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Every schoolchild in France has learned that the First Republic established the metric system in 1795. What is not taught, however, is that Napoleon I revoked this decision and that it was not until 1837 that King Louis Philippe finally made the metric system compulsory, which even caused a number of riots. The Netherlands, which has been "metric" without interruption since 1816, can thus claim to have been the first country to adopt the metric system.

I am not referring to these historical events in order to discuss questions of priority or precedence, but to stress that Europe - or at least Continental Europe - has considerable experience in the field of "metrication" and of metrology in general and is well accustomed to working jointly with international organizations. More specifically, everyone knows that the "Convention on the Metre" was signed in 1875.

It may therefore be wondered why it was necessary for the European Economic Community to be concerned about the differences between the laws of the Community Member States in this field before the enlargement that led to the accession of the United Kingdom and of Ireland.

It should be recalled first of all that not just one metric system but several systems were developed and used successively, and even simultaneously, X until the adoption of the International System by the world scientific community. It should also be remembered that metrology is not confined to defining the units to be used, but that, in the role of legal metrology, it must at least define the minimum performance of measuring instruments and the metrological requirements relating to products.

If no agreement exists in respect of this performance and these requirements, any commercial transaction is likely to be hampered by what we habitually call technical barriers to trade. It was precisely within the context of its

programme for the removal of intra-Community technical barriers - an indispensable condition for the free movement of products and the creation of the common market - that the Community had occasion to promote legislation relating to metrology.

It is not my intention today to describe in detail the legal procedures in accordance with which such provisions, based on Article 100 of the Treaty of Rome, are drawn up. In brief outline, they are as follows: the Commission of the European Communities, to which I belong, draws up proposals for directives after consultation with all the parties concerned (governments, industry, consumers, international organizations, etc.). These proposals are published officially and submitted for the opinion of the European Parliament and of the Economic and Social Committee. Subsequently, each proposal, accompanied by the opinions of the European Parliament and the Economic and Social Committee, is studied by the Council of Ministers and by the delegates of the governments of the nine Member States and, after having been amended to some extent, is unanimously adopted by the nine Member States. The directive adopted by the Council must be put into force in the Member States without amendment within a fixed period, which is generally eighteen months. If it subsequently proves necessary to amend the directive in order to adapt it to technical progress, a more flexible procedure that does not require unanimity has been laid down: the representatives of the Member States are convened by the Commission to study a draft amendment and vote on the text. A majority of votes, weighted in accordance with Article 148 of the Treaty, enables the Commission to adopt a directive amending the initial directive, which imposes similar obligations on the Member States.

In the field of metrology, the first directives adopted by the Council date back to 1971, but the work has been actively continued and twenty-three directives have so far been adopted by the Council; two of them have been the subject of Commission directives for adaptation to technical progress.

Each of these directives concerns a particular aspect of legal metrology, and, for purposes of classification, those relating to units, to instruments and to products can be distinguished; we shall now briefly review these subjects.

#### THE UNITS

When the problems associated with units of measurement in the European Community are being discussed, everyone thinks of the differences that exist between the metric systems and the Anglo-Saxon systems. Within the European Community, however, it was in 1970, long before the enlargement, that the Commission proposed to the Council a directive to standardize the

system of units used by the Member States. This proposal, adopted in September 1971 by the Council, which still had only six members, obviously made no reference to the units of the Imperial system. It was, however, a very courageous proposal, since, in referring to the decisions taken in the context of the General Conference on Weights and Measures, it made the use of the International system units obligatory and even then provided for the future disappearance of units which, although not in conformity with this system, were, and unfortunately still are, very widely used. This is particularly the case with the units of the so-called "practical" system, in which the kilogramme is considered as a unit of force - force example, from 31 December 1977 it will be forbidden to perform pressure measurements or to express their results in kg/cm<sup>2</sup> (if these values are to have any legal or commercial validity). In the same spirit, it was also decided to abolish at the same time the use of the calorie, a unit of energy that is, however, much used in thermology and in dietetics. Certain units were nonetheless left in abeyance, but it was planned that the Council would likewise decide their fate before 31 December 1977. It goes without saying that the application of this directive to the United Kingdom and to Ireland presented certain difficulties when the Community was enlarged. The Treaty of Accession then supplemented the directive adopted by taking into consideration the units of the Imperial system, which were dealt with in a special annex; all the Member States agreed to postpone the decision to be taken in this regard, but in order that the delay might not be too long they fixed 31 August 1976 as the deadline for this decision.

This was the decision which gave rise to the new directive adopted by the Council in July 1976; but that directive combines three points of concern. First of all, it takes into account the latest decisions of the General Conference on Weights and Measures, taken at its fifteenth meeting, held in Paris in May 1975, and accordingly introduces into Community legislation the latest prefixes and names of units recently accepted by the most representative world scientific bodies. Secondly, it adopts a new classification for the units in respect of which the Council took no decision in 1971 : in principle, they should be dropped before 31 December 1979, but in the case of some of them, particularly those relating to radioactivity, it was simply decided to review them before the end of the decade, since their abrupt removal was considered to be premature as long as the corresponding units of the SI system had not yet proved their worth in the laboratories and health services.

Finally, it also divides the units of the Imperial system into three categories : those due to disappear by the end of 1977, those due to disappear by the end of 1979 and those that have been granted a further stay of execution and whose fate will be the subject of further deliberation before the end of the decade.

As regards this last point - one on which the Anglo-Saxons are so sensitive - the Council subscribed to the Commission's view that it was not desirable to propose overturning the "British way of life".

It is normal and reasonable to envisage a gradual and progressive transition to the International system of Units, which is simpler, more coherent and accepted by the vast majority of governments and individuals. British and Irish industries, for their part, are suffering considerably from the handicaps imposed by the dual system of units with which they have to juggle when products intended for export or for the internal market are involved : complications in respect of bookkeeping, multiplication of stocks, numerous risks of misunderstanding; for the most part they want metrication to take place as quickly as possible.

This is not true of the Anglo-Saxon consumer, who will be reluctant to relinquish the degrees Fahrenheit and the pints to which he feels a sentimental attachment and which represent for him something infinitely more intuitive than the corresponding metric values.

The Council decision, too rapid for some and too hesitant for others, seems, however, to have struck a balance between the necessity for an inevitable development and that of not provoking emotional reactions.

By the end of 1979 the Commission will, of course, have to present to the Council a new proposal that will settle the fate of the units left in abeyance and, if necessary, will propose a review of the timetable drawn up for the disappearance of certain units. This proposal will take account of metrication trends, primarily in the United Kingdom and Ireland but also throughout the world.

#### MEASURING INSTRUMENTS

As regards instruments, the Community has been concerned with the most disparate sectors, granting priority, of course, to those which are most important from the standpoint of trade, whether in the instruments themselves or in the products to which the instruments are applicable.

Hence the directives adopted relate to various types of weighing instruments and to weights, to gas meters, to liquid meters and to accessories for these meters, to linear measuring devices, to the gauging of tankers, to electricity meters, to clinical thermometers, to alcohol tables and alcoholometers, and to taximeters.

Among the Commission proposals being studied by the Council, the following should be mentioned : measuring systems for liquids other than water, check-weighing machines, and the charges made when gas meters are inspected.

This variety of subjects shows that the Community has not relaxed its efforts since 26 July 1971, when the Council adopted the first directive in this field - known as the "outline directive" - which concerns "the approximation of the laws of the Member States relating to common provisions for both measuring instruments and methods of metrological control".

This directive defines the Community control procedures which are a necessary condition for the free movement within the Community of measuring instruments and of products in respect of which certain directives lay down metrological data, that is to say precise conditions concerning the physical quantities to be measured, for example weight or volume.

The necessity for such a directive had long been recognized by the Commission, which in 1966 had presented an initial proposal in this regard. The considerable differences of structure and competence between the inspection bodies in the various Member States caused numerous difficulties in the Council and it was not until a second proposal had been presented by the Commission in 1970 that agreement was reached.

The two Community procedures thus instituted, which are applied regularly, though in a flexible and appropriate manner, in the various special directives, each of which concerns specific instruments, are EEC pattern approval and EEC initial verification. They obviously involve reciprocal recognition of tests; in other words an instrument which belongs to a series the pattern of which has received EEC approval (where this is required) in one Member State and which passes the tests required for EEC initial verification to the satisfaction of an official testing laboratory (again where this formality is required) is entitled to move within the entire Community without ever again being subjected to any test other than routine checks on proper functioning, to which all the instruments are subjected in the Member States, (mainly in order to prevent frauds.) X

The EEC pattern approvals are published in the Official Journal of the Community and the Commission was notified for this purpose of more than one hundred EEC approvals in 1976 involving weighing machines, gas-volume meters, linear measuring devices and liquid meters alone. It is very difficult to describe here the scope of the various special directives without going into technical details. Let me say merely that each of them describes, in respect of each instrument, the metrological characteristics required in order that it may circulate freely within the Community : accuracy, reliability, maximum permissible tolerances during measurements. Very often, it also gives design specifications from which it is possible to determine the minimum degree of sturdiness required by instruments that must be capable of functioning for many years under difficult operating and environmental conditions without giving rise to appreciable errors. (Think, for example, of weighing scales in shops or petrol pumps in service stations).

The units used must, of course, belong to the International System.

Lastly, these directives set out the rules in respect of manufacture and presentation that must be complied with in order that those instruments that are used - as is generally the case - in commercial transactions enable each of the parties involved to understand the full meaning of the readings provided. This is particularly important when one of the parties is a customer without any specific training, whereas the supplier is accustomed to using the instrument. It is desirable to avoid as far as possible any risk of fraud, tampering or improper use of the instruments. Technological development is very rapid in this field. In particular, the increasing use of electronics results every year in the marketing of new types of instrument. It is thus necessary to update continually the directives adopted by the Council in order, on the one hand, that instruments based on new technologies or methods may benefit from the Community market, and, on the other hand, that these techniques may be used to improve the quality of the instruments entitled to benefit from this market.

Consequently, the Commission has already revamped several of the directives adopted during the last few years. As early as 1974 it issued a directive amending the Council directive of 1971 on gas-volume meters and, in 1976, a directive amending the 1971 directive on weighing machines. Other adaptations to technical progress are in hand. Obviously, the work that these adaptations entail for the competent departments of the Commission is increasing rapidly with the number of subjects covered by the Council directives. But this constant review of the results obtained, which is a function of scientific and technological progress, is indispensable if the Community laws are always to be up to date. By undertaking the harmonization of legislation in this field, the relevant Community bodies have taken a path that they will have to follow as long as the Community exists.

## PRODUCTS

It is not only instruments that are required to possess defined metrological characteristics. When the consumer purchases a pre-packed product, whether solid or liquid, the net weight or volume of which is marked on the package; he must be able to believe that the packet, tin or bottle for which he has paid contains the requisite quantity, that is to say has been adequately filled. This is an indispensable condition. It is also necessary, however, for the laws to cover another aspect: for the protection of the consumer, there must be some control over the quantities in which a given product may be sold.

In the past, there has never been any lack of manufacturers who exploited loopholes in the regulations in order to place on the market new containers that appeared more advantageous to the customer but in respect of which the changes in price and in quantity that had been made offset each other in such a way as to reduce, or even cancel out altogether, this apparent advantage.

How can a consumer readily compare two similar products if they are offered for sale at different prices and in different quantities? These difficulties are not new, and, for a number of years, several Member States had had laws, either actually in force or in course of preparation, to limit the abuses that were prevalent. It is clear, however, that such measures taken independently at national level could result in the compartmentalization of the Community market: a product conforming to the dimensions, weights and tolerances laid down in one country might be rejected in another country where the specifications were different. If manufacturers are forced to put up their products in different forms according to the Member State in which they wish to sell them, the economy of scale that the Community market is supposed to represent will no longer exist and the consumer will have to pay the additional costs besides having his freedom of choice reduced.

Community legislation is therefore necessary.

At the end of 1974 the Council adopted a directive in this field dealing with most beverages (wine, milk, beer, alcohol, fruit juices, etc.) together with a directive relating to bottles used as measuring containers. It was desirable to separate the responsibilities clearly, since the bottle manufacturer cannot be held responsible for the quantity of liquid held by the container, while the bottler cannot guarantee to provide a specific quantity if the capacity of the bottles is not defined with sufficient precision.

The directive on beverages also made a fundamental decision in respect of the principle of filling, which must be such that the quantity actually contained is at least equal on average to the value stated on the container and must fall within strict tolerances. This principle, although recognized by the vast majority of countries, was resisted for a long time by the advocates of the "minimum value" principle, who wanted the quantity contained to be at least equal to that indicated. Their argument was that the consumer cannot ascertain whether or not there is a fraud when he receives a bottle the content of which is within the permissible tolerances but is less than the quantity indicated, since the principle followed in the directive implies the purchase of a sample that is statistically representative of the production.

This is in fact an illusory problem, since the statistical scatter at the time of filling still exists and there is no country in which a manufacturer can be prosecuted unless a "reasonable number of the products tested" has been examined. But the fact of authorizing only a small percentage of products below the established value inevitably induces the manufacturers to overfill as a matter of course, and the customer pays for this. The two systems thus lead to equivalent results.

In addition, the directive provides for a severe statistical check at the filling and importation stages and lays down, for each of the categories of liquid in question, the volumes which must be permitted to circulate freely within the entire Community.

This directive will, of course, undergo adaptation to economic and technical developments. When adopting it, the Council also requested the Commission to present new sets of permissible values before the end of the decade and to reduce the number of those which had had to be included on account of the confusion on the community market. Despite its imperfections, however, this directive represents undeniable progress in comparison with the situation that previously existed and it is already reducing very considerably the uncontrolled proliferation of volumes that prevailed in a number of Member States. Nevertheless, further improvement is necessary. For this reason the Commission, having regard to the development of international trade, has decided to place a new proposal before the Council in 1977. It will take account of the recent decisions in the United States concerning permissible dimensions for wine and spirit bottles and will probably try to come into line with them. It is by no means the intention of the Community to raise around itself the very barriers it is trying to abolish between the Member States. This is an important point to which I shall return.

Another directive, adopted early in 1976, extends to all prepackaged products the principle of the mean value, the tolerances and the verification methods defined in the directive on beverages. The problem of permissible tolerances is very tricky here, since not all products are conducive to ease of filling, and it was necessary to distinguish between two categories of tolerance. Here again, the Council requested the Commission to present new proposals as soon as possible to enable it to form a better idea of the permissible distinctions on the basis of a more detailed analysis of the characteristics of the products concerned. Previously, however, the Commission had drawn up a new proposal for a directive, which laid down the ranges of permissible values for numerous products, whether these be foodstuffs, cosmetics or cleaning products. This proposal for a directive was forwarded in July 1976.

But even after this latter proposal has been adopted it will be necessary to supplement and adapt it, in order on the one hand to extend its scope to products in respect of which it had not been considered useful - or possible - to come to an agreement, and on the other hand to take account of trends in production and trade as well as of progress made in manufacturing techniques.

It therefore appears that, in the field of products as well, the work of the Commission is far from finished and that during the next few years there is likely to be an uninterrupted flow of new proposals and new Community decisions amending or supplementing the directives already adopted.



REMARKS AND CONCLUSION

What I have just said shows the continuous and necessary evolution of Community legislation on metrology. It is clear that, in order to prepare their work of adaptation, the competent departments of the Commission must be in contact with scientific and economic circles : it is not possible to draw up new texts or to amend existing ones without knowing what work has been undertaken by the international organizations, whether these be scientific, technical or economic bodies, intergovernmental agencies, standards institutes or professional associations.

In connection with units of measurement it has already been necessary to mention the General Conference on Weights and Measures. Where instruments are concerned, the International Organization of Legal Metrology to which are affiliated the metrological services of a large number of countries, prepares and publishes recommendations which almost always serve as the basis for Community activities. As I said before, it is not the way of the Community - the world's leading commercial power - to seek to promulgate rules that could hamper trade with non-member countries. Wherever possible therefore, it tries to follow the recommendations of the international organizations without being in the least concerned if these organizations transcend by far the framework of the Europe of the Nine. In practically all sectors, moreover, the professional federations bring together not only Community manufacturers but also those from neighbouring countries, and the technical and scientific organizations are more often than not on a world scale.

Where products are concerned, although the statistical control methods were based largely on those developed by the International Organization for Standardization (ISO), the principle of the mean value was recommended by the relevant working party of the "Codex alimentarius" (set up jointly by the FAO and the WHO) before being adopted in the Community directives; with regard to the permissible value ranges, the competent departments of the Commission had contacts not only with about one hundred European professional associations and various Community consumer associations, but also with a large number of non-member countries to learn about their relevant laws, their intentions and their requirements.

It would thus be absurd to regard this work and the Community laws that have been adopted as matters that were settled in ivory towers in the absence of any contact with or comprehension of economic realities, in order to pursue a policy that nothing could influence. The snail's pace at which each text progresses (when a new subject is involved, several years elapse between the beginning of the work and the adoption of the text !) is the very proof of the profusion of information that it was considered necessary to collect in order to draw up the text. This also provides the certainty that all the bodies involved and all the economic sectors concerned were able to make themselves heard. This is no will for protectionism but a continuous and unflagging effort to translate into Community law the decisions which, in wider contexts, have been defined as scientifically or technically the best.

Where a will exists, it is the will to progress along this path. Despite the progress achieved over the last six years, much still remains to be done, both in promoting the use of the International System of units and in harmonizing the laws in new sectors, in addition to maintaining at a high level the technical standard of the directives already adopted. The measure of success achieved in spite of the burden of work - measure which is far from being negligible in such a short time - is the proof of this will to have common methods of thinking and of working in this sector. The primary aim, of course, is to facilitate trade, but the better understanding between the various quarters concerned that resulted from the discussions must not be underestimated.

The Commission of the European Communities is certain that, by continuing to work along these lines, it is helping to strengthen the bonds that exist between the Member States of the Community on the one hand and between the Community and the rest of the world on the other. There is still a long way to go, even in the field of metrology alone, but the results already obtained justify a reasonable optimism, and the fact that the task is proving to be a long and difficult one is no reason for abandoning it but rather an additional reason for not abating our efforts.

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