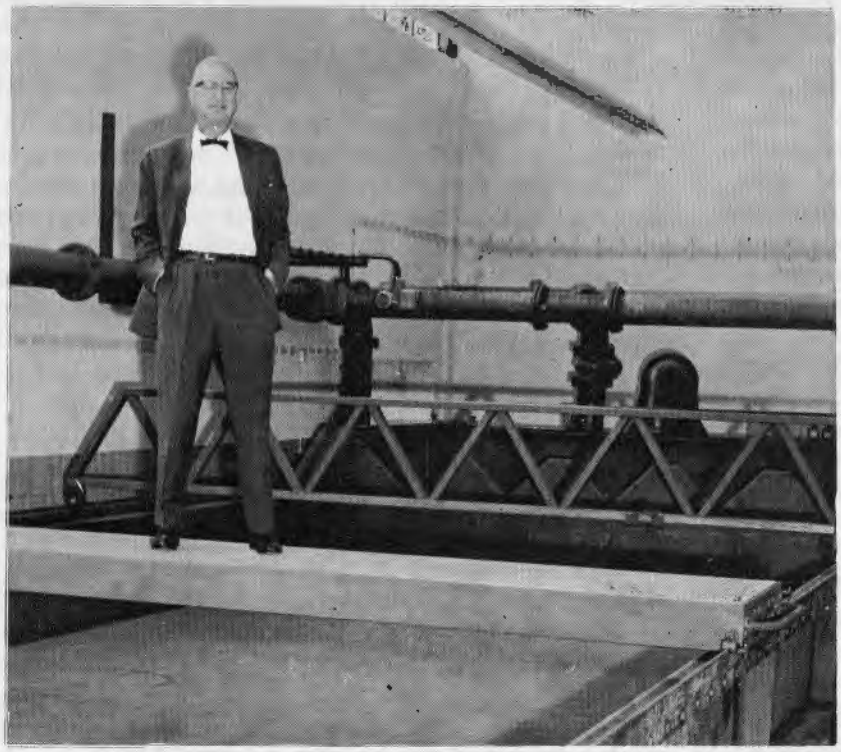
When aid giving countries offer their technical assistance, they base it on their own standards or habits. It will, therefore, create some friction when Ethiopia in the future clearly indicates what rules should be followed here.

The embryo of the ESI has started its preparatory work. Some few technical fields should be mentioned: quantities and units, bricks, concrete blocks, corrugated sheets, pipes, screw threads, hides and skins, weights.

Basic Standards

What is Standardization?

Standardization is the agreement on the selection of well defined alternatives out of an unlimited number of different possibilities. It aims at optimal



Picture 1 — *Equipment in the hydraulic lab of the new College of Technology. Prof. Peter in the picture is, among other things, also a staunch supporter of national standardization.*

Picture 2 — *Cubic test specimens of concrete being moulded.*

overall economy taking relevant functional requirements into account. Standards should be formulated and applied for the benefit and with the cooperation of all concerned.

Standardization is based on the consolidated result of science, technology and experience. It determines not only the basis for present, but also for future development and it should keep pace with progress. It may be considered as part of the process, deeply rooted in human history, of bringing order out of potential chaos.

There are basic standards recommended by ISO which are universally accepted and in this paper we will outline some of these and their applications in Ethiopia.

1. Renard Series or Series of Preferred Numbers

R-series or Series of Preferred Numbers are standardized numbers in preferred series intended to be used in the selection of characteristic values of all kinds and are recognized as a part of the basic standards all over the world. These series are the conventionally rounded off term values from 1 to 10 using integral powers of 10 as factors.

R 5 1,0 1,6 2,5 4 6,3 10 $\left(\text{factor } \sqrt[5]{10}\right)$

R10 1,0 1,25 1,6 2 2,5 3,15 4 5 6,3
8 10 $\left(\text{factor } \sqrt[10]{10}\right)$

R20 1,0 1,12 1,25 1,4 1,6 1,82 2,0 2,24 2,5
2,8 3,15 3,55 4 4,5 5 5,6 6,3 7,1
8 9 10 $\left(\text{factor } \sqrt[20]{10}\right)$

R40 1 1,106 1,12 1,18 1,25 1,32 1,4 1,5 1,6
1,7 1,8 1,9 2,0 2,12 2,24 2,36 2,5 2,65
2,8 3,0 3,15 3,35 3,55 3,75 4,0 4,25 4,5
4,75 5,0 5,3 5.6 6 6,3 6,7 7,1 7,5 8
8,5 9 9,5 10 $\left(\text{factor } \sqrt[40]{10}\right)$

R80 The factor $\sqrt[80]{10}$ is also international standard but it is rarely used.

The R-series can of course be used in any decade. These Preferred Numbers should always be used when a scale of values has to be selected.

Application

(a) Before standardization the following thicknesses of galvanized corrugated metal sheets were kept in stock (thickness in mm).

0,16 0,17 0,18 0,19 0,22 0,26
0,28 0,32 0,36 0,40 0,60

There were too many choices but no regularity in the distribution of thicknesses. Using R 10 for the selection of thicknesses we arrive at the following standards.

0,16 0,20 0,25 0,32 0,40 0,50 0,63

The tolerance for the production of these is of course specified and by choosing these values overlapping of thickness is avoided and a clearly defined product obtained. The total range is covered by fewer values and with planned and good distribution. Unless there are technical arguments supporting the existing system, it can be changed for the better. Standardization of zinc coatings is another matter.

(b) The quality of paper is measured in terms of gramme per square metre. The scale for paper and cardboard expressed in g/m², selected from the R20 series of preferred numbers is as follows:

12 16 28 40 45 50 63
71 80 90 100 112 125

2. Rectangular Sizes in the A-series

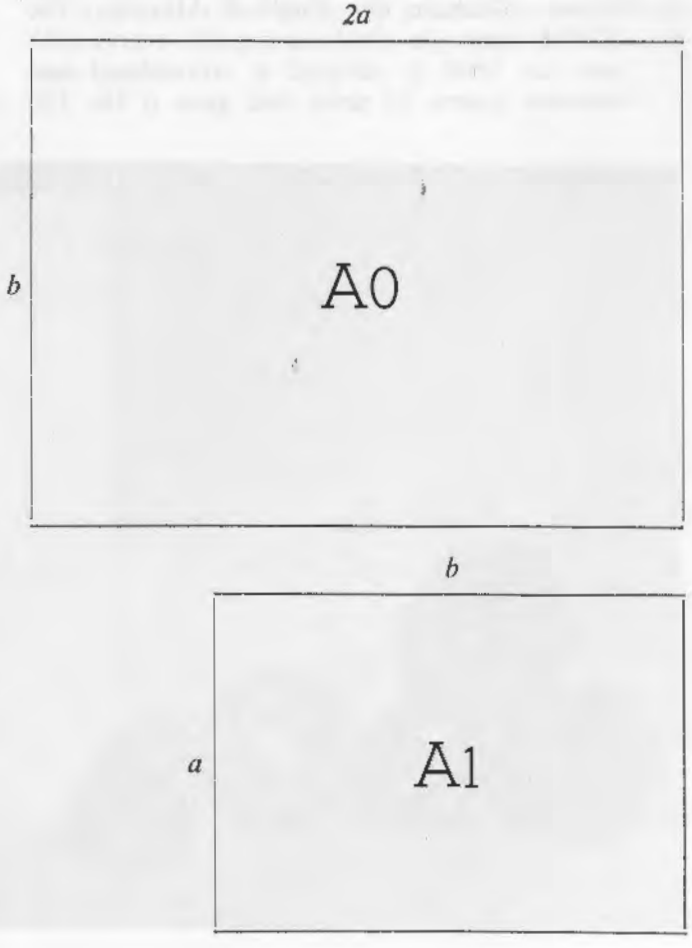
An international standard exists in the field of paper sizes. This is known as ISO-series or A-series The A-series of sizes was originally designed to cover the need of trimmed sizes of writing paper and certain classes of printed matter. However, the sizes should be generally used wherever possible, e.g. also for signboards and posters made by plastics or metal sheets.

There are three fundamental conditions on which the A-series is built up. These are:

(1) The basic size AO has an area of 1 m².

(2) All sizes in the series should have one and the same side relations.

(3) The smaller sizes shall be obtained by dividing the nearest larger size into 2 halves.



$$2a.b = 1$$

$$\frac{2a}{b} = \frac{b}{a}$$

From these two equations we find the following values of a and b:

Sizes	a	b
A0	814	1189
A1	594	841
A2	420	594
A3	297	420
A4	210	297
A5	148	210
A6	105	148
A7	74	105
A8	52	74
A9	37	52
A10	26	37

Almost all countries stick to the A-series and it is now suggested that Ethiopia should adopt this. The whole system of modern office techniques is built upon the A-series. From this series other series intended for envelopes, folders, binders, etc. are derived by multiplying by a factor. Modern technical papers use the A4 size for filing (e.g. zede).

3. The SI-units

All international matters concerning the metric system have been the responsibility of the Conférence Générale des Poids et Mesures. The CGPM meets in Paris, normally every sixth year. In 1960, it adopted a rationalized and coherent system of units and gave it the full title "Système International d'Unités" for which the abbreviation is "SI."

The International System (SI) is a coherent system with six basic units.

Length	metre	m
mass	Kilogramme	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	degree kelvin	K
luminous intensity	candela	cd

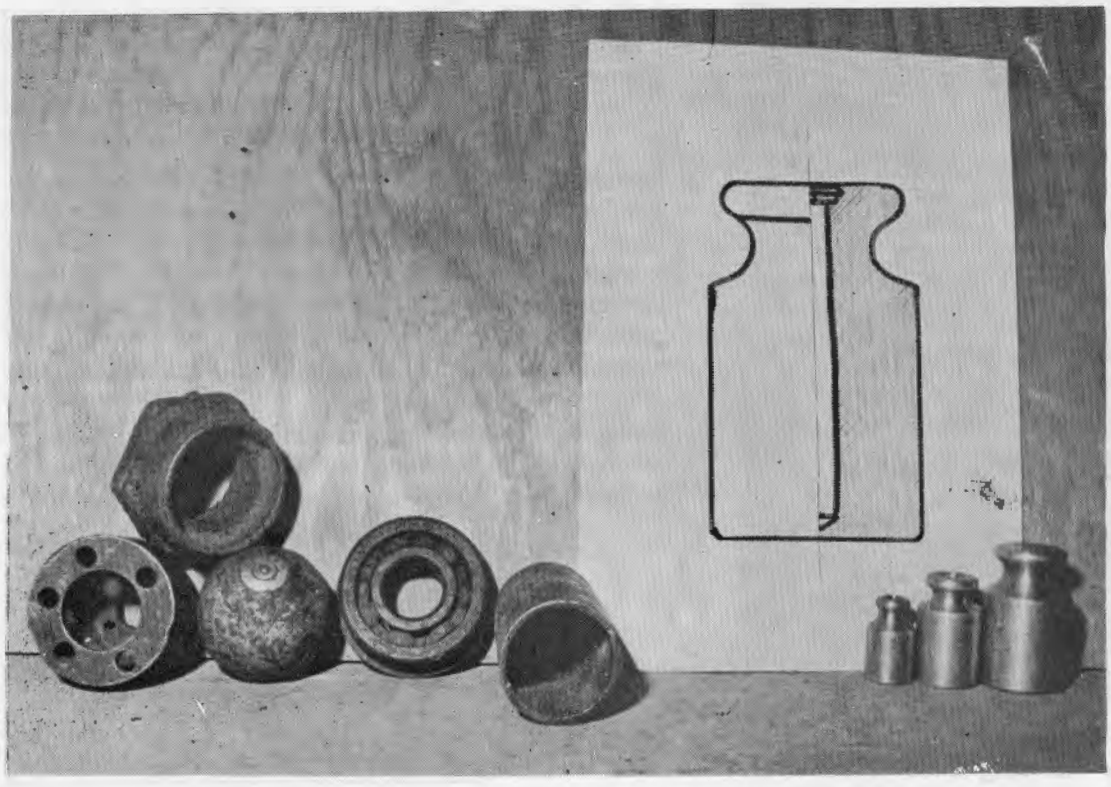
and the following two complementary units: Radian and steradian.

The expressions for the derived SI-units are stated in terms of base-units; for example, the SI-unit for velocity is metre per second (m/s). For some of the derived SI-units special names and symbols exist, e.g. the name of SI-unit of force is newton with the symbol N and expressed in terms of basic SI-unit, 1 N = 1 kgm/s².

As the SI-units have been adopted by the ISO and the International Electrotechnical Commission (IEC) it is expected that they will become the generally accepted metric units throughout the world.

The SI-system is to a great extent applied in most industrial countries, the USA being an exception as the system is applied in some fields only. The National Bureau of Standards, to facilitate the exchange of scientific information, adopted the international system of units for use by its staff.

The laboratories of the Bureau International des Poids et Mesures at Sèvres are the repository of the standard kilogramme and the former standard metre. The kilogramme is still defined in terms of the international prototype at Sèvres, but the metre is now defined in terms of a number of wave lengths of a particular radiation of light.



Picture 3 — *Non-standardized weights are seen on the left and samples of standardized weights on the right.*

4. **Weights**

The OIML (Organisation Internationale de Métrologie Légale) has set down the standard for weights. The scale of weights for general commercial use is as follows.

1 2 5 10 20 50 100 200 500 g

1 2 5 10 20 50 kg

As you can see in picture 3, the weights found in the market in Ethiopia are varied in shape and are not made of the same material.

The Standards Section has proposed to adopt the OIML standard with minor changes. Weights 1 gramme up to 10 kilogrammes will be cylindrical in shape and weights 20 kilogrammes up to 50 kilogrammes will be parallelepipedic. The material of the weight up to 200 grammes will be brass and for weights 200 grammes up to 10 kilogrammes grey cast-iron.

5. **Screw Threads**

Regarding screw threads, the unified and metric systems are the dominant ones and the dimension of the major diameter is given in mm and inches. The profiles of these threads are the same. For the size of the unified screw the original basis was the inch. The metric system is recommended for use in Ethiopia.

6. **Pipes**

This is a science in itself nowadays covering everything - plastic, rubber, steel, cast-iron, concrete, etc. We have limited ourselves to steel pipes which are going to be produced in the country. For pipe thread ISO has adopted the Whitworth with fine pitches.

7. **Translittering**

Translittering Amharic works into cyrillic characters is one field where a basic rule is needed. The practice at present is that each organization has its own rules of translittering. Another subject which needs immediate attention is that of defining technical terms in Amharic.

8. **Hides and Skins**

This being the second most important export commodity of the country, it is essential to determine its quality and raise it to the standard of the hides transacted at the international market.

There are elementary rules that have to be followed very strictly in the preparation of hides and skins.

(a) An improvement of the situation involves different aspects such as the breed and slaughtering of the animal, the flaying, processing, grading and transportation.

(b) The present method of drying hides on the ground must be replaced by suspending them in frames. This can almost eliminate putrifaction and helps to keep the hides clean.

(c) Using the proper kind of salt helps in avoiding permanent dark spots on the hide.

By making national standards as universal as possible, exchange of goods can be carried out between various countries, and the adoption of practices in the industrial process and basic rules from industrialized countries will greatly enhance technical progress in a country like Ethiopia. It must also be pointed out that the setting up of standards will act as a stimulus for domestic production or in fields where domestic production is not feasible will facilitate imports.

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