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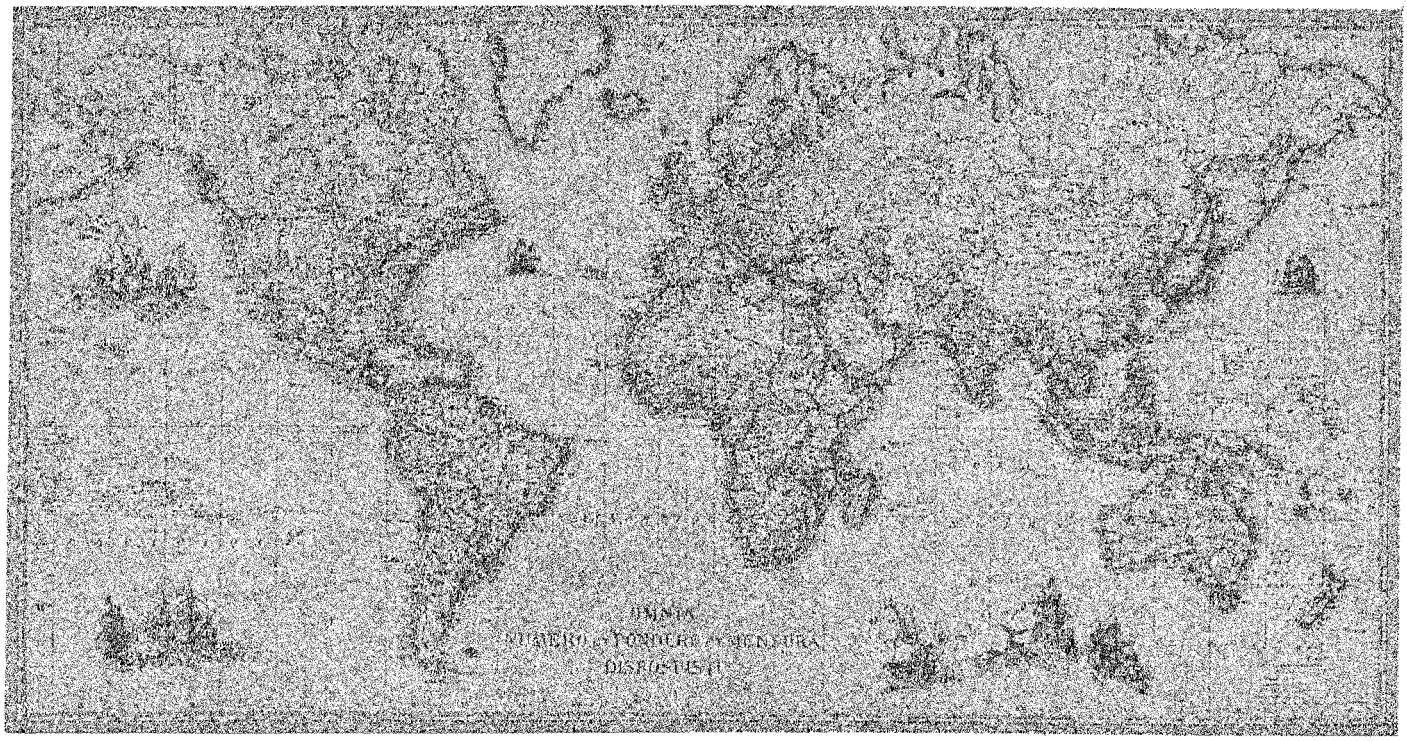

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OIML SEMINAR

PREPACKAGED PRODUCTS

Berne, Switzerland — 6-8 June 1983

This OIML seminar was made possible thanks to the invitation of the Federal Office of Metrology of Switzerland, located at Wabern in the suburb of Berne.

The subject of the seminar concerned requirements for and methods of testing of net content of prepackages and was directly related to the activities of the OIML pilot secretariat SP 20 and its reporting secretariats. The three-day seminar was followed by a two-day meeting of these secretariats allowing participants who so desired to attend both events.

The seminar was attended by 38 participants from 12 member countries and 3 corresponding member countries. The Commission of the European Economic Community had also sent a representative.

The aim of the seminar like the previous one on electronics was not to duplicate work of the relevant OIML secretariats but to discuss problems related to official testing and practical implementation of various national requirements. The representatives of the pilot and reporting secretariats present were thus given an excellent opportunity to sum up the views on the various technical problems treated in the presentations and the subsequent discussions.

There were 18 presentations as shown in the list below. Several of these papers will be published in the OIML Bulletin starting with this issue.

The BIML and all the participants greatly appreciated the hospitality offered by the Federal Office of Metrology and the excellent facilities provided for the seminar. Special thanks are addressed to the Director Mr. A. PERLSTAIN and his deputies Messrs P. KOCH and J.M. VIRIEUX.

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* Presentation published in this issue of the Bulletin.

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REPUBLIQUE FEDERALE D'ALLEMAGNE

LEGAL REQUIREMENTS and ENFORCEMENT of PREPACKAGE CONTROL in the FEDERAL REPUBLIC of GERMANY *

by Dr A. STRECKER
Bundesministerium für Wirtschaft, Bonn

1. The Effects of the New Regulations on Quantities in the Calibration Law and the Order on Prepackages

The principle of the « standard measure requirement » introduced in § 15 of the Calibration Law (Eichgesetz) in the Federal Republic of Germany, i.e. the requirement that the average quantity should at least be the same as the nominal capacity posed considerable problems to all concerned in the drafting of the Calibration Law at the time. There were three basic approaches to the problem : firstly, the formula that the quantity in a package must not be less than the nominal capacity, i.e. what is stated as the quantity in the package (minimum quantity principle). This makes the administration and control very much easier. Checks can be made at any stage as to whether the regulation has been followed, as long as the requirement is not limited to the point in time when the package is filled but made general. It means that every filler has first to put in a greater quantity than the nominal capacity, or to state a smaller quantity - in any case he has to adjust his equipment to a higher quantity. To what extent, depends only on the nature of the product. But if only the point in time when the package is being filled matters, the regulation can entail considerable excess quantities, anything up to 10 or 20 %, if a product is difficult to package so that larger units are involved.

Tackling the quantity problem in this way and issuing new orders containing this formulation would very certainly have brought general and immediate price increases for consumer goods of 10 % or even 20 %, since the packers and wholesalers could not have added excess quantities of this order without price increases. This solution would therefore only have benefited the administration ; economically it would not have been feasible, the undesirable effects (on competition between large and smaller firms as well) would have been too great. In drafting the new Calibration Law a formulation of this nature was therefore not considered.

The second possibility was not to require a minimum compulsory quantity, but to express this in terms of the quantities for the individual product, in other words the nominal quantity. A tolerance requirement could therefore have been attached, determined by the way the product is packed (standard tolerance principle). This was the solution envisaged in the early drafts of the legislation and formulated by the Federal Government, but although it would have avoided the faults of the minimum quantity principle it would have had other disadvantages. The main disadvantage was that the requirement would have made it possible for manufacturers always to fill to below the standard quantity as long as they remained within the tolerance allowed. There was no average or mean requirement to prevent this. An

* This is an abridged version of a paper presented at the OIML seminar on prepackages in Berne, Switzerland 6-8 June 1983.

order forbidding manufacturers always to utilize one side of the tolerance margin would not have sufficed, since in practice it is extremely difficult to establish that they are doing so. The order would have been of more theoretical than practical value. The only solution was therefore to use a system of average requirements for prepacked products (average quantity principle). Average here means an average quantity of a larger manufactured amount. The requirement is supplemented by minus tolerances, although, depending on the technical properties of the product and equipment these can be exceeded by a small amount. To prevent the negative error from being too large, a second requirement has been introduced forbidding a product to be sold if the package contains less than a certain minimum quantity.

The following objections were made to the average quantity principle : a package of 5 kg nominal capacity, for example, containing a product which is difficult to pack, consisting perhaps of lumps, could contain only 4 900 grammes, and packages permitted to go below the tolerable negative error, as little as 4 750 g. In the latter case, therefore, the package would contain 250 g less than the nominal capacity and in the former, with normal negative tolerances, 100 g less. This would really be to deceive the customer, for he expects a package to contain the quantity stated on it.

The argument presupposes that the customer has minimum expectations regarding the quantity of the product. Apart from the fact that this is questionable, certainly if consumers were once informed on filling techniques and equipment, it is also to overlook the fact that the technical nature of the filling process means that the same number of packages containing more than the stated amount is just as likely to result as under-filled packages, although all the argument is concentrating on these. The counter argument, that one cannot expect to find excess quantity to the same extent as inadequate quantities, i.e. one cannot expect a certain balance in practice, is statistically false although it is often put forward.

Of course the individual customer, who only buys one package, may get short weight. But if the packing plant succeeds in utilizing the permitted tolerances properly there should be 50 % of the packages with quantities within the negative error margin, in this case under 5 kg, and 50 % above. If a consumer only buys a package once in his life, the most he can lose is 2.6 %, so that if the package costs DM 1.00 he has lost 2.5 pfennigs. But if he buys a package once a month or once a week, he is likely to get as many overweight as underweight and over the course of time they should balance out on statistical average. If he buys a package once a month, the most he can possibly lose will drop in the course of a year to about 0.7 %, and if he buys one once a week to less than 0.4 %. As time goes on losses drop to zero. The same applies on the plus side, for there is one customer who gains for every one who loses.

In any case only one in about every 200 customers will lose at all. It can therefore be stated that as time goes on the maximum possible loss which can accrue to a customer under a system of average requirements will show a progression towards zero, while the loss for the manufacturer with minimum quantity requirements will remain unchanged over time. Clearly the manufacturer will therefore base his calculations, if he is forced to observe minimum requirements, on the excess quantity, i.e. there would simply be a shift in prices, or the nominal quantity will simply be observed, and the requirement will not benefit the consumer at all.

2. The German Experience with the Average Quantity System

In the industrial production of prepackages a system of checks and controls is needed, and this must be adjusted to the conditions in the plant. A control card system is not only a means of checking, it is also and indeed first and foremost a steering instrument for industrial mass production. It enables intervention if less than the required quantity is put into the packages, so that the official regulations can be kept, and it also enables the manufacturer to avoid overfilling. The

appropriate control system can enable a maximum of accuracy in filling, and this will have considerable cost advantages.

It is only possible to oblige companies to carry out plant controls in the required sense within national borders. But it is not possible to check all imports of prepacked products for accuracy. The customs and other authorities have to rely on the documents from the third country. Importers should be obliged to make contractual arrangements for control cards to be provided by the foreign manufacturer when each lot is being produced and sent with imports from third countries. For this reason it is not feasible to exempt certain products altogether from obligatory checking and control, as was envisaged, for example, in the two EC guidelines of 1975 and 1976, if calibrated measuring instruments were used in the production or if bottles could be used as the standard measure. These cases of exemption have in the meantime been reincluded in the requirements. In any case, exemptions of this nature are not in keeping with an average quantity system. Neither the use of a calibrated measuring instrument in filling, nor the use of bottles as measures alone would ensure that the requirements are being met.

However, special regulations are necessary in some cases on checks and control cards. They are needed if :

1. Measures are being used which permit the plant to operate solely with initial controls and simple control instruments such as stereotype measures ;
2. Only small amounts are being filled, generally only to be sold on the domestic market ;
3. Filling is mainly by hand (in the crafts, for instance), again largely for the domestic market.

Official controls in Germany are to a binding plan (Appendix 4 to the Prepackage Order), and the authorities are entitled to carry out modified checks in certain cases (e.g. when measures are being used or small quantities filled). Fines may only be imposed if the control has been carried out to the official plan. The two EC guidelines on prepackages of 1975 and 1976 only give two specific reference methods, in their Appendices, although Appendix 1 to the Guidelines states that these reference methods should be regarded as having the validity of a control plan. So the national plans must be comparable with the reference methods described in the Guidelines. This means not only comparable acceptance figures, it covers the entire field of application of the plan.

The main disadvantage of simple control plans as given in the EC Guidelines is that the random samples to be taken from individual batches are almost 50 % larger than given in Appendix 4 to the Prepackage Order. The difference between the two plans could in practice presumably mean that in rare cases the results of the checks would not be queried, although the regulations were not being kept, if the German plan were used. On the other hand, however, the German plan means that 50 % more controls are being carried out, so that more plants are being checked and so there is more room for query.

The effectiveness of the controls in the next few years will very largely depend on the extent of controls exercised in the other EC member states, and not on how strict the individual plans are. It should be remembered that the result of the two Guidelines is that prepackages, which are imported from individual member states to the Federal Republic of Germany after the Guidelines come into force can no longer be checked. Should the tests carried out in the other member states be far less stringent, for instance, if checks are only carried out on individual plants once a year, there would not only be disequilibrium but also distortion to competition for the plants in the Federal Republic of Germany which are subject to stricter controls. Here one may well ask, how the consumer would benefit if in isolated cases there is no query on slight deviations from the regulations, while thousands of plants are not being controlled at all.

Checks of contents of prepackages have been performed in the Federal Republic since 1972. The number of checks performed has steadily increased up to 1977.

Since that year up to the present the number of checks has remained constant at between 55 000 and 60 000. Arithmetically this would be equal to between 3.5 and 4 million prepackage checks performed annually by the calibration authorities from 1977 to 1982. This number of checks ensures that every packer in Germany is subject to inspection at least once a year. Imports are also inspected regularly. In the event of non-compliance with requirements packers will have to expect subsequent inspections ensuring that packing operations are properly performed.

The following product groups have been selected to illustrate the situation :

1. *Liquid Food Products :* Since 1978 non-compliance with standard measure requirements increased from 4.7 per cent through 5.9 per cent to 6 per cent in 1982 ; negative errors remained relatively constant at up to 1 per cent. Certain products, such as spirits and edible (cooking) oil recorded particularly high rates of non-compliance, e.g. in the case of spirits between 13 and 15 per cent between 1977 and 1982, but no more than 10.3 per cent after taxes on spirits had been raised. In the case of edible (cooking) oil, the rate of non-compliance between 1977 and 1980 was between 9.5 and 18.5 per cent, falling back to 8.8 per cent in 1982. The high prices of these products induced packers to pack too close to the mean value.

2. *Non-liquid Food-Products :* Non-compliance with standard measure requirements declined continuously between 1977 and 1982 from 11.4 to 8.3 per cent. Standard measure requirements were particularly difficult to comply with in the case of calibrated poultry (irregularities of up to 27.4 per cent and up to 50 per cent for imports), because of the technical problems involved in standard measuring, and in the case of sugar confectionery because of the many small packers. Formerly minor violations of tolerances permitted increased in number in 1977 when the tolerance margin was narrowed from 5 to 2 per cent (variations of up to 9 per cent), but subsequently fell again back to about 2 per cent.

3. *Non-food products :* Irregularities in this category are hard to assess because of the very large variety of products covered (ranging from detergents to hardware, from yarns to fertilizers). Generally speaking, variations from standard measures would however tend to decline.

4. *Pharmaceuticals :* Variations from standard measures have almost invariably been small amounting in 1982 to no more than 3.3 per cent for the standard measure and often to no more than 1 per cent for negative errors.

ETATS-UNIS D'AMERIQUE

PACKAGING and LABELLING in the UNITED STATES *

by **E. VADELUND**
National Bureau of Standards, USA

Introduction

The regulatory control of packaged goods has probably been the most rapidly growing element in the weights and measures field in the past twenty years. The number and type of packaged goods made available to consumers has had the effect of increasing the responsibility of regulatory officials. And the end does not appear to be at hand. Many new packages are introduced each year. Fortunately or unfortunately, the failure rate is high, but it doesn't seem to deter producers.

Background

In the decade between 1955 and 1965, the attention of weights and measures officials in the United States became more and more occupied with packaging and labelling issues. The use of prepackaging scales for random weight meat and poultry products became widespread. The growth of self-service supermarkets was at a rapid pace. A related, but very important development, was the growth in the manufacture and sale of television sets which provided packagers with the means to reach the entire nation with advertising for their goods. In effect, this promoted a national market for packaged goods.

At about the same time, the consumer movement in the United States was increasing in size and importance. Several State governments established consumer offices and the national government followed by establishing the Office of Consumer Adviser to the President.

Halfway through the decade, the National Bureau of Standards published a package checkweighing manual, Handbook 67, for use by legal metrology officials. The availability of the checkweighing manual provided officials with methods by which they could systematically control packaged goods, and a number of States began package checking programs. Quite naturally this drew attention to labeling.

All of these developments were brought to focus on packaged goods and particularly on their labels. Numerous shortcomings were noted. Although legal requirements for package labeling were in place, they were very general in nature both at the State and Federal government levels. Legally required package label information was often obscured through the use of very small print, non-contrasting colors, or by locating the information in the middle of a large body of label copy. In some cases, the required information was missing entirely.

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* Paper presented at the OIML seminar on prepackages in Berne, Switzerland 6-8 June 1983.

Legislative Activity

Attempts to improve package labeling began with the National Conference on Weights and Measures. This is an organization of legal metrology officials from all levels of government, plus representatives of industry, trade associations, consumer groups and the like. One of its main concerns is the development and promotion of uniform legislation throughout the fifty States. It had developed a Model Regulation Pertaining to Packages. Amendments to this Model were proposed to make required label information much more definite and conspicuous, particularly the quantity declarations.

While the States were working to change their requirements, the United States Congress became concerned with packaging and labeling. In 1961, the United States Senate passed a resolution authorizing exploratory hearings on packaging practices. The purpose was to determine general reaction to possible legislation. As an outgrowth of these hearings, legislation was introduced in 1962 and immediately became identified as the « Truth In Packaging Bill ». In 1963, a second version of the legislation was introduced. The hearings on these bills demonstrated that consumers were unable to compare values between and among packaged products because they were unable to locate the necessary label information. When consumers did find the quantity information, it was often in such varying sizes that complicated mathematical calculations were necessary to make any comparisons.

The debate on the proposed legislation continued for several more years. Finally, in 1966 the U.S. Senate passed the bill and later that year the U.S. House of Representatives voted almost unanimously for it. The bill, renamed the « Fair Packaging and Labeling Act », went into effect in July 1967. This Law established a national policy.

Policy and Purpose

Section 2 of the Fair Packaging and Labeling Act clearly states the policy of the Congress as follows :

> Informed consumers are essential to the fair and efficient functioning of a free market economy. Packages and their labels should enable consumers to obtain accurate information as to the quantity of the contents and should facilitate value comparisons. Therefore, it is hereby declared to be the policy of the Congress to assist consumers and manufacturers in reaching these goals in the marketing of consumer goods.
>
> To fulfill this policy, the Act has three basic purposes :
>
> (1) the establishment of nationwide uniformity of package labeling requirements ;
>
> (2) the clear, conspicuous and definite declaration of identity, quantity of contents and origin of packages ; and
>
> (3) the « standardization », where possible of the quantities in which packages of consumer goods are offered for sale.

The first two purposes are clearly directed to labeling, while the third is concerned with packaging.

Nationwide Uniformity

The absence of uniformity in package labelling was one of the most often heard consumer complaints during the legislative debates on the Fair Packaging and Labelling Act. The non-uniformity was a direct result of the fact that labelling

requirements were general in nature and the responsibility was diffused between the national and state governments.

The new Law remedied the problem by preempting all state and local requirements that differed from the newly established national requirements. The preemption provision essentially forced all the States to change their requirements and this effort has been very successful.

Labelling Requirements

The Act directed the regulatory authorities to issue certain mandatory labelling requirements and permitted them to issue additional requirements if abuses were found. Mandatory requirements included :

(a) the identity of the commodity,

(b) the name and place of business of the manufacturer, packer, or distributor, and

(c) the net quantity of contents in terms of weight, measure, or count.

The requirements concerning net quantity statements received the most attention in the regulations. It is required that :

(1) the declaration of net quantity be separately and accurately stated in a uniform location upon the principal display panel of the package ;

(2) it must be in a conspicuous and easily legible type in distinct contrast with other matter on the label ;

(3) it must be in letters and numerals at least as large as a prescribed type size established in relationship to the area of the principal display panel ;

(4) it must be uniform for all packages of substantially the same size ; and

(5) it must be so placed that it is generally parallel to the base on which the package rests as it is designed to be displayed.

In addition, the use of qualifying words or phrases with the mandatory quantity declaration (e.g., « giant pound ») is prohibited, but supplemental statements of net quantity are permitted so long as such supplemental statements do not include any term qualifying a unit of weight, measure, or count that tends to exaggerate the quantity contained in a package. Frequently supplementary quantity information, such as the number of items in a package, is helpful to the consumer in making a selection.

To overcome what was identified as a cause of serious consumer confusion, the regulatory agencies were directed to issue regulations which require that whenever there appears on the label of a package a representation as to the number of servings of food products, there also shall appear a statement of the net quantity of each such serving.

Discretionary authority is given to the regulatory agencies to issue regulations designed to establish and define terms used to characterize the size of packages, such as « small », « medium », and « large » ; to regulate the use of any marketing technique which represents, by implication, that a commodity is offered for retail sale at a price other than the normal retail sale price ; to require inclusion on the label of a package of consumer commodity the common name of the commodity and, in the case of a commodity consisting of two or more ingredients, the common name of each ingredient, listed in order of decreasing prominence ; and to prevent non-functional-slack-filling of packages. Non-functional-slack-fill was defined as filling to substantially less than a package capacity for reasons other than the protection of the contents or the limitations of the packaging machinery.

Package Standardization

The third purpose of the Fair Packaging and Labelling Act was to ease the consumer's burden in making value comparisons by reducing the number of quantities in which consumer commodities are offered for sale. No regulatory authority was provided for this purpose.

The National Bureau of Standards was assigned the responsibility of working with industry to develop voluntary reductions in package quantities. Such voluntary efforts were designed to promote sound consumer judgment in the marketplace. Agreements to reduce the number of packages were reached with approximately 50 industries, and major reductions were achieved. However, the effort had limited success because of both technical and cost reasons, and because of the introduction of unit pricing. Package quantity standardization serves the same consumer purpose as unit pricing. It enables the consumer to make value comparisons at the point-of-purchase.

Voluntary Labelling

Currently in the United States there are two voluntary labelling practices that should be mentioned. The first, of course, is the addition of metric equivalents to the required quantity statements. The legal labelling requirements at both national and state government levels permit the addition of metric quantity statements to package labels. In 1975, the Metric Conversion Act was passed which encouraged this voluntary use of the metric system. (More recently, wine and alcoholic beverage packages - not including beer - are required to be labeled in metric terms).

A second voluntary labelling practice is the use of fill weight labelling on packaged fruits and vegetables. In 1976 a consumer group petitioned the government to require drained weight labelling on all canned fruits and vegetables. The canning industry responded that the cost of such a requirement would outweigh the consumer benefit and offered to voluntarily label the fill weight. The fill weight is the amount of solids placed in the can or jar prior to the addition of any liquid necessary for processing. The practice of providing fill weight labelling, rather than drained weight labelling, avoids the problems of establishing detailed test methods and inspection procedures which can only be carried out after the product has been packaged and offered for sale. Fill weights can be easily determined with the only disadvantage being that inspection and testing can only be done at the point-of-pack.

A third labelling practice in the United States that is, to a great extent, voluntary is open date labelling. It is true that some jurisdictions require open date labelling for some products ; however, the presentation of such information on package labels extends far beyond what is legally required. For example, there is no national requirement for open dating on packages of perishable food, yet many producers provide such information in the belief that it is a good marketing strategy.

Open date labelling presents some problems to both consumers and officials because of the variety of methods used to present the date. Confusion exists over whether to use a pack date, a sell date, or a use date. There is some reason to believe that all three methods of presenting dating information are equally useful, because of the different nature of the packaged products to which they apply. There is also the possibility that open dating, in some cases, could be misleading. This might be true, for example, where distribution practices for refrigerated and frozen items are much more critical in maintaining freshness than is presentation of a date.

Comparisons

In the past two years, the National Conference on Weights and Measures appointed a special study group to make comparisons between regulatory systems for

prepackaged commodities in various nations and the United States. Their chief concern was with the methods of inspection, the treatment of particular problem products, and the standards used for compliance. The study group obtained laws and regulations from approximately a dozen nations to make their comparisons.

We have taken advantage of the availability of this material to make a limited comparison of U.S. labelling requirements with those of other nations, most of whom are members of OIML. From this comparison, we were able to identify certain elements common to all and to draw some general conclusions. It should be noted, however, that this effort was not as exhaustive as we would have liked. We are not certain, for example, that we had all package labelling laws and regulations for any of the nations we looked at. We know that packaging and labelling authority and responsibility is spread throughout many agencies in the various levels of government in the United States. Perhaps the same is true elsewhere.

Despite these shortcomings, similarities were obvious. All of the nations required packaged products to be labelled with the :

1. Identity of the product
2. Quantity of the contents
3. Identity of the party responsible for the package.

The major differences we observed were in coverage and specific requirements. In the United States, labelling requirements are all-inclusive. What is not covered by national regulations, is provided for by state regulations. Therefore, every packaged product of every type of commodity is subject to very similar, if not identical, requirements. Our limited study indicated that many nations only provide for labelling of packaged food items.

As has previously been noted, U.S. requirements are very specific as to where a packer must label the quantity, how large it must be, how much space there must be above, below and to either side, and what terms may or may not be used. We did not find specific all-inclusive requirements of this kind in other national regulations.

Conclusions

There are certain conclusions that can be drawn. The variety and extent of packaged goods will increase. More and more the consumer will be making choices based on label information. They will look to legal metrology officials to establish and enforce requirements that minimize or eliminate confusion and deception. At the very least, the metrology services have to consider both the adequacy and the accuracy of label information.

There is sufficient common interest in, and common movement of packaged goods across national borders, to explore the possibility of harmonization of packaging and labelling requirements. We feel it is an appropriate issue for consideration by OIML.

ETATS-UNIS D'AMERIQUE

NET CONTENTS REQUIREMENTS and THEIR APPLICATION in the UNITED STATES *

by **Carroll S. BRICKENKAMP**
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The approach to net contents control in the United States is somewhat complex. Individual laws at the national level govern segments of the packaging industry according to the type of prepackaged goods produced, whether consumer or non-consumer, whether meat or non-meat food, whether economic poisons, etc. Laws at the State level govern prepackaged goods more generally but are, where authority is shared, usually constrained to be the same as or no less stringent than national laws. Federal and State agencies share concurrent authority over certain types of prepackaged goods. Different procedures are used by these agencies to determine compliance with the regulations. Different enforcement actions are taken when noncompliance is found.

In the United States the annual production of prepackaged consumer and non-consumer goods having net quantity of contents declarations on their labels is estimated to be at least 400 000 million packages [1], with a wholesale value exceeding 480 000 million dollars [2] in 1982. This includes the food and beverage industry (286 000 million dollars), the chemical industry (170 000 million dollars), the tobacco industry (11 200 million dollars), and the paper industry (10 600 million dollars). A further subdivision of these industries is presented in Table 1. Food and beverage manufacturing plants alone (not counting retail supermarkets that prepackage meat, cheese, and several other food products) number about 80 - 85 000.

Article I of the Constitution of the United States authorize Congress to « fix the standards of weights and measures » ; however, no general legislation has ever been enacted by that body to govern all types of packages with respect to weights and measures or net content control.

Although State laws concerning requirements of net contents to be applied to certain prepackaged commodities date from as early as 1869, the first Federal food and drug law [3] dates from 1906. This law was amended in 1913 to require the net quantity of contents to be stated on the outside of prepackaged goods [4].

Meat was separately covered by the Meat Inspection Act of 1906. A clarifying law was enacted in 1919 so that prepackaged meats also were required to contain a net contents declaration [5]. By 1946 Federal and State laws had been passed requiring net contents declarations on all prepackaged food and nonfood commodities [6].

Having evolved from these early milestones in law, present day Federal laws and regulations apply to specific categories of goods, not generally to all packaged goods. For example, there are separate net contents regulations for meat, for poultry, and for non-meat/non-poultry food packages. Table 2 identifies major Federal statutes under which net contents regulations have been promulgated. State weights and

* Abridged version of a paper presented at the OIML seminar on prepackages in Berne, Switzerland, 6-8 June 1983.

TABLE 1

RANKING OF CERTAIN PACKAGED GOODS PRODUCED IN THE U.S. IN TERMS OF WHOLESALE VALUE OF INDUSTRY SHIPMENTS IN 1982*

	In 10^9 dollars
Meat, meat products, poultry, and eggs	65.9
Milk, cheese, ice cream, butter	38.4
Industrial organic chemicals	23.7
Drugs	22.9
Plastics and resins	17.1
Bottled and canned soft drinks	16.8
Soaps, detergents, and other sanitation preparations	16.7
Inorganic chemicals	15.3
Bread and other bakery products	13.3
Agricultural fertilizers and pesticides	12.8
Paints, coatings, adhesives	12.8
Animal food	12.2
Malt beverages	11.5
Tobacco products	11.2
Soybean oil	11.2
Frozen foods	10.7
Paper products	10.6
Canned fruits, vegetables, preserves	10.3
Cosmetics	10.3
Candy, confections	6.8
Wine, brandy, and distilled spirits	6.8

TABLE 2

MAJOR FEDERAL STATUTES THAT PROVIDE THE BASES FOR NET CONTENTS REQUIREMENTS

Federal Food, Drug, and Cosmetic Act, as amended
(52 Stat. 1040 et seq. ; 21 U.S.C. et seq.)

Fair Packaging and Labeling Act
(80 Stat. 1296 et seq. ; 15 U.S.C. 1451 et seq.)

Federal Meat Inspection Act as amended by the Wholesome Meat Act
(79 Stat. 903, 81 Stat. 584 et seq., 84 Stat. 91, 438 ; 21 U.S.C. 601 et seq.)

Poultry Products Inspection Act, as amended by the Wholesome Poultry Products Act (82 Stat. 791 et seq. ; 21 U.S.C. 451 et seq.)

Federal Insecticide, Fungicide, and Rodenticide Act, as amended by the Federal Environmental Pesticide Control Act (86 Stat. 973 et seq. ; 61 Stat. 163 et seq., 7 U.S.C. 135 et seq.)

Federal Alcohol Administration Act
(49 Stat. 977 et seq. ; 27 U.S.C. 201 et seq.)

Abbreviations : Stat. = United States Statutes, 1980. U.S.C. = United States Code, 1976.

* U.S. Industrial Outlook 1983.

measures laws and regulations are general in nature and apply to all prepackaged goods. Table 3 identifies the division and sharing of authority in net contents compliance activities of Federal, State, and local (city and county) government agencies.

TABLE 3

CATEGORIES OF PREPACKAGED GOODS AND THE GOVERNMENT AGENCIES IN THE U.S. REGULATING THESE GOODS

Type of Package	Agency	Field Force	Time Devoted to Net Weight	Predominant Location of Test
Meat, poultry, meat or poultry product	Food Safety and Inspection Service, U.S. Department of Agriculture	8 000 Federal 2 000 State (8 600 inspectors licensed by foreign countries)	less than 1 %	packing plant
All other food, cosmetics	Food and Drug Administration, U.S. Department of Health & Human Services	600	less than 5 %	warehouse or plant level
Drugs	Food and Drug Administration, U.S. Department of Health & Human Services	(a)		
Pesticides	U.S. Environmental Protection Agency	(b)		
Certain non-food/ non-drug consumer packaged goods	U.S. Federal Trade Commission	(b)		
Alcohol & tobacco	Bureau of Alcohol, Tobacco, and Firearms, U.S. Treasury	500	(c)	plant level
All consumer and nonconsumer packaged goods	State and local Weights and Measures Departments, Bureaus, and Offices	3 000	from 1 % to 40 % (d)	retail-store level

(a) In-plant quality control requirements enforced.

(b) State and local government agencies do field inspection.

(c) Audit of inventories in order to assess tax is full-time task

(d) Final Report of the Special Study Group on Enforcement Uniformity, Report of the 66th NCWM 1981, U.S. Department of Commerce, NBS SP 629, p. 53, 1982.

The National Conference on Weights and Measures (NCWM) is a United States organization whose membership is comprised of State and local regulatory agency representatives (voting members) and business and industry representatives (non-voting members). Sponsored by the National Bureau of Standards (NBS), the NCWM seeks to achieve uniformity among individual State weights and measures laws and regulations and uniformity between State and Federal requirements. The NCWM

meets annually to draft, vote upon, and subsequently recommend to State and local agencies « model » laws, regulations, and test methods. The NCWM Model State Weights and Measures Law and Model State Packaging and Labeling Regulation have been adopted by a majority of States ; the Model Packaging and Labeling Regulation [7] will be cited as the example of State requirements.

Although not always identical in language, the legal requirements at Federal and State levels of government are sufficiently similar to permit concurrent jurisdiction. These requirements have traditionally been interpreted as and termed « average requirements ».

Two requirements on the quantity of contents of prepackaged goods must be met in the United States.

1. The average quantity of contents of packages in a lot, shipment, or delivery must at least equal the labeled quantity.
2. The variation of individual package net contents from the labeled quantity must not be « unreasonably large ».

Both requirements apply simultaneously to any given collection of packages.

Variations are permitted :

1. within the bounds of good manufacturing practice ; and
2. due to gain or loss of moisture, within the bounds of good distribution practice.

In order to convert these regulatory requirements into compliance testing procedures, it has been necessary to define what is an acceptable lot of prepackaged goods*. In general terms, a lot should be acceptable if its average net contents at least equals the declared net contents and no (zero) individual packages are unreasonably short measure. However, this definition does not permit sampling as a means of obtaining evidence of compliance, because sampling cannot guarantee that zero individual packages will be unreasonably short. Therefore, in order to permit sampling as a compliance tool, an acceptable lot has had to be defined as follows :

1. the average net contents at least equals the declared net contents ; and
2. no more than a very small proportion of individual packages in the lot are unreasonably short.

The next step in devising sampling plans for compliance testing is to determine what the probability of acceptance will be for acceptable lots. There are three alternatives (if we set aside for the moment requirements on individual package net contents) [8], [9] :

1. These lots could be given a « high » probability of acceptance. The labeled net contents would then be an Acceptance Quality Level (AQL). This permits packagers to target production at the labeled net contents. Unfortunately, because of natural process variability, about half the packager's production will average under the labeled net contents. « Shipments » or « deliveries », wich may be subportions of a production lot, may have average net contents which do not equal or exceed the labeled value.
2. These lots could be given a « low » probability of acceptance. The labeled net contents would then be a Limiting Quality (LQ). Unfortunately, this requires packagers to target very much higher than the labeled net contents.
3. These lots could be given a 50 percent probability of acceptance. The labeled net contents would then be an Indifference Quality (IQ).

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* The following discussions also apply to « shipment » and « delivery » which appear in some of the regulations.

U.S. Federal and State regulatory agencies have generally selected this last alternative because it « splits the risks » of making incorrect decisions based on sampling and « achieves a reasonable balance between producers ' and consumers ' interests » [10].

Several compliance testing procedures in the United States employ the IQ approach. They assume an essentially normal distribution of package net contents. Table 4 lists the major procedural manuals in use by government officials in the United States.

TABLE 4

PROCEDURAL MANUALS FOR COMPLIANCE TESTING

Government Agency	Name of Manual	Coverage	Other Details
Food and Drug Administration	Inspection Operations Manual (1/16/81)	weight	Chap. 448 « Economic Violations »
Food Safety and Inspection Service	Meat and Poultry Inspector's Manual (76-11)	weight	Net Weight Subpart 18-K
State and local weights and measures	National Bureau of Standards Handbook 67 « Checking Prepackaged Commodities » (1959)	weight and liquid measure	Majority of States use this manual with variations
State and local weights and measures	National Bureau of Standards Handbook 133 « Checking the Net Contents of Packaged Goods » (1981)	weight, liquid measure, dry measure, count, length, area, & special products	20 States have participated in training (as of May 1983). No exact count on number of States that are using handbook or parts of it ; estimates range from 5 to 25.

The Inspection Operations Manual of the Food and Drug Administration specifies a sample size of 48. No limits on individual package variations from the labeled net weight are set in this manual.

The Meat and Poultry Inspector's Manual provides a two-stage sampling procedure, (with an initial sample size of 10 and a second stage sample of 30). Individual package net weight shortages (defining the limits of « reasonable variation ») are specified.

The National Bureau of Standards' Handbook 67 specifies a sample size of 10 (and permits another 40 packages to be selected if « the average... representing a very large lot is just barely minus... ») [11]. Both individual package net weight shortages and overages (with the overage limit twice the value of the shortage limit) are specified as limits of « reasonable variation » and are excluded from the computation of the average. Different larger limits are used by about half the States that use Handbook 67.

The National Bureau of Standards' Handbook 133 was written [12] to replace Handbook 67 for several reasons :

— To provide testing procedures for packages labeled by liquid or dry volume, length, area, count, and combinations of labeled quantities

— To provide procedures for certain hard-to-measure prepackaged goods such as aerosols, viscous products, packages with tare weights that vary a great deal, etc.

— To provide procedures for sampling for evidence of compliance for (1) routine inspection when noncomplying product is normally marked off-sale (an IQ approach) and (2) when court action might be contemplated. (It was routine for weights and measures inspectors to do 100 percent testing or take very large samples when evidence for court was being collected ; Handbook 133 provides a sampling scheme for this eventuality using something closer to an AQL approach.)

— To provide procedures that could be used in packaging plants, in warehouses, and at retail.

The sampling plans are shown in Table 5 for routine inspection (Category B) and for court action (Category A).

TABLE 5

NBS HANDBOOK 133

Sampling plans of Category B.

1 Lot size (number of packages in lot) *N*	2 Sample size (number of packages in sample) *n*	3 Tare sample size* (number of packages chosen for tare determination) n_t	4 Allowable number of package errors exceeding the MAV**
Up to and including 250	10	2	0
251 and greater	30	2	0

$\bar{x}_n \geqslant$ label

* Special rules for tare sampling apply when Section 2.11.4 is used (glass or aerosol packages).

** Maximum allowable variation for individual packages (Tables 2-8 through 2-11, Section 2.12.).

Sampling plans of Category A.

1 Lot size (number of packages in lot) *N*	2 Sample size (number of packages in sample) *n*	3 Tare sample size* (number of packages chosen for tare determination) n_t	4 Allowable number of package errors exceeding the MAV**
30 or less	all	2	0
31-800	30	2	1
801-2 000	50	5	2
2 001-5 000	80	5	3
5 001-15 000	125	5	5
15 001-50 000	200	10	7
50 001 and greater	315	10	10

$$\left[\bar{x}_n + \left(\frac{2s}{\sqrt{n}}\right)(f)\right] \geqslant \text{label}$$

Where $\bar{x}_n$ is average net contents of sample of size n
S is sample standard deviation
f is finite population correction

Figure 1
Handbook 133 Individual Package Limits Compared With EEC Directive

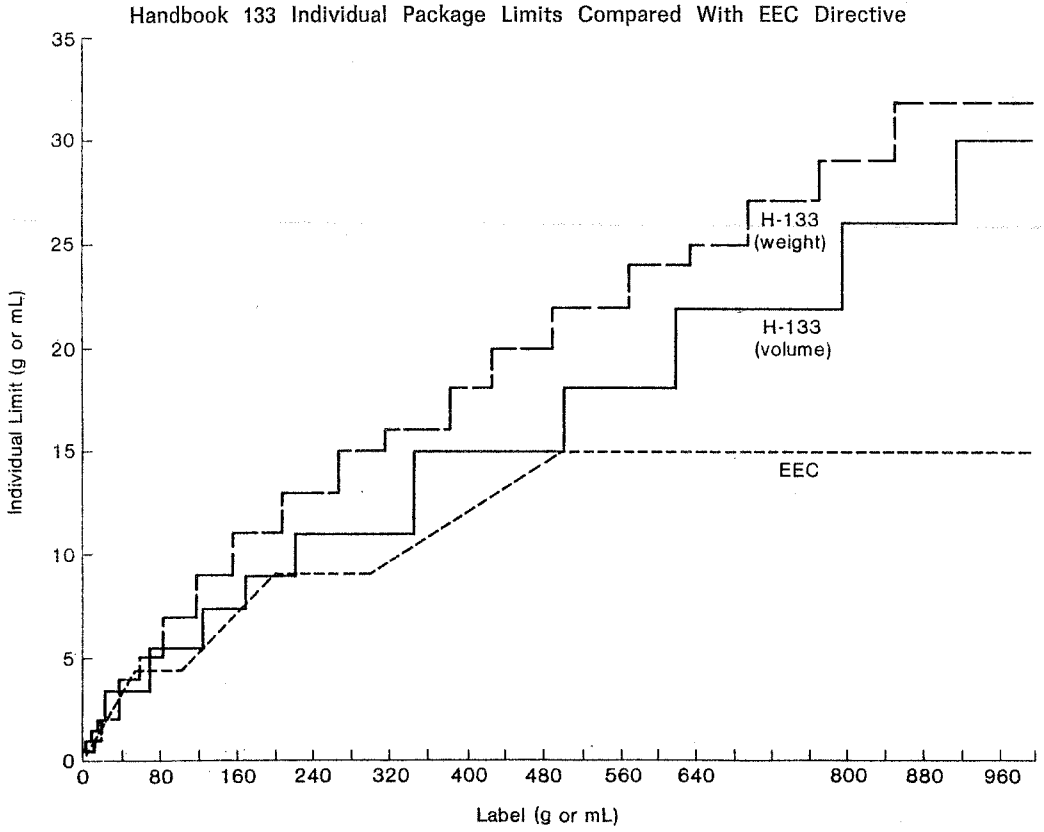
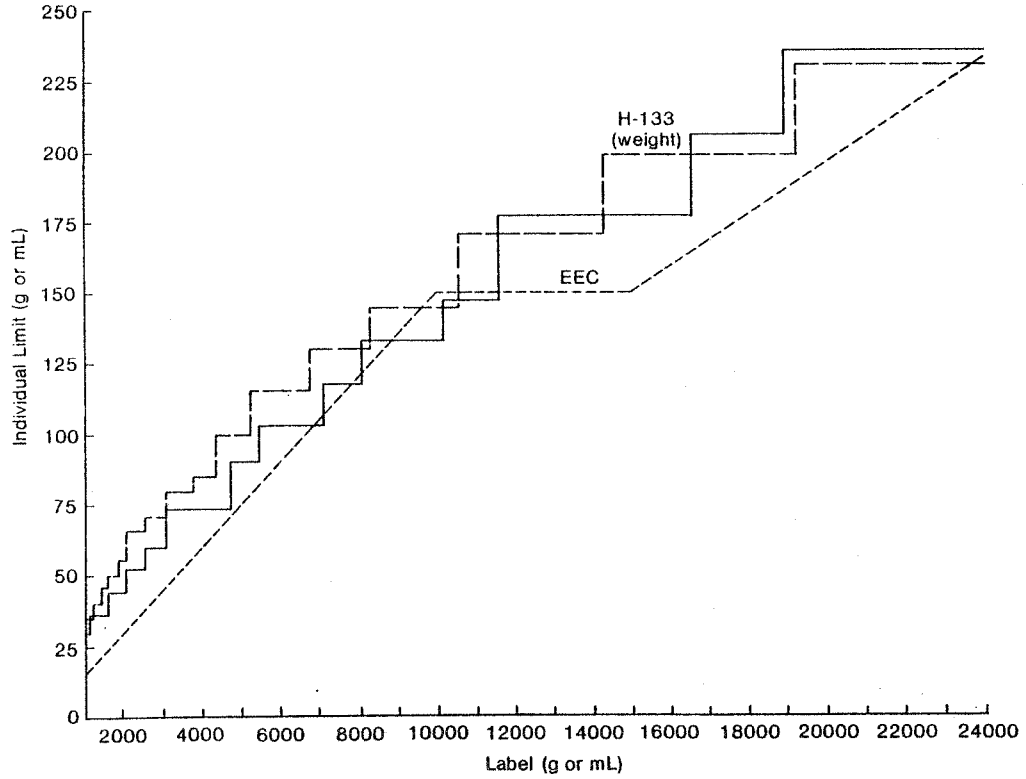


Figure 2
Handbook 133 Individual Package Limits Compared With EEC Directive



Individual package net contents limits were derived for Handbook 133 from field studies of actual variability observed in packaging plants, at warehouses, and in retail store locations. Judgments were made concerning poor process or outliers. Data were provided by the U.S. Department of Agriculture, the U.S. Food and Drug Administration, State weights and measures officials, and packagers. Different limits have been set for packages labeled by weight, volume, length or area, and count. The tables of limits for packages labeled by weight and by volume in Handbook 133 were developed in step increments equivalent to the measurement divisions of common package testing equipment, and so that no step would break at popular package sizes. These limits are termed « Maximum Allowable Variations » and are shown expressed in metric units in Figures 1 and 2, where they are compared with the limits in the EEC Directives [13].

A « Field Manual » which condenses the tables and report forms from Handbook 133 and provides examples is under review by NBS prior to publication. Several drafts have proven extremely popular among field inspectors. A second edition of Handbook 133 is being prepared, improving the tables and report forms and providing additional guidance on their use. Video cassettes for training purposes are also in process.

The procedures described in the Meat and Poultry Inspection Manual, Handbook 67, and Handbook 133 are combinations of variables and attributes approaches [14]. The sample average $\bar{x}_n$ is used to test the lot average, and individual package shortages in the sample are used to compare with the limits of « reasonable » variation.

— $\bar{x}_n \geqslant$ Labeled net contents

— No individual package net contents in the sample $<$ net contents — permitted variation

Probabilities of noncompliance have been calculated for the sampling plans in Handbook 133 as a function of the standard deviation of the weights of packages coming from a given process and as a function of the true percentages of underweights being manufactured [15]. Sampling for compliance is rarely done on a lot-by-lot basis, and is more usually only very occasional.

Experience with these compliance testing procedures can only be indicated by examples. A net weight survey [16] of dry packaged foods (dessert mixes, prepared mixes, macaroni and spaghetti, cookies, crackers, pretzels, potato chips, and candy) was conducted by the Food and Drug Administration in 1972. Net weight determinations were made on 11 688 packages of 853 products.

Eighty-five percent of the 11 688 packages had net weights equal to or greater than the labeled weights. 91.8 percent had net weights at least 99 percent of the labeled weights. Another survey was conducted in 1982 on expensive or difficult-to-measure products such as instant tea and coffee, spices, and fruit juices. The results have not been released. Since meat and poultry inspection is done at the packaging plant, no product found short weight is permitted to leave the packaging premises and no information on the frequency of violations found inside plants is available.

More testing and inspection is carried out by State and local officials than by Federal officials. The county of Los Angeles, California, for example, tested 607 524 packages at packaging and warehouse locations in the biennium 1979-81 using sampling procedures somewhat different from those discussed above [17]. These packages represented lots totaling 12 513 713 packages. 1.6 million packages were ordered « off-sale » for short weight or measure ; that is, the packages were ordered to be removed from sale or distribution until corrected. Projected dollar value of these shortages (if the warehouse shipments or deliveries accurately represented shortages in the production lot) was $ 21 million. Forty-seven criminal complaints were filed in which $ 16 000 in fines was paid. Five civil actions were settled in this same time frame amounting to $ 96 886 in civil penalties collected. These penalties were assessed on such varied products as adhesives, resin, barbeque sauce, terry cloth towels, grout and caulking, and silver solder.

The State of California collects marketplace data based on ranking food and nonfood categories by dollar volume and provides guidance to the counties on where to concentrate their inspection resources. In the last two years, increased emphasis was directed to the testing of paint, agricultural chemicals, shampoo, automotive supply products, feed and seed, and frozen seafood. About 300 to 400 000 packages are removed from sale in California each month [18].

In another example, a State using Handbook 133 tested approximately 65 000 sample packages (« standard-pack » packages with preprinted fixed-measure labels) in a three-month period in 1983 and ordered 24 percent of the lots or 155 244 packages removed from sale for short measure. Until adopting Handbook 133, this State had not done very much package testing, and practically no non-food package inspection. Now, about 25 percent of their inspection time is spent at the warehouse and packaging plant locations. Products such as icepacked poultry, distilled water, cement, institutional-sized soap and food, milk, grass seed, industrial chemicals, produce, animal food, and flour were removed from sale. Because this program is relatively new, it is likely that the level of compliance will rise with time.

It is interesting to note that when an « off-sale » notice is issued, this State informs the packager that he is responsible for finding additional short measure packages, and that his product will be reinspected in about 30 days. If the same short measure product is found after this period, prosecution for every short measure package found is begun. Another 30 000 random-pack or catch-weight (individually weighed and labeled) packages (mostly packaged at the retail store) were also tested by this State using Handbook 133. No figures on compliance of such packages are yet available.

Most State and local jurisdictions concentrate their package testing efforts on retail store-packed items. For example, one State tested 288 222 packages sampled from 744 108 packages in 1977 (using Handbook 67). 41.1 percent, or 306 158 of the total, were random-pack meat, fish, and poultry items of which 12 242, or 3.93 percent, were short weight. The compliance record overall indicated that 55 306 or 7.4 percent of all items checked were removed from sale.

Special problems arise when State and local jurisdictions test packages at retail stores when the product was packaged at other locations. As was mentioned earlier, Federal and State regulations recognize variations due to loss or gain of moisture occurring during good distribution practice. There are very few States that provide fixed tolerances for moisture loss ; most prefer to investigate and make decisions based on the facts of each case. Handbook 133 provides the procedures for applying a correction for moisture loss but provides no fixed tolerances. The National Conference on Weights and Measures is studying the use of in-plant quality control data (such as is already in use by the U S. Department of Agriculture) to establish whether short weight found at retail may have been caused by moisture loss. Establishing an administrative and communications plan that will prove beneficial to dispersed regulatory agencies is of major importance in this effort.

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[11] « Checking Prepackaged Commodities » by Malcolm W. Jensen, National Bureau of Standards Handbook 67, U.S. Department of Commerce, 1959.

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FRANCE

EXPÉRIENCE FRANÇAISE dans le CONTROLE MÉTROLOGIQUE des PRÉEMBALLAGES *

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La vente de produits conditionnés à l'avance et portant l'indication d'une quantité mesurée en dehors de la présence de l'acheteur est un phénomène commercial contemporain d'une grande ampleur. Aussi dès 1973, le Service de Métrologie Français s'est-il penché sur le problème du contrôle des produits préemballés. Les études ont été effectuées en tenant compte des positions prises tant à la Commission des Communautés Européennes que dans d'autres organismes internationaux tels que le comité du Codex Alimentarius.

Plus de dix ans après, il nous paraît intéressant de faire globalement le point sur les résultats obtenus dans le domaine du contrôle des préemballages par les services officiels, les problèmes posés et à résoudre, les difficultés rencontrées et les améliorations qui pourraient intervenir.

I — Remarques sur le contrôle statistique par sondage aléatoire

Au début de l'organisation du contrôle des préemballages par les services officiels, le contrôle à 100 % n'était pratiquement pas envisageable compte tenu que la confection des préemballages est une fabrication en grande série caractérisée par des cadences élevées d'emplissage. Les méthodes statistiques par sondage sont donc apparues comme la solution la meilleure pour s'assurer que les conditionneurs respectaient loyalement les quantités annoncées.

Le Service de Métrologie Français utilise les tests statistiques prévus par la directive européenne 76/211/CEE du 20 janvier 1976. Je rappelle ci-après les caractéristiques essentielles de ces tests.

Les tests appliqués sont de deux catégories :

— la première catégorie permet de vérifier que le critère de la moyenne est ou non respecté. C'est par conséquent un test de comparaison de la moyenne inconnue d'un lot de préemballages à la quantité nominale.

— la deuxième catégorie de tests permet de s'assurer que la proportion de préemballages sous-dosés dans un lot contrôlé est la plus faible possible. Il s'agit d'un ensemble de plans d'échantillonnage double dont l'efficacité est telle que le service officiel de contrôle est amené dans la plupart des cas à prononcer l'acceptation de lots comportant 2 % de préemballages défectueux.

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* This paper concerning the French experience in testing of prepackages was presented at the OIML seminar on prepackages in Berne, Switzerland 6-8 June 1983. An English translation is available from BIML.

A l'expérience il nous semble que des améliorations pourraient être apportées. La pratique de ces tests a mis en évidence une anomalie qui mérite d'être signalée. Nous remarquons en effet que les effectifs d'échantillons à prélever croissent avec la taille des lots. Il s'en suit que, l'efficacité d'un test statistique croissant notamment avec l'effectif de l'échantillon, les lots importants sont soumis à des tests relativement plus sévères que les lots plus petits. Cette situation nous paraît paradoxale, car souvent les fabrications en grande série se rapportent à des produits relativement peu coûteux, alors que les lots d'effectif réduit concernent des produits plus rares donc d'un coût plus élevé.

Nous pensons donc que la liaison qui a été introduite entre effectifs de lots et effectifs d'échantillons est très artificielle et n'a même aucune raison d'être.

Une confusion devrait être évitée entre le contrôle d'une série continue de lots issus d'une même fabrication et le contrôle d'un lot pris isolément dans cette fabrication. L'Administration se trouve placée le plus souvent, si ce n'est uniquement, dans le second cas où elle opère par contrôle inopiné. Le premier cas est celui qui est essentiellement retenu par la norme ISO 2859 d'où sont tirés d'ailleurs les plans d'échantillonnage pour le contrôle par comptage du nombre de défectueux.

Il découle de cette confusion entre contrôle d'une série continue de lots et contrôle d'un lot pris isolément que les plans d'échantillonnage utilisés pour des contrôles de lots isolés sont relatifs, en partie, à des tirages exhaustifs, le rapport de l'effectif de l'échantillon à l'effectif du lot étant supérieur à 0,10.

Ce qui est le cas pour des lots d'effectifs compris entre 100 et 300 d'où l'on extrait un échantillon de taille 30. Elle est en réalité meilleure pour les mêmes critères d'acceptation et de rejet.

Il en résulte que dans ce cas particulier l'efficacité du test n'est pas celle qu'on attend.

Les possibilités offertes par l'ensemble de ces tests ne sont donc pas utilisées avec suffisamment de cohérence.

Sans nier l'effort louable qui à l'époque a permis de mettre de l'ordre dans le contrôle des préemballages, il nous apparaît souhaitable maintenant que la variété dans les effectifs de l'échantillon s'inscrive dans le cadre d'une procédure précise autre que la relation lot-échantillon pûrement artificielle dans le cas du contrôle d'un lot pris isolément.

On pourrait retenir dans le choix d'effectifs d'échantillon plus ou moins importants des critères plus réalistes tels que :

— Importance économique du produit préemballé

— Plus ou moins grande sévérité du contrôle en fonction de constatations antérieures : contrôle renforcé après un premier avertissement par exemple.

Ces remarques demanderaient à être approfondies tant sur la réalisation pratique des procédures envisagées que sur l'analyse proprement statistique.

II — Remarques sur les lieux de contrôle

80 % environ des contrôles sont exercés par l'administration chez les conditionneurs.

Contrôler à la « source » nous paraît indispensable, l'usine de conditionnement est le seul lieu où l'échantillonnage a la plus grande chance d'être représentatif d'une production donnée.

Néanmoins il ne faut pas négliger pour autant les contrôles dans le commerce de détail. Ces contrôles sont des indicateurs qui incitent à remonter à l'usine de conditionnement.

Sauf atteinte grave à la garantie publique, laquelle est évidemment sanctionnée immédiatement, l'expérience nous a montré qu'il était plus efficace d'user de la procédure ci-dessus plutôt que de sévir brutalement sans autre examen.

En effet, les lots qui sont exposés à la vente dans les magasins sont le plus souvent d'effectif très réduit. Compte tenu des systèmes de distribution le plus souvent très complexes qui interviennent entre la sortie d'usine et les rayons d'un magasin peut-on objectivement considérer de tels lots comme représentatifs de la production d'un fabricant ?

Par ailleurs si nous voulons être réalistes, nous savons très bien qu'un conditionneur, compte tenu des nombreux aléas qui interviennent dans une fabrication en grande série, a un risque non négligeable, même s'il exerce un contrôle sérieux sur sa production, de laisser échapper un pourcentage, sans doute minime, de préemballages non conformes qui peuvent se retrouver, selon les conditions de distribution, réunis en petits lots dans le commerce de détail.

Peut-on dans ce cas, en toute objectivité, accuser le commerçant de fraude caractérisée alors qu'il n'est pas responsable du conditionnement ? Peut-on de même considérer le conditionneur comme négligent alors que le fait constaté appartient au risque inhérent à toute fabrication en grande série ? Nous ne le pensons pas, c'est pourquoi en matière de contrôle au niveau du commerce de détail notre règle de base est la prudence.

III — Remarques sur le contrôle interne du conditionneur

Le contrôle chez le conditionneur présente un autre avantage : permettre de constater l'existence dans l'entreprise d'un matériel de contrôle adapté et de méthodes permettant au conditionneur de s'assurer lui-même que sa production est conforme aux spécifications réglementaires.

Dans ce domaine nous nous gardons absolument d'intervenir d'une manière autoritaire et d'imposer des systèmes de contrôle interne qui seraient satisfaisants selon nous alors qu'en fait ils seraient mal adaptés à une industrie particulière pour des raisons diverses qui peuvent ne pas être uniquement métrologiques.

L'agent d'un service de contrôle ne connaît pas à fond les problèmes d'une entreprise relatifs par exemple au personnel employé, aux machines utilisées, au coût minimal d'un système de contrôle.

Aussi comprenons-nous notre rôle dans ce domaine comme un rôle d'information et de conseil.

— Informations d'abord sur les textes réglementaires,

— Conseils, renseignements sur les possibilités de contrôle interne dans les entreprises qui seraient peu informées sur ce sujet.

Actuellement les conseils que l'on peut donner à un industriel sont axés sur deux points essentiels :

— les appareils de mesure pour le contrôle

Ils doivent être adaptés à l'usage que l'utilisateur veut en faire et présenter notamment une précision telle que les erreurs dues à l'instrument de mesure soient pratiquement négligeables devant les erreurs tolérées sur les préemballages.

La réglementation fixe à cet égard des valeurs maximales d'échelon en fonction des charges pesées.

— **le système de contrôle statistique par cartes de contrôle**

Nous recommandons aux conditionneurs, sans l'imposer, la norme française NF X-06-031 ; cette norme donne les moyens d'établir à moindre frais, un système de contrôle statistique en cours de fabrication, système qui a fait ses preuves et qui consiste à suivre une fabrication en notant sur un graphique qu'on appelle carte de contrôle les fluctuations d'une fabrication afin de pouvoir intervenir dans les meilleurs délais lorsqu'une anomalie s'avère significative.

Nous remarquons, néanmoins, que ces systèmes graphiques bien que simples et peu coûteux font place de plus en plus à des ensembles de contrôle beaucoup plus sophistiqués tendant à réduire, voire à supprimer l'intervention humaine dans le processus de surveillance d'une fabrication.

Dans le domaine du préemballage nous rencontrons deux formes de ces systèmes :

— l'un consiste en une balance de précision suffisante couplée à un mini-ordinateur programmé pour le contrôle statistique par sondage.

— l'autre est constitué essentiellement par un instrument qu'on appelle trieuse pondérale et qui réalise non plus un contrôle par sondage mais un contrôle à 100 %.

Nous nous réjouissons de l'évolution des techniques dans ce domaine et il serait peu réaliste de les ignorer et d'exiger de la part des utilisateurs un système de contrôle parallèle à ces systèmes qui sont vendus pour se suffire à eux-mêmes.

Cependant si nous considérons qu'un service de métrologie ne doit pas imposer tel ou tel système de contrôle, nous pensons qu'il est dans ses attributions d'évaluer la validité d'un système de contrôle interne quel qu'il soit tout comme on évalue le niveau de qualité métrologique d'un instrument de mesure.

Or si l'évaluation d'un système classique par cartes de contrôle peut être envisagée avec une relative facilité celle de systèmes informatisés et automatisés apparaît plus complexe.

La seule solution que puisse raisonnablement adopter dans ce dernier cas un service officiel de contrôle nous semble se réduire à un contrôle approfondi des résultats obtenus par ces systèmes modernes.

Indépendamment des contrôles légaux prévus sur les instruments de mesure proprement dits inclus dans ces systèmes (balances, trieuses) il ne nous apparaît guère possible en effet, dans le cadre d'un contrôle de préemballages, d'effectuer des contrôles techniques de même nature sur les autres éléments de la chaîne de contrôle (vérification des programmes, fiabilité des automatismes,...etc...).

Ce contrôle de résultats que nous envisageons pourrait être un contrôle statistique plus élaboré que les contrôles actuellement prévus par la directive européenne. Ces derniers sont relativement légers et supposent nécessairement de la part du conditionneur un contrôle préalable qui puisse être examiné et évalué le cas échéant par un service officiel de contrôle.

Le problème reste donc posé. En ce qui nous concerne, nous conseillons aux agents chargés du contrôle, de procéder de temps à autre à un test sur l'écart-type de la fabrication, c'est-à-dire comparer à un instant donné l'estimation de l'écart-type obtenue sur échantillon à l'écart-type retenu par le conditionneur pour construire son système de contrôle. Ce test peut être appliqué d'ailleurs, quel que soit le système employé par le conditionneur, la dispersion d'une fabrication restant de toute manière un paramètre essentiel qu'il importe de maîtriser le mieux possible.

IV — Le traitement des lots refusés

Le contrôle chez le conditionneur permet également d'éviter la commercialisation de lots dont l'irrégularité a été constatée.

L'une des mesures ci-après peut être prise dans ce cas :

— Surdosage d'un autre lot que le conditionneur mélange au lot sous-dosé de manière à obtenir un nouveau lot dont la moyenne est au moins égale à la quantité nominale. Le service de contrôle vérifie évidemment par sondage qu'il en est bien ainsi.

— Le conditionneur est invité à trier le lot défectueux de manière à en éliminer les préemballages sous-dosés et à réaliser une moyenne répondant au critère de la réglementation.

— Faire modifier l'étiquetage de la quantité de manière à ce que cette indication corresponde à la quantité réelle, si toutefois le produit n'est pas soumis à une réglementation fixant des valeurs obligatoires de quantités nominales.

— Vente du lot irrégulier à un acheteur dûment informé. C'est en général une collectivité telle que hôpital, restaurant d'entreprise, etc...

Si aucune des solutions ci-dessus ne peut être envisagée, le conditionneur détruit le lot afin de reconditionner le produit lorsque cela est possible. De toute façon l'agent apposera, si cette destruction ne peut se faire entièrement en sa présence, la mention « vente interdite » au moyen d'un cachet sur chacun des préemballages du lot incriminé.

V — Exploitation des résultats des contrôles

Chaque contrôle effectué chez le conditionneur fait l'objet d'une fiche portant différents renseignements destinés à être exploités sur ordinateur par le Service Technique Central.

Sans entrer dans le détail de ce document, cette fiche comprend globalement trois formes de renseignements :

— Renseignements relatifs au service qui a effectué le contrôle.

— Renseignements relatifs au conditionneur, en particulier les inscriptions portées sur l'emballage.

— Conditions et résultats du contrôle.

L'exploitation informatique de ce document nous permet de suivre l'évolution du niveau de qualité métrologique des préemballages par principales catégories de produits et par région.

Nous citerons seulement quelques exemples qui nous paraissent significatifs.

Ainsi un bilan relatif à la période de début des contrôles (du 1-9-1974 au 1-2-1975) fait état des résultats suivants en pourcentage de lots ne respectant pas les critères retenus par la réglementation.

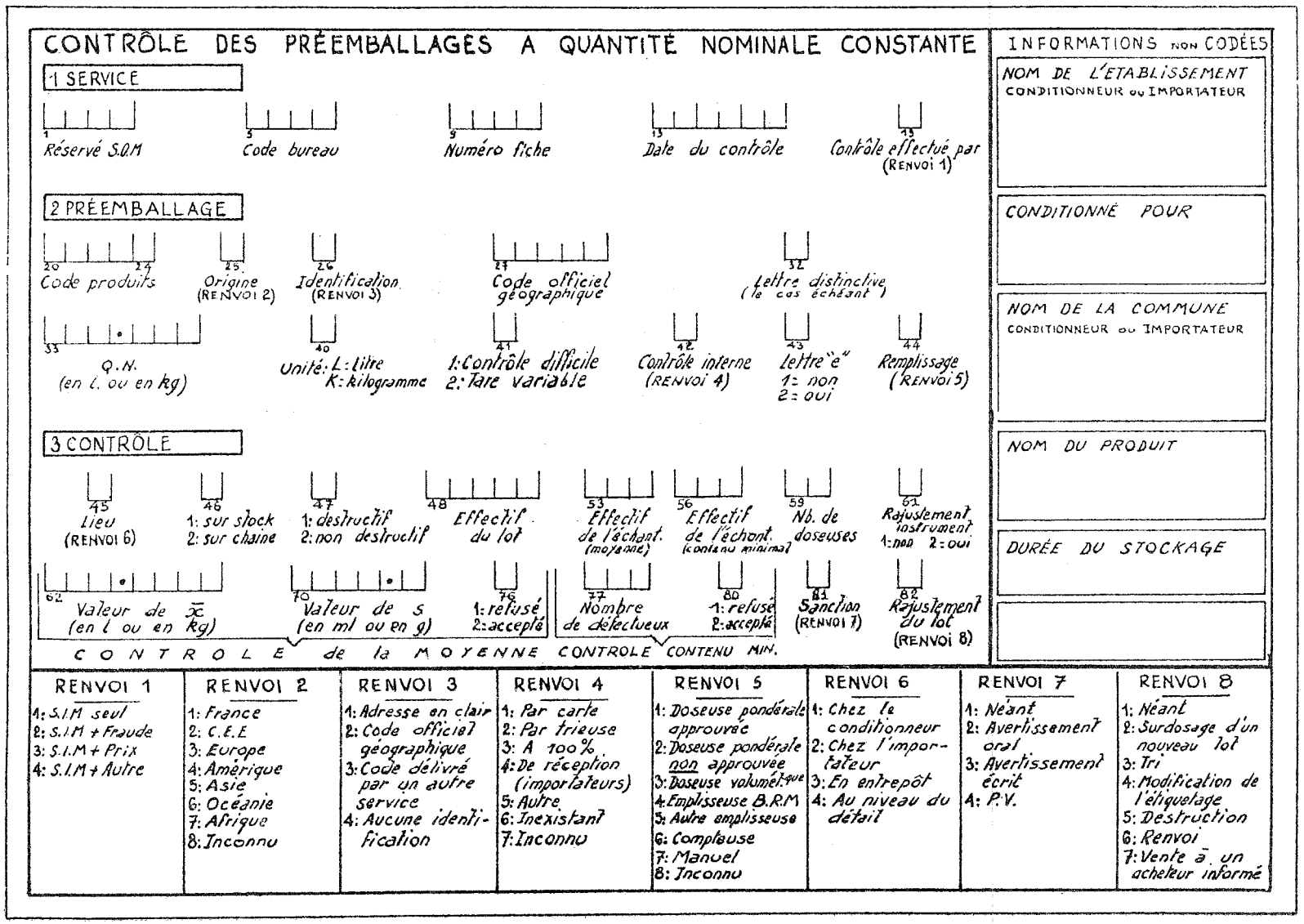
— huiles comestibles : 58 %
— huiles industrielles : 55 %
— cafés : 34 %
— lait : 38 %
— aliments pour bétail : 40 %.

En complément aux avertissements donnés aux responsables de chacune des entreprises, les responsables des fédérations professionnelles en cause ont été alertés et priés d'intervenir auprès de leurs mandants pour les conseiller utilement.

Un bilan relatif à l'année 1981 donne pour les mêmes produits les résultats suivants :

— huiles comestibles : 17,9 %
— huiles industrielles : 25,0 %
— cafés : 20,5 %
— lait : 13,6 %
— aliments pour bétail : 29,5 %.

CONTRÔLE DES PRÉEMBALLAGES A QUANTITÉ NOMINALE CONSTANTE



INFORMATIONS NON CODÉES

NOM DE L'ETABLISSEMENT CONDITIONNEUR ou IMPORTATEUR

CONDITIONNÉ POUR

NOM DE LA COMMUNE CONDITIONNEUR ou IMPORTATEUR

NOM DU PRODUIT

DURÉE DU STOCKAGE

RENVOI 1
1: S.I.M seul
2: S.I.M + Fraude
3: S.I.M + Prix
4: S.I.M + Autre

RENVOI 2
1: France
2: C.E.E
3: Europe
4: Amérique
5: Asie
6: Océanie
7: Afrique
8: Inconnu

RENVOI 3
1: Adresse en clair
2: Code officiel géographique
3: Code délivré par un autre service
4: Aucune identification

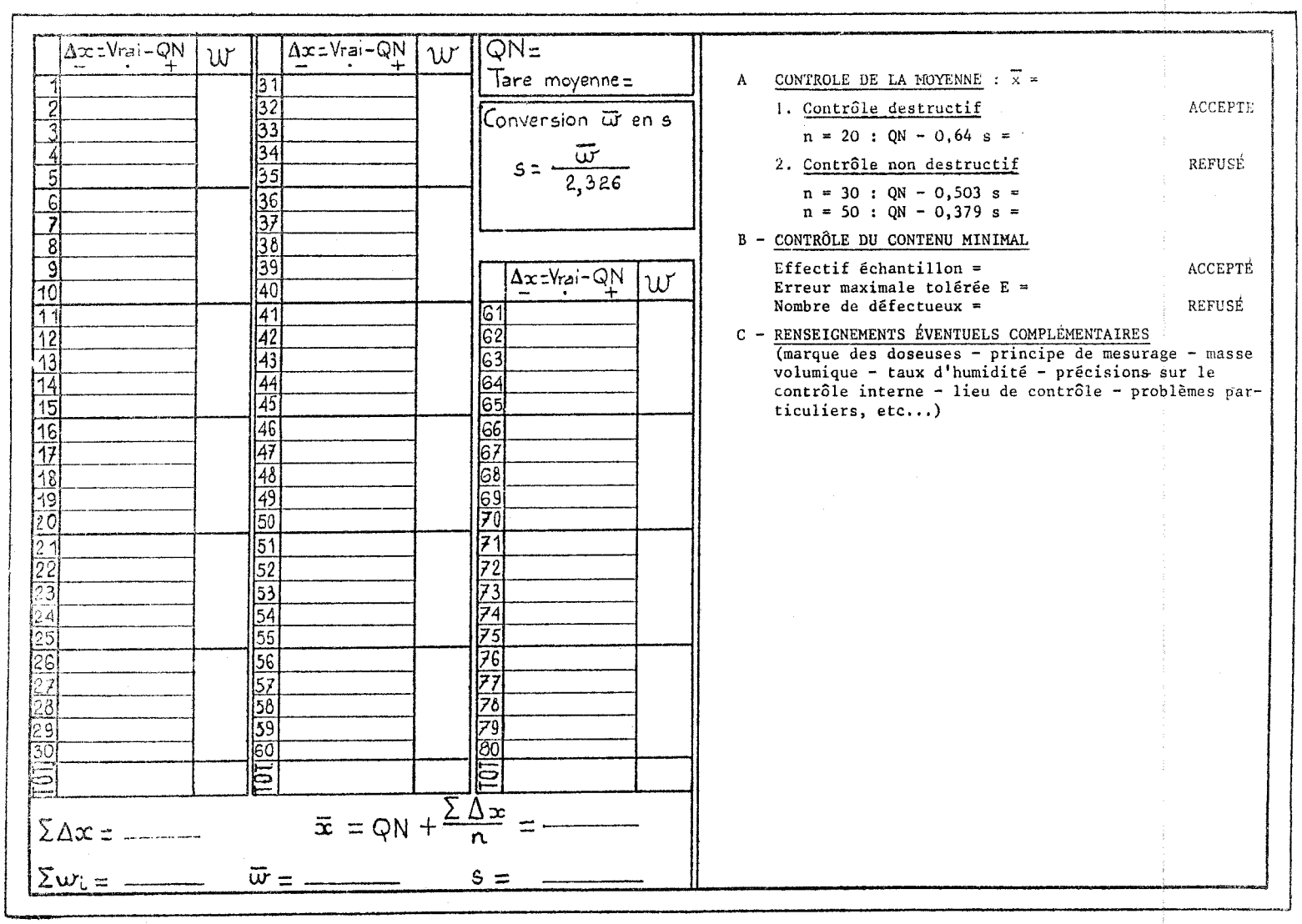
RENVOI 4
1: Par carte
2: Par trieuse
3: A 100 %
4: De réception (importateurs)
5: Autre
6: Inexistant
7: Inconnu

RENVOI 5
1: Doseuse pondérale approuvée
2: Doseuse pondérale non approuvée
3: Doseuse volumétrique
4: Emplisseuse B.R.M
5: Autre emplisseuse
6: Compteuse
7: Manuel
8: Inconnu

RENVOI 6
1: Chez le conditionneur
2: Chez l'importateur
3: En entrepôt
4: Au niveau du détail

RENVOI 7
1: Néant
2: Avertissement oral
3: Avertissement écrit
4: P.V.

RENVOI 8
1: Néant
2: Surdosage d'un nouveau lot
3: Tri
4: Modification de l'étiquetage
5: Destruction
6: Renvoi
7: Vente à un acheteur informé



	Δx = Vrai − QN (− · +)	w		Δx = Vrai − QN (− · +)	w		Δx = Vrai − QN (− · +)	w
1			31			61		
2			32			62		
3			33			63		
4			34			64		
5			35			65		
6			36			66		
7			37			67		
8			38			68		
9			39			69		
10			40			70		
11			41			71		
12			42			72		
13			43			73		
14			44			74		
15			45			75		
16			46			76		
17			47			77		
18			48			78		
19			49			79		
20			50			80		
21			51			71		
22			52			72		
23			53			73		
24			54			74		
25			55			75		
26			56			76		
27			57			77		
28			58			78		
29			59			79		
30			60			80		
101			101			101		

QN =
Tare moyenne =

Conversion $\bar{w}$ en s

$$s = \frac{\bar{w}}{2{,}326}$$

$\Sigma \Delta x =$ _____ $\quad \bar{x} = QN + \frac{\Sigma \Delta x}{n} =$ _____

$\Sigma w_i =$ _____ $\quad \bar{w} =$ _____ $\quad s =$ _____

A CONTROLE DE LA MOYENNE : $\bar{x}$ =

1. Contrôle destructif — ACCEPTE

   n = 20 : QN − 0,64 s =

2. Contrôle non destructif — REFUSÉ

   n = 30 : QN − 0,503 s =
   n = 50 : QN − 0,379 s =

B − CONTRÔLE DU CONTENU MINIMAL

Effectif échantillon = — ACCEPTÉ
Erreur maximale tolérée E =
Nombre de défectueux = — REFUSÉ

C − RENSEIGNEMENTS ÉVENTUELS COMPLÉMENTAIRES
(marque des doseuses − principe de mesurage − masse volumique − taux d'humidité − précisions sur le contrôle interne − lieu de contrôle − problèmes particuliers, etc...)

Ces derniers résultats ne sont évidemment pas encore satisfaisants ; ils mettent néanmoins en évidence la nécessité qu'il y avait de mettre de l'ordre dans ce domaine ; on constate une lente évolution, mais évolution quand même, vers une meilleure qualité métrologique.

Mais il est indéniable qu'il reste beaucoup à faire et nous pouvons nous demander si le moment n'est pas venu pour les services de contrôle de mettre en œuvre des méthodes de contrôle statistique ou autre plus élaborées, ce qui pourrait corrélativement inciter les industriels à étudier de plus près leur propre contrôle tant dans leur propre intérêt que dans celui du consommateur final.

VI — Quelques difficultés

Nous évoquerons succinctement à la suite des résultats présentés ci-dessus, les difficultés essentielles qui actuellement nous préoccupent et pour lesquelles nous ne trouvons pas de solutions véritablement satisfaisantes.

— l'utilisation des bouteilles récipients-mesures

Le niveau de qualité métrologique de ces récipients devrait être tel que l'utilisateur puisse se fier aussi bien pour l'emplissage que pour le contrôle au niveau indiqué correspondant à la capacité nominale.

Or pour des raisons techniques, les verriers, bien qu'ils aient depuis l'application de la directive européenne de 1975, amélioré notablement leur fabrication ne sont pas parvenus à éliminer totalement le risque de mettre sur le marché quelques lots de bouteilles qui peuvent exposer l'utilisateur à des sous-dosages dont il n'est pas directement responsable.

Doit-on en venir à imposer aux emplisseurs des formes de contrôles pondéraux niant en fait la possibilité qu'offre la bouteille récipient-mesure d'effectuer un contrôle simplifié par repérage d'un niveau ?

En ce qui nous concerne, service de contrôle, et sous réserve d'enquêtes ultérieures, nous nous en tenons actuellement à un contrôle pondéral par détermination d'une masse volumique ; mais il est certain que les emplisseurs d'une manière générale ne procèdent pas ainsi et s'exposent par conséquent au risque évoqué plus haut.

— le problème de la dessiccation des produits vendus à la masse

Ce problème se pose essentiellement pour les services officiels de contrôle qui opèrent dans le commerce de détail, sur des produits tels que fromages, charcuteries, farine, etc... soumis à des pertes en eau.

Deux positions peuvent être prises en pareil cas :

— le conditionneur de ces produits doit prendre toutes ses dispositions pour qu'au moment de la vente au consommateur final, compte tenu d'un circuit commercial normal, le poids indiqué soit respecté. Cela signifie que le conditionneur doit tenir compte de la perte de poids par dessiccation en pratiquant un surdosage au cours de la fabrication des préemballages.

— le conditionneur dose normalement sans prévoir la perte en masse due à la dessiccation. Si au niveau du commerce de détail un déficit en poids est constaté, il s'agit alors pour le service de contrôle de déterminer par analyse chimique si ce manquant est totalement expliqué par une perte en eau.

La réglementation nationale française ne retient que la première procédure, sauf cas particulier.

Néanmoins nous sommes conscients que ce problème n'est pas uniquement métrologique.

Imposer le surdosage est une mesure qui a nécessairement des implications économiques qui peuvent être parfois lourdes pour l'industriel.

Il y a donc à opérer, soit un choix entre le souci de ne pas pénaliser exagérément l'industrie et la défense inconditionnelle du consommateur, soit un compromis entre ces deux extrêmes, ce qui suppose de traiter le problème pratiquement produit par produit.

Ce tour d'horizon rapide des enseignements que l'on peut tirer de quelques 10 ans de contrôle en matière de préemballages est certes incomplet.

Mais si nous avons pu ainsi, sinon apporter des solutions aux problèmes difficiles, ce qui serait présomptueux, du moins susciter quelques thèmes de réflexion, nous considérons que ce court exposé a atteint son but.

SUEDE

ERROR STATISTICS for PETROL METERS and SCALES INSPECTED in 1982

by **R. OHLON**

Statens provningsanstalt, Boras

SUMMARY — The paper discusses data obtained in Sweden from verification of gasoline meters and weighing machines used in trade. The compilation has been made by use of a new computerized data system. The results obtained for mandatory verification show an improvement compared to previous results when only inspection by sampling was applied.

RESUME — L'article traite les données obtenues en Suède pour la vérification des pompes d'essence et instruments de pesage utilisés dans le commerce. La compilation a été effectuée grâce à un nouveau système à ordinateur. Les résultats obtenus montrent une amélioration comparés aux résultats précédents lorsque la vérification s'effectuait seulement par échantillonnage.

1. Introduction

The National Testing Institute (Statens provningsanstalt, SP) is responsible for the official inspection of verification of weights and measures in Sweden. The compulsory part of this inspection is limited to measuring instruments for volume and weight used for sale to consumers in retailershops. The purpose of this inspection - which is periodic - is to protect the consumers from incorrect measurements. Petroleum meters and electronic scales are inspected each year ; mechanical scales every 3 years.

An instrument which fulfils the requirements will be verified. The verification implies confirmation by marking and sealing that the instrument fulfils the requirements. As a crown is included in the marking, the verification is named « kröning » (crowning) in Swedish. Verification of weights and measures has existed in Sweden for about 250 years. The statistical follow-up of the activity has earlier been limited to information concerning approved or rejected instruments found at the inspections.

However, by an enlargement of a data-based invoicing system a more complete statistical follow-up system has been developed. Collection and treatment of measuring errors of the instruments are parts of the follow-up system. The trial activity of the new system started during 1982.

Below information concerning measuring errors from the trial activity is summarized. The compilation is limited to instruments which are submitted to compulsory verification in Sweden : petrol meters with a flow less than 100 liters/min and scales with capacity less than 30 kilograms. The reported information concerns 8 570 petrol meters ; of these 4 940 are single product meters and 3 630 blend meters. The statements concerning sealing, approval and rejection of scales comprise totally 2 892 units ; of these 1 231 are mechanical and 1 661 electronic scales.

The information concerning the measurement errors of the scales comprises only 934 units as full reporting for the scales started later than for the petrol meters.

2. Results

Table 1 shows the relative errors of petrol meters as found at inspections at half maximum flow. Figure 1 gives a graphical picture of the distribution of the errors on normal distribution paper for the meters concerned. Information concerning mean value ($\bar{x}$), standard deviation (s) and number of inspected meters (n) is also found in the figure. The requirements for the meters are that the measurement errors shall not exceed the limits ± 0.5 %.

The corresponding information concerning the scales will be found in Table 2 and Figure 2 respectively. The scale errors are expressed as multiples of the verification scale interval e at the load of 500 e. The requirement is that the errors shall not exceed the limits ± e.

Table 3 gives information concerning approved and rejected meters and includes also information of meters having broken and unbroken seals at the inspection. A broken seal indicates that the meter in question has been serviced since the previous inspection.*

The corresponding information for the scales will be found in Table 4. The mechanical scales have a verification period of 3 years ; the electronic scales 1 year. Some scales have been possible to accept only after actions from our verification officers. Information concerning those scales is given under the heading « after adjustment » in Table 4. The column in question applies to scales which originally had errors outside the allowed limits but which have been adjusted to be in order. The primary errors for the mentioned scales are stated in Table 5.

The earlier legislation did not require a periodic, regular verification of the scales. The verification was done by sampling. Table 6 states information of scales which were approved or rejected according to the earlier sampling procedure.

3. Observations

Petrol meters

It is evident from Figure 1 that the error distribution curves on normal distribution paper will get ∫-character. Only the central parts of the curves are approximately straight. The extreme errors of the meters are thus considerably greater as compared to a normal distribution.

The mentioned circumstances contribute to the fact that the estimated standard deviations s according to figure 1 (0.34 % for single product meters and 0.51 % for blend meters) are considerably greater as compared to normal distribution. Thus, if the tendencies in the central parts of the respective curves had remained over the whole range the standard deviations would instead have been approximately 0.2 % and 0.3 % respectively.

The probability that the measurement errors exceed ± 3 s is about 0.2 % for normal distribution. Thus, it may be interesting to compare this value with the errors observed outside the limits ± 0.6 % for single product meters and ± 0.9 % for blend meters. It is evident from Table 1 that the probabilities for errors greater than ± 3 s are significantly higher than 0.2 % ; namely 2.57 % for single meters and 1.05 % for blend meters. The reason for the extreme values deviating from normal distribution is probably different operational conditions for the meters. Thus, great liquid volumes pass through some of the meters. It is evident that such meters are more worn out than meters with lower consumption. Thus it is reasonable to

* Note : For servicing purposes it is allowed to break the official seals of instruments in Sweden provided this is announced to the nearest regional verification office.

TABLE 1

DISTRIBUTION OF RELATIVE ERRORS AT HALF MAXIMUM FLOW OF PETROL METERS

Errors (%)	Interval number		Cumulated number		Cumulated part (%)	
	Single meters	Blend meters	Single meters	Blend meters	Single meters	Blend meters
— 20		1		1		0.03
— 12		1		2		0.06
— 9	1		1		0.02	
— 8	1		2		0.04	
— 5		1		3		0.08
— 3	5		7		0.14	
— 2.5	3	1	10	4	0.20	0.11
— 2	3	1	13	5	0.26	0.14
— 1.6		1		6		0.17
— 1.5	4	7	17	13	0.34	0.36
— 1.3	1	2	18	15	0.36	0.41
— 1.2	3	1	21	16	0.43	0.44
— 1.1		1		17		0.47
— 1	23	12	44	29	0.89	0.80
— 0.9	8	6	52	35	1.05	0.96
— 0.8	10	16	62	51	1,26	1.40
— 0.7	21	22	83	73	1,68	2.01
— 0.6	41	44	124	117	2,51	3.22
— 0.5	40	30	164	147	3.31	4.05
— 0.4	83	84	247	231	5	6.4
— 0.3	267	196	514	427	10.4	11.8
— 0.2	549	480	1 063	907	21.5	25.0
— 0.1	775	624	1 838	1 531	37.2	42.2
0	1 235	752	3 073	2 283	62.2	62.9
0.1	763	530	3 838	2 813	77.7	77.5
0.2	584	426	4 420	3 239	89.5	89.2
0.3	278	189	4 698	3 428	95.1	94.4
0.4	109	69	4 807	3 497	95.3	96.3
0.5	50	41	4 857	3 538	98.3	97.2
0.6	24	41	4 881	3 579	98.8	98.6
0.7	15	21	4 896	3 600	99,11	99.17
0.8	15	8	4 911	3 608	99.41	99.39
0.9	1	2	4 912	3 610	99.43	99.45
1	11	11	4 923	3 621	99.66	99.75
1.3	1	2	4 924	3 623	99.68	99.81
1.4	2		4 926		99.72	
1.5	9	3	4 935	3 626	99.90	99.89
2	3		4 938		99.96	
2.5		1		3 627		99.92
3		1		3 628		99.94
4		1		3 629		99.97
4.5	1		4 939		99.98	
7	1		4 940		100	
9.5		1		3 630		100

TABLE 2

DISTRIBUTION OF ERRORS OF SCALES EXPRESSED AS MULTIPLES OF THE VERIFICATION SCALE INTERVAL e AT THE LOAD OF 500 e

Errors (e)	Interval number	Cumulated number	Cumulated part (%)
— 150	1	1	0.1
— 10	3	4	0.4
— 9	2	6	0.6
— 8	2	8	0.9
— 7	3	11	1.2
— 6	1	12	1.3
— 5	5	17	1.8
— 4	17	34	3.6
— 3	24	58	6.2
— 2	35	93	10.0
— 1	251	344	36.8
0	448	792	84.8
1	116	908	97.2
2	12	920	98.5
3	7	927	99.25
4	3	930	99.57
5	3	933	99.89
16	1	934	100

TABLE 3

APPROVED AND REJECTED PETROL METERS

Type of meter	Number of meters	Approved						Rejected					
		Unbroken seal		Broken seal		Total		Unbroken seal		Broken seal		Total	
		Number	Part	Number	Part	Number	Part	Number	Part	Number	Part	Number	Part
Single	4 940	4 167	84.4 %	534	10.8 %	4 701	95.2 %	172	3.5 %	67	1.4 %	239	4.5 %
Blend	3 630	2 289	63.1 %	1 063	29.3 %	3 352	92.3 %	167	4.6 %	111	3.1 %	278	7.7 %
Total	8 570	6 456	75.3 %	1 597	18.6 %	8 053	94.0 %	339	4.0 %	178	2.1 %	517	6.0 %

TABLE 4

APPROVED AND REJECTED SCALES

Verification period	Number of scales	Approved								Rejected					
		Unbroken seal		Broken seal		Total		After adjustment		Unbroken seal		Broken seal		Total	
		Number	Part	Number	Part	Number	Part	Number	Part	Number	Part	Number	Part	Number	Part
3 years	1 231	887	72.1 %	300	24.4 %	1 187	96.4 %	18	1.5 %	34	2.8 %	10	0.8 %	44	3.6 %
1 year	1 661	1 058	63.7 %	512	30.8 %	1 570	94.5 %	65	3.9 %	60	3.6 %	31	1.9 %	91	5.5 %
Total	2 892	1 945	67.3 %	812	28.1 %	2 757	95.3 %	83	2.9 %	94	3.3 %	41	1.4 %	135	4.7 %

TABLE 5

DISTRIBUTION OF ERRORS BEFORE ADJUSTMENT OF SCALES REQUIRING ADJUSTMENT

Errors (e)	Interval number	Cumulated number	Cumulated part (%)
— 10	3	3	3.6
— 9	1	4	4.8
— 7	2	6	7.2
— 5	1	7	8.4
— 4	9	16	19.3
— 3	16	32	38.6
— 2	30	62	74.7
2	11	73	88.0
3	5	78	94.0
4	3	81	97.6
5	1	82	98.8
16	1	83	100

TABLE 6

APPROVED AND REJECTED SCALES INSPECTED IN 1965-69

	1965	1966	1967	1968	1969
Total number of scales	8 041	9 140	9 453	12 230	10 473
Approved without adjustment					
Number	6 627	7 262	8 004	10 003	8 411
Part	82.4 %	79.5 %	84.7 %	81.8 %	80.3 %
Approved after adjustment					
Number	283	524	272	450	490
Part	3.5 %	5.7 %	2.9 %	3.7 %	4.7 %
Rejected					
Number	1 131	1 354	1 177	1 777	1 572
Part	14.1 %	14.8 %	12.4 %	14.5 %	15.0 %

assume that highly loaded meters will get tendencies to greater dispersion than less loaded ones. In spite of this the total error distribution of the meters is approximately symmetric about zero.

Table 3 gives information concerning approved and rejected meters. Significant diversities can be noticed between single product and blend meters respectively. Thus, the part rejected meters is significantly higher for the latter category : 7.7 % as compared to 4.8 %. The same trend also applies to meters with broken seals. Thus, the part of meters with broken seals is 15.6 % for single product meters as compared to 32.4 % for blend meters. Thus, about every third blend meter has been serviced since the previous inspection.

By comparing the ratios between rejected and approved meters with broken and unbroken seals respectively one may get information about the quality of the servicing operations which have necessitated the breaking of seals. From Table 3 it follows that 12.5 % of the single meters with broken seals were rejected as compared to 4.1 % with unbroken seals ; for blend meters the corresponding values are 10.4 % and 7.3 % respectively. Thus, for both categories of meters a higher rejection percentage can be noticed for meters which have been serviced as compared to the unserviced ones since the previous inspection.

Scales

The error distribution curve for the scales follows from Figure 2. This curve shows the same tendency as those for the meters. Thus, for the scales the extreme error values are also significantly higher than what should follow from normal distribution. Even a gross error of — 150 e has been registered. It is evident from figure 2 that such an extreme value will greatly influence the standard deviation value but also to some extent the mean value. The mentioned extreme value has been excluded in the results shown in brackets. The mean value will be — 0.55 e and the standard deviation 5.13 e with the above extreme value included as compared to — 0.39 e and 1.55 e with it excluded. The results indicate that the scales after some time on the average have a systematic tendency to negative errors.

The information concerning approved and rejected scales according to Table 4 is based on a more complete foundation than the error statistics according to Table 2 ; the scales in Table 4 have been separated into two main categories : scales with a verification period of 3 years and 1 year respectively. The former group represents mechanical scales, the latter electronic ones.

The rejection percentage of the electronic scales is considerably higher than that for the mechanical scales in spite of the verification period being shorter : 5.5 % as compared to 3.6 % respectively.

Table 4 gives information concerning scales which were approved after actions from our verification officers under the heading « after adjustment ». The table shows that 1.5 % of the mechanical scales had been adjusted before approval and 3.9 % respectively of the electronic scales. The information concerning original measurement errors of the adjusted scales can be found in Table 5.

The summation of the number of the adjusted and rejected scales gives information about the original state of the scales at the inspections. From Table 4, it follows that 5.1 % of the mechanical scales and 9.4 % of the electronic scales were not in an acceptable state originally.

According to Table 4, 24.4 % of the mechanical and 30.8 % of the electronic scales respectively were approved with originally broken seals. The values of the rejected scales with broken seals were 0.8 % for the mechanical scales and 1.9 % for the electronic ones respectively. Thus, about 25 % of the mechanical scales and 33 % of the electronic scales had been serviced since the previous inspection. The ratio between the rejected and approved scales with broken seals is 3.3 % for the mechanical scales and 6.1 % for the electronic ones respectively. Thus, the situation for the scales is in this respect better than that for the petrol meters.

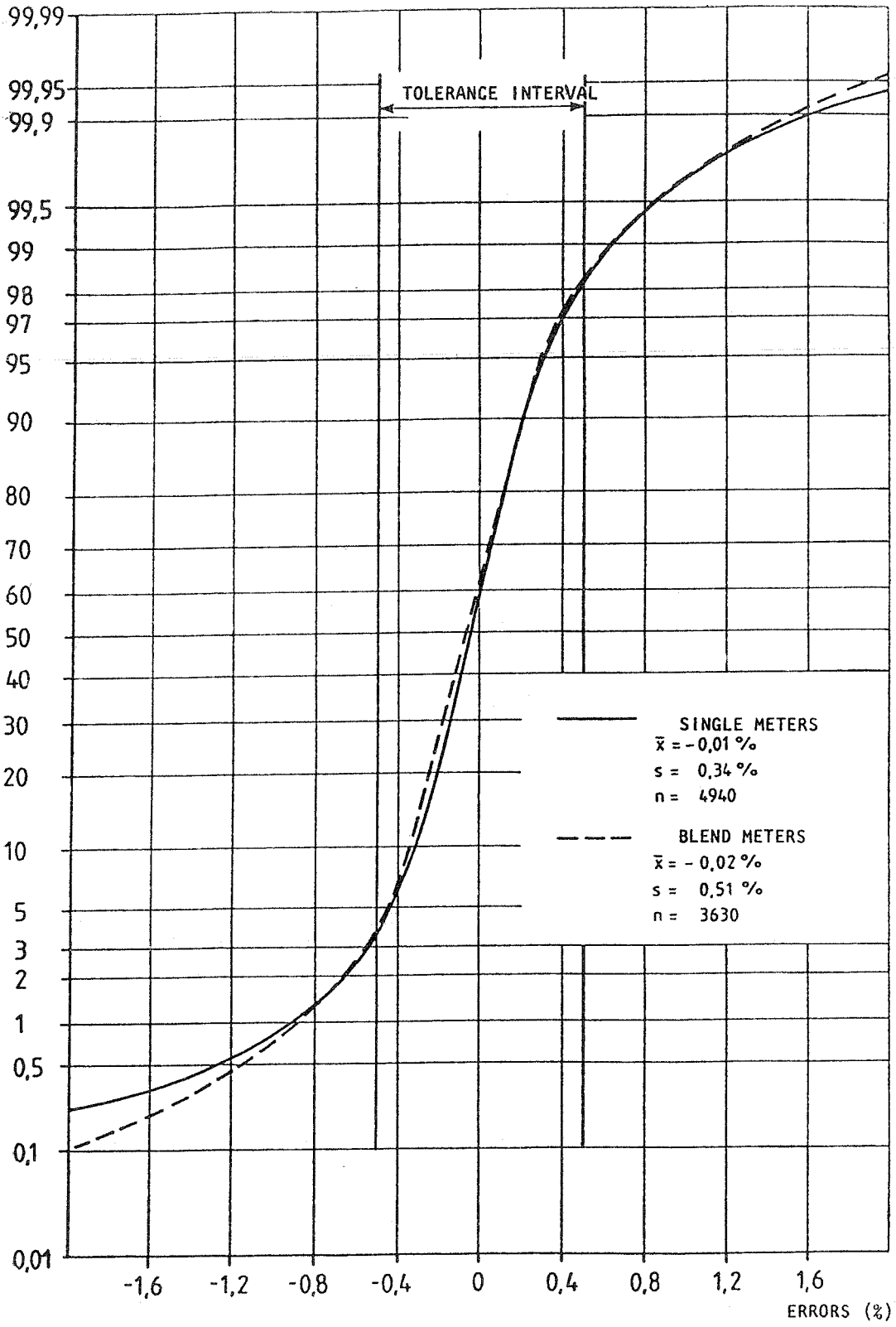


Figure 1

Distribution of relative errors of petrol meters at half maximum flow

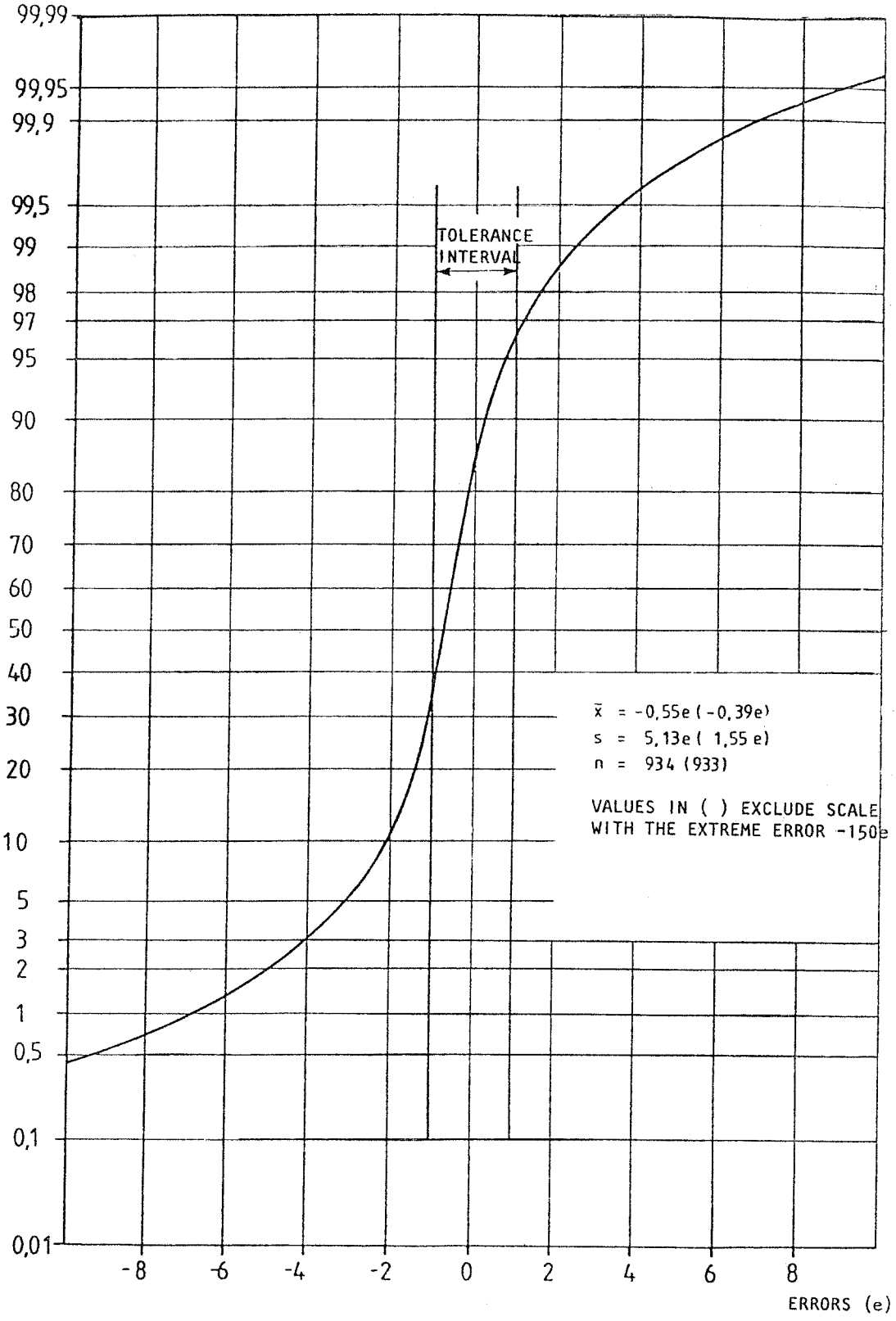


Figure 2

Distribution of errors of scales expressed as multiples of the verification scale interval e at the load of 500 e

A comparison between the figures in Tables 4 and 6 gives information of the effect caused by the introduction of compulsory verification. The comparison has to be limited to the mechanical scales in Table 4 as electronic scales were not included in the material of Table 6.

It is evident that a significant improvement has been obtained by the introduction of compulsory verification. Thus, it follows from the Tables 6 and 4 that the numbers of the rejected scales has been reduced from about 14 % to less than 4 % for the scales in question.

4. Conclusions

As mentioned above, the purpose of compulsory verification in Sweden is the consumer protection. It can be estimated that the commercial transactions to the consumers involving measurements with verified instruments reach an amount which for the moment is about $28 \cdot 10^9$ swedish crowns per year; of this amount about 79 % due to the use of petrol meters and about 21 % due to weighing, prepacked goods not included. Due to these great amounts our main target for the official inspections is to safeguard conditions for correct measurements. The described material shows that the official, regular verification has a positive effect in this respect.

Thus, comparison with earlier conditions shows that the percentage of rejected scales has been roughly reduced about four times through the introduction of the compulsory verification for these instruments.

The petrol meters were verified regularly also earlier. Thus, it is not possible to present a material from which a direct comparison could be made with any other form of inspection in Sweden. However, comparison with error figures received from a country without compulsory verification indicates that the Swedish consumers on average get 0.4 % more in volume.

Not less than about 10 % of the petrol meters with broken seals were to be rejected in spite of the fact that these meters had been serviced since the previous inspections and therefore ought to be in a better state. Thus, an advantage with regular verification is that meters showing tendencies to be worn-out will be taken out of use. Without this selection it may be expected that the percentage of meters with gross errors would increase significantly.

The results also indicate that there is no reason at present to change the existing verification periods: 1 year for petrol meters and electronic scales, 3 years for mechanical scales.

The complete statistical material about measurement errors of instruments being verified will be available at the beginning of 1984 and will concern activities during 1983.

5. Acknowledgements

The new statistical system is due to contributions made by Gustaf Linander and Per-Anders Persson. The author likes to express his great thanks to these persons.

ENSEIGNEMENT de la MÉTROLOGIE

LITTERATURE

Vocabulaire de Métrologie Légale en allemand

Nous avons le plaisir d'annoncer la parution d'un vocabulaire de métrologie pratique et légale en langue allemande, comprenant tous les termes du vocabulaire bilingue de l'OIML de l'édition 1978, complété par des références aux réglementations et normes de la RFA. Le vocabulaire contient également les titres des termes en français, anglais et espagnol :

E. SEILER (Editeur) : Grundbegriffe des Mess- und Eichwesens
Friedr. Vieweg and Sohn
Braunschweig/Wiesbaden, 1983

La structure et le fonctionnement d'un service de métrologie légale

Deux livres que nous venons de recevoir décrivent les expériences de l'auteur dans le domaine de l'administration du contrôle des poids et mesures en Australie et donnent, d'une façon générale, des conseils utiles aux agents de vérification :

S.J. PROCTOR : Weights and Measures Administration,
107 p., 1983

S.J. PROCTOR : Weights and Measures in Victoria
A History and Survey
82 p., 1983

Les deux livres peuvent être achetés en s'adressant à

Campion Books,
83 Franklin Street
Melbourne, 3000,
Victoria,
Australie

Nécessité, rôle et mise en application de la métrologie légale

Un guide très utile sur l'organisation d'un service de métrologie légale écrit par un expert qui a longtemps travaillé dans un pays en développement, peut être obtenu en s'adressant au Commonwealth Science Council, Marlborough House, Pall Mall, London SW1Y 5HX.

Le titre de l'ouvrage est :

A.J. STOLZ : A manual on the need for, the role of and application of Metrology in Trade,
55 p., 1982
edited by the Ministry of Commerce, Industry, Mines and Tourism, Kingdom of Swaziland.

TRAINING in METROLOGY

LITERATURE

Vocabulary of Legal Metrology in German

We have the pleasure to announce the recent publication of a vocabulary in legal and practical metrology in German including all the terms of the bilingual OIML vocabulary 1978 edition completed by references to regulations and standards of the Federal Republic of Germany. The vocabulary also comprises the titles of French, English and Spanish terms :

E. SEILER (Editor) : Grundbegriffe des Mess- und Eichwesens
Friedr. Vieweg and Sohn
Braunschweig/Wiesbaden, 1983

Structure and functionning of a legal metrology service

Two books that we have just received describe the experience of the author in the field of administration of weights and measures control and give, in a general way, useful advice to inspectors :

S.J. PROCTOR : Weights and Measures Administration,
107 p., 1983

S.J. PROCTOR : Weights and Measures in Victoria
A History and Survey
82 p., 1983

The two books may be purchased from

Campion Books,
83 Franklin Street
Melbourne, 3000,
Victoria,
Australia

Need for, role and application of legal metrology

A very useful guide-book concerning the organisation of a legal metrology service written by an expert who has for a long time worked in a developing country can be obtained through the Commonwealth Science Council, Marlborough House, Pall Mall, London SW1Y 5HX.

The title of the publication is :

A.J. STOLZ : A manual on the need for, the role of and application of Metrology in Trade,
55 p., 1982
edited by the Ministry of Commerce, Industry, Mines and Tourism, Kingdom of Swaziland.

INFORMATIONS

NOUVEAUX MEMBRES DU COMITE

ETHIOPIE — Monsieur Yohannes AFEWORK, Head of Technical Service, Ethiopian Standards Institution, a été désigné pour représenter son Pays au Comité. Cette place était vacante depuis le décès de Monsieur Negussie ABEBE il y a deux ans.

TUNISIE — Monsieur Ali BEN GAID, Président Directeur Général de l'Institut National de la Normalisation et de la Propriété Industrielle, vient d'être nommé comme représentant de la Tunisie au Comité en remplacement de Monsieur F. MERDASSI, appelé à d'autres fonctions.

Nous leur adressons nos meilleures salutations de bienvenue au sein du Comité.

NOUVELLE REVUE

Nous signalons que l'Institut National de la Normalisation et de la Propriété Industrielle (INNORPI) de la Tunisie publie à partir de novembre 1983 un mensuel traitant de la normalisation, de la métrologie et de la propriété industrielle, dont le titre est MUWASSAFAT (Normes). La publication est entièrement bilingue arabe-français.

INFORMATION

NEW COMMITTEE MEMBERS

ETHIOPIA — Mr Yohannes AFEWORK, Head of Technical Service, Ethiopian Standards Institution, has been appointed as CIML Member. This position was vacant since the death two years ago of Mr Negussie ABEBE.

TUNISIA — Mr Ali BEN GAID, President Director General, Institut National de la Normalisation et de la Propriété Industrielle, has just been appointed as representative of Tunisia on the Committee, replacing Mr F. MERDASSI, who has been called to other duties.

We express our best wishes of welcome to them as new Committee Members.

NEW REVIEW

We would like to advise that National Institute of Standards and Patents (INNORPI) of Tunisia publishes starting November 1983 a monthly review concerning standardization, metrology and industrial property (patents) with the title MUWASSAFAT (Standards). The publication is fully bilingual Arabic-French.

REUNIONS

	Groupes de travail	Dates	Lieux
SP 2 - Sr 4	Reconnaissance internationale des contrôles et des marques de vérification	29-30 mars 1984	PARIS, BIML
SP 31	Enseignement de la métrologie	2-3-(4) avril 1984	PARIS FRANCE
SP 22 et ses	Secrétariats-rapporteurs Principes du contrôle métrologique	9-13 avril 1984	COBLENCE R.F. d'ALLEMAGNE
SP 17 et ses	Secrétariats-rapporteurs Mesure des pollutions	7-11 mai 1984	PARIS, BIML
SP 5 - Sr 11	Dispositifs de repérage des niveaux des liquides dans les réservoirs	mai 1984 *(provisoire)*	
SP 20 - Sr 1	Contenu informatif de l'étiquetage	5-8 juin 1984	BERNE SUISSE
SP 20 - Sr 2	Vérification des quantités contenues dans les emballages		
SP 7 - Sr 4	Instruments de pesage à fonctionnement non automatique	13-15 juin 1984	BERGEN NORVEGE
SP 2 - Sr 6	Instruments électroniques.	18-20 juin 1984	DELFT PAYS-BAS
SP 7 - Sr 2	Instruments de pesage. Dispositifs électroniques	21-22 juin 1984	DELFT PAYS-BAS

Conseil de la Présidence	8-10 février 1984	LENINGRAD U.R.S.S.
Conseil de Développement	(4)-5-6 avril 1984	PARIS, BIML
Septième Conférence Internationale de Métrologie Légale	1-5 oct. 1984	HELSINKI FINLANDE
Vingtième Réunion du Comité International de Métrologie Légale		

CENTRE DE DOCUMENTATION

Documents reçus au cours du 4e trimestre 1983

BUREAU INTERNATIONAL DES POIDS ET MESURES — BIPM

Procès-Verbaux des Séances du Comité International des Poids et Mesures 7e Session, 12-14 octobre 1982 (Tome 50)

Monographie : Supplementary information for the IPTS-68 and the EPT-76 (1st edition, 1983)

ORGANISATION INTERNATIONALE DE NORMALISATION — ISO

Rapport de la 18e réunion du DEVCO, Genève, 10-11 mai 1983

COMMISSION ELECTROTECHNIQUE INTERNATIONALE — CEI

Rapport Annuel/Annual Report, 1982

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE/ORGANISATION MONDIALE DE LA SANTE — FAO/OMS

CAC/Vol. XI - Ed. 1 (Codex Alimentarius volume XI) : Normes CODEX pour les graisses et huiles combustibles

CONSEIL D'ASSISTANCE MUTUELLE ECONOMIQUE — SEV

Secretariat

Ukazatel' Standartov SEV, 1983

REPUBLIQUE FEDERALE D'ALLEMAGNE

Physikalisch- Technische Bundesanstalt

PTB Testing Instructions (1980) : Liquid Manometers
(traduction de PTB-Prüfregeln « Flüssigkeitsmanometer »)

AUSTRALIE

Weights and Measures Administration (S.J. Proctor, 1983)

Weights and Measures in Victoria - a History and Survey (S.J. Proctor, 1983)

BRESIL

Instituto Nacional de Metrologia, Normalizaçao e Qualidade Industrial - INMETRO

Regulations for the accreditation of test laboratories, 1983

Procedures for the application of test laboratory accreditation, 1983

Criteria of competence for the accreditation of testing laboratories, 1983

DANEMARK

Dantest

Maleteknisk Direktiv, EOF-typegodkendelse og verifikation. Almindelige bestemmelser (1-5-1983) 2 udgave :

19.91.1-01 Alkoholometre og areometre
32.46.1-01 Maleanlaeg til vaesker bortset fra vand
33.02.1-01 Volumen - Gasmalere
34.11.1-01 Ikke - Automatiske vaegte

ETATS-UNIS D'AMERIQUE

National Bureau of Standards

NBS Spec. Publ. 643 (Feb. 1983) National Bureau of Standards

NBS Spec. Publ. 250 (Oct. 1983) Appendix : Fees and Services

NBS Spec. Publ. 663 Report of the 68th National Conference on Weights and Measures 1983

FRANCE

Service des Instruments de mesure

Rapport d'activité 1982

SUEDE

Statens Provningsanstalt

SPFS 1983:13 (LM:G 18) : Föreskrifter för bandvagar avsedda för kröning

TUNISIE

Journal Officiel de la République Tunisienne

Loi N° 82-66 du 6-8-1982 relative à la normalisation et à la qualité

RECOMMANDATIONS INTERNATIONALES

R.I. N°

— Vocabulaire de métrologie légale (termes fondamentaux)
Vocabulary of legal metrology (fundamental terms)

1 — Poids cylindriques de 1 g à 10 kg (de la classe de précision moyenne)
Cylindrical weights from 1 g to 10 kg (medium accuracy class)

2 — Poids parallélépipédiques de 5 à 50 kg (de la classe de précision moyenne)
Rectangular bar weights from 5 to 50 kg (medium accuracy class)

3 — Réglementation métrologique des instruments de pesage à fonctionnement non automatique
Metrological regulations for non automatic weighing machines

4 — Fioles jaugées (à un trait) en verre
Volumetric flasks (one mark) in glass

5 — Compteurs de liquides autres que l'eau à chambres mesureuses
Meters for liquids other than water with measuring chambers

6 — Prescriptions générales pour les compteurs de volume de gaz
General specifications for volumetric gas meters

7 — Thermomètres médicaux (à mercure, en verre, avec dispositif à maximum)
Clinical thermometers (mercury -in-glass, with maximum device)

8 — Voir RI 59
See RI 59

9 — Vérification et étalonnage des blocs de référence de dureté Brinell
Verification and calibration of Brinell hardness standardized blocks

10 — Vérification et étalonnage des blocs de référence de dureté Vickers
Verification and calibration of Vickers hardness standardized blocks

11 — Vérification et étalonnage des blocs de référence de dureté Rockwell B
Verification and calibration of Rockwell B hardness standardized blocks

12 — Vérification et étalonnage des blocs de référence de dureté Rockwell C
Verification and calibration of Rockwell C hardness standardized blocks

14 — Saccharimètres polarimétriques
Polarimetric saccharimeters

15 — Instruments de mesure de la masse à l'hectolitre des céréales
Instruments for measuring the hectolitre mass of cereals

16 — Manomètres des instruments de mesure de la tension artérielle (sphygmo-manomètres)
Manometers for instruments for measuring blood pressure (sphygmomanometers)

17 — Manomètres, vacuomètres, manovacuomètres indicateurs (instruments usuels)
Indicating pressure gauges, vacuum gauges and pressure-vacuum gauges (ordinary instruments)

18 — Pyromètres optiques à filament disparaissant
Optical pyrometers of the disappearing filament type

19 — Manomètres, vacuomètres, manovacuomètres enregistreurs (instruments usuels)
Recording pressure gauges, vacuum gauges, and pressure-vacuum gauges (ordinary instruments)

20 — Poids des classes de précision E_1 E_2 F_1 F_2 M_1 de 50 kg à 1 mg
Weights of accuracy classes E_1 E_2 F_1 F_2 M_1 from 50 kg to 1 mg

21 — Taximètres
Taximeters

22 — Tables alcoométriques internationales
International alcoholometric tables

23 — Manomètres pour pneumatiques de véhicules automobiles
Tyre pressure gauges for motor vehicles

24 — Mètre étalon rigide pour agents de vérification
Standard one metre bar for verification officers

25 — Poids étalons pour agents de vérification
Standard weights for verification officers

26 — Seringues médicales
Medical syringes

27 — Compteurs de volume de liquides (autres que l'eau). Dispositifs complémentaires
Volume meters for liquids (other than water). Ancillary equipment

28 — Réglementation technique des instruments de pesage à fonctionnement non-automatique
Technical regulations for non-automatic weighing machines

29 — Mesures de capacité de service
Capacity serving measures

30 — Mesures de longueur à bouts plans (Calibres à bouts plans ou cales-étalons)
End standards of length (gauge blocks)

31 — Compteurs de volume de gaz à parois déformables
Diaphragm gas meters

32 — Compteurs de volume de gaz à pistons rotatifs et compteurs de volume de gaz à turbine
Rotary piston gas meters and turbine gas meters

33 — Valeur conventionnelle du résultat des pesées dans l'air
Conventional value of the result of weighing in air

34 — Classes de précision des instruments de mesurage
Accuracy classes of measuring instruments

35 — Mesures matérialisées de longueur pour usages généraux
Material measures of length for general use

36 — Vérification des pénétrateurs des machines d'essai de dureté
Verification of indenters for hardness testing machines

37 — Vérification des machines d'essai de dureté (système Brinell)
Verification of hardness testing machines (Brinell system)

38 — Vérification des machines d'essai de dureté (système Vickers)
Verification of hardness testing machines (Vickers system)

39 — Vérification des machines d'essai de dureté (système Rockwell B, F, T - C, A, N)
Verification of hardness testing machines (Rockwell systems B, F, T - C, A, N)

40 — Pipettes graduées étalons pour agents de vérification
Standard graduated pipettes for verification officers

41 — Burettes étalons pour agents de vérification
Standard burettes for verification officers

42 — Poinçons de métal pour agents de vérification
Metal stamps for verification officers

43 — Fioles étalons graduées en verre pour agents de vérification
Standard graduated glass flasks for verification officers

44 — Alcoomètres et aréomètres pour alcool
Alcoholometers and alcohol hydrometers

45 — Tonneaux et futailles
Casks and barrels

46 — Compteurs d'énergie électrique active à branchement direct (de la classe 2)
Active electrical energy meters for direct connection (class 2)

47 — Poids étalons pour le contrôle des instruments de pesage de portée élevée
Standard weights for testing of high capacity weighing machines

48 — Lampes à ruban de tungstène pour l'étalonnage des pyromètres optiques
Tungsten ribbon lamps for calibration of optical pyrometers

49 — Compteurs d'eau (destinés au mesurage de l'eau froide)
Water meters (intended for the metering of cold water)

50 — Instruments de pesage totalisateurs continus à fonctionnement automatique
Continuous totalising automatic weighing machines

51 — Trieuses pondérales de contrôle et trieuses pondérales de classement
Checkweighing and weight grading machines

52 — Poids hexagonaux. Classe de précision ordinaire de 100 g à 50 kg
Hexagonal weights. Ordinary accuracy class, from 100 g to 50 kg

53 — Caractéristiques métrologiques des éléments récepteurs élastiques utilisés pour le mesurage de la pression. Méthodes de leur détermination
Metrological characteristics of elastic sensing elements used for measurement of pressure. Determination methods

54 — Echelle de pH des solutions aqueuses
pH scale for aqueous solutions

55 — Compteurs de vitesse, compteurs mécaniques de distances et chronotachygraphes des véhicules automobiles - Réglementation métrologique
Speedometers, mechanical odometers and chronotachographs for motor vehicles. Metrological regulations

56 — Solutions-étalons reproduisant la conductivité des électrolytes
Standard solutions reproducing the conductivity of electrolytes

57 — Ensembles de mesurage de liquides autres que l'eau équipés de compteurs de volumes. Dispositions générales
Measuring assemblies for liquids other than water fitted with volume meters. General provisions.

*58 — Sonomètres
Sound level meters

*59 — Humidimètres pour grains de céréales et graines oléagineuses
Moisture meters for cereal grains and oilseeds

* Projet adopté par le CIML - mai 1983.
A sanctionner par la Septième Conférence - octobre 1984.
Draft adopted by the CIML - May 1983.
To be sanctioned by the Seventh Conference - October 1984.

DOCUMENTS INTERNATIONAUX

D.I. N°

1 — Loi de métrologie
Law on metrology

2 — Unités de mesure légales
Legal units of measurement

3 — Qualification légale des instruments de mesurage
Legal qualification of measuring instruments

4 — Conditions d'installation et de stockage des compteurs d'eau froide
Installation and storage conditions for cold water meters

5 — Principes pour l'établissement des schémas de hiérarchie des instruments de mesure
Principles for the establishment of hierarchy schemes for measuring instruments

6 — Documentation pour les étalons et les dispositifs d'étalonnage
Documentation for measurement standards and calibration devices

Note — Recommandations internationales et Documents internationaux peuvent être acquis au *International Recommendations and International Documents may be purchased from* Bureau International de Métrologie Légale, 11, rue Turgot, 75009 PARIS.

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TG standard

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TP = telephone

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The call numbers are generally indicated for international automatic dialling excepted where the local number is preceded by a dash.

TG = telegramme TX = telex

Pour tout télex ou télégramme, il est nécessaire d'indiquer le nom de la personne et sa qualité.

For all telex or telegrams it is necessary to indicate name of person and occupation.

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The French experience in legal control and testing of net content of prepackages

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The sale of prepackaged products indicating contents not measured in the presence of the buyer is a contemporary commercial phenomenon of great importance. The French metrology service started to study the problem of applying controls from 1973 on. These studies have been made taking into account the standpoints as well within the Commission of the European Communities as within other international organisations like the CODEX ALIMENTARIUS Committee.

After more than ten years, it seems interesting to sum up in a global way the results obtained within the field of prepackage control by official authorities, the problems encountered and to be resolved, the experienced difficulties and the improvements which could be made.

I - COMMENTS ON STATISTICAL TESTS BY RANDOM SAMPLING

At the beginning of the testing activity by official authorities, it could hardly be considered to make 100% controls taking into account the high speed of filling of large series of prepackages. Statistical methods by sampling therefore seemed to be the best solution to ascertain the loyalty of packers as regards stated contents.

The French metrology service uses the statistical tests foreseen in the European Community Directive 76/211/CEE at 20 January 1976. I am below recalling the essential characteristics of these tests.

The tests applied are of two types :

- the first one allows checking whether the mean value requirement is fulfilled or not. This is consequently a comparison test of the unknown mean content of a batch of prepackages to the nominal content.

- the second type of tests allows to ascertain that the proportion of under-filled prepackages in a batch subject to control is the smallest possible. This is a collection of double sampling plans the efficiency of which is such that the official control authority is led to pronounce the acceptance of batches comprising 2% of defective prepackages.

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From experience it seems to us that improvements could be made. The practical testing has shown an anomaly which is worth being stressed. We notice in fact that the sizes of the samples to be taken increase with the size of the batches. It follows that, as the efficiency of a statistical test increases with the size of the sample, great batches are submitted to tests which are relatively more severe than for small batches. This situation seems paradoxical to us especially as manufacturing in large series frequently concerns products which are relatively unexpensive whereas batches of limited size concern more rare and costful products.

We think that the relation which was introduced between the size of batches and the size of samples is very artificial and that it has even no reason to exist.

The confusion should be avoided between the testing of a continuous series of batches of the same production and the testing of a single batch chosen separately in this production. The official testing authority has most frequently, if not exclusively, to act according to the second case where it operates by non-announced controls. The first case is that which is essentially contained in the standard ISO 2859 from which by the way those sampling plans have been taken which concern tests by counting of the number of defective items.

It follows from this confusion between a continuous series of batches and tests of a single isolated batch that the sampling plans used for testing isolated batches concern partially sampling without replacement, the ratio between the size of the sample and the size of the batch being greater than 0.10.

This is the case for batches the sizes of which are comprised between 100 and 300 from which one extracts a sample of the size of 30. It follows that in these particular cases the efficiency of the test is not that expected; it is in fact better for the same acceptance or rejection requirements

All these tests present possibilities which are not utilized with sufficient coherence.

Without denying the appraisable efforts which, at a certain time, permitted to put some order in the control of prepackages, it appears now desirable that the variety in sample sizes is put into a framework of a more precise procedure than the relation batch to sample which is purely artificial in the case of single lot testing.

One could select for the choice of sample size more realistic criteria such as :

- Economic importance of the packaged product,

- More or less severe tests based upon previous test results such as re-enforced controls after a first warning.

These comments should be studied in more detail as concerns both the practical realisation of the procedures and the statistical analysis.

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II - COMMENTS ON THE SITES OF TESTING

About 80% of the tests by official authorities are carried out at the packers premises.

The control at the 'source' seems indispensable to us as the filling factory is the only site where the sampling has the greatest chance of being representative for a given production.

However one must not neglect testing in the retail market. These tests are indicators which may induce to trace back to the filling factory.

Except in severe infringement to public warranty which of course is immediately sanctioned, the experience has shown us that it is more efficient to use the above procedure than to suddenly punish without further investigation.

In fact, the batches which are exhibited for sale in the shops have most frequently a very limited size. Taking into account the very complex systems of distribution of products between the factory and the shelves of a shop, one may question whether such batches are really representative for a manufacturer's production.

On the other hand, if we want to be realistic, we know very well that, taking into account the various factors which affect large scale production, there is a non-negligible risk for the manufacturer even in case of good production control that a small percentage of non-conform products united into small batches finds its way to the retail market.

Is it in this case objectively possible to accuse the seller of characterized fraud when he is not responsible for the packing? Is it even possible to accuse the packer of negligence when the established fact belongs to the risk inherent to any large scale production? We do not think so and this is the reason why as concerns retail tests our basic rule is prudence.

III - COMMENTS ON THE PACKER's OWN TESTING

The testing at the packer has another advantage : it permits to verify that suitable testing equipment is used in the factory and to know the methods employed by the manufacturer to ensure that his production is in conformity with the regulations.

In this field, we take absolute care not to intervene in any authoritative way or to impose internal control systems which may be satisfactory to our advice but badly adapted to a particular industry for reasons which are not purely metrological.

The officer from a control authority does not know in detail the problems of an enterprise relative for instance to the staff employed, machines used and the minimum cost of a control system.

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We thus understand our role in this field to be informative and advising :

- Information first as concerns regulatory texts,
- Advice and information on possibilities of internal control for those enterprises which are not well informed on this subject.

Presently the types of advice which one may give to a manufacturer point on two essential items :

- the measuring instruments for tests :

These should be adapted to the user's requirements and have such accuracy that the errors due to the instrument itself can practically be neglected compared to the tolerances of the prepackages.

The regulations set in this case forth the maximum scale intervals in respect of the weighed load.

- the statistical control system by control cards :

We recommend to packers,without obligation, the French standard NF X - 06 - 031. This standard indicates the means for establishing at low cost a statistical production control system which has been proved and which consists in following the production by recording the fluctuations of the production on a graphic called control card so as to enable rapid intervention as soon as an anomaly becomes significant.

We observe, however, that these very simple and cheap graphical systems are more and more replaced by more sophisticated control systems which reduce, or even fully replace, human interventions in the control survey of the production.

In the field of prepackaging, we encounter two forms of these systems :

- one, consisting of a weighing instrument of sufficient accuracy connected to a mini-computer programmed for statistical sampling tests.
- the other consisting mainly of a checkweighing machine which does not operate by sampling but which carries out 100% testing.

We are happy to see the developments in this field and it would not be realistic to ignore them and require from manufacturers parallel control procedures to these systems which are sold for being sufficient in themselves.

However, if we consider that an official metrology service should not impose this or that system, we think that it is anyway its duty to evaluate the validity of any internal control system in the same way as one evaluates the metrological performance of a measuring instrument.

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However if it is relatively easy to make the evaluation of a control card system, that of automated data systems is more complex.

The only solution that an official control service may reasonably adopt in this last case seems to be limited to a thorough check of the results obtained by these modern systems.

Independently of the legal verification of the measuring instruments properly speaking which are included in these systems (weighing and grading machines, checkweighers, etc.), it does in fact hardly seem possible within the framework of prepackage tests to make technical inspections of similar nature on other elements in the control chain (verification of programs, reliability of automatic devices, etc.).

This verification of results that we consider, could be a statistical control which is more elaborate than the ones presently foreseen in the European Directive. These latter are relatively light and suppose necessarily testing by the packer that can be examined or evaluated by an official control authority.

The problem thus remains. As concerns us, we advise inspectors in charge of the control to execute from time to time a test on the standard deviation of the production, i.e. to compare at a given time the estimator of the standard deviation of a sample with the standard deviation used by the packer for the construction of his control system. This test may be applied whatever system is used by the packer, the dispersion of the production remaining in any case the essential parameter which it is necessary to master in the best possible way.

IV - THE TREATMENT OF REJECTED BATCHES

The testing at the packer's premises also permits to avoid the marketing of non-conform batches.

One of the following steps can be taken in this case :

- Overfilling of another batch that the packer mixes with the underfilled batch so as to obtain a new batch, the mean content of which is at least equal to the nominal content. The control authority checks of course by sampling that this result is obtained.

- The packer is requested to grade the defective batch so as to elimine the underfilled packages and obtain a mean value corresponding to the legal requirements.

- Modification of the content printed on the label so that the indication corresponds to the real content if the product is not subject to a regulation fixing a compulsory value of nominal content.

- Sale of the defective batch to a duly informed purchaser. This is generally a collectivity such as a hospital, a restaurant of an entreprise, etc.

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If none of the above-mentioned solutions can be considered, the packer destroys the batch so as to repack the product if this is possible. In any case the inspector will stamp, if the destruction cannot be made in his presence, the mention 'prohibited for sale' on the prepackages of the defective batch.

V - USE OF TEST RESULTS

Each test made at the packer's premises is recorded on a card containing various information to be used by the computer at the central technical office of the control authority.

Without entering into details about this document, the card should comprise globally three types of information :

- The inspection service which made the tests,
- The packer and in particular the inscriptions used on the prepackage,
- Conditions and results of the tests.

The data processing of this document permits us to follow the evolution of the level of metrological performance of prepackages by their category and by geographical region.

We will only mention a few examples which we consider significant.

Thus the records concerning controls (from 1/09/1974 to 1/02/1975) show the following results in percentage of batches which do not fulfil the regulated requirements.

- edible oil	:	58%
- industrial oil	:	55%
- coffee	:	34%
- milk	:	38%
- animal food	:	40%

In addition to warnings given to the responsible enterprises, professional associations concerned have been informed and asked to intervene among their members and give suitable advice.

The records for the year of 1981 indicate for the same products the following results :

- edible oil	:	17.9%
- industrial oil	:	25.0%
- coffee	:	20.5%
- milk	:	13.6%
- animal food	:	29.5%

./.

These last results are of course not yet satisfactory. They show anyway the necessity of bringing about order in this field; one may see an improvement which is slow but anyhow an improvement towards better metrological performance.

But it is undeniable that much remains to be done and we may ask ourselves if the right time has not come for testing authorities to apply more elaborated statistical control methods which could in turn incite manufacturers to study more in detail their own control systems in their own interest as well as in the interest of the consumer.

VI - SOME DIFFICULTIES

Following the results reported above, we will briefly summarize the essential difficulties which actually preoccupy us and for which we do not find solutions which are really satisfactory.

- Use of measuring container bottles

The level of metrological performance of these container bottles should be such that the user can rely upon their filling as well as on the indicated fill height corresponding to nominal capacity.

However, although glass manufacturers have considerably improved the production since the application of the European Directive in 1975, they have not been able to eliminate fully the risk of marketing batches of bottles which may lead the user to underfillings for which he is not directly responsible.

Shall one come to impose forms of weight control by fillers thus denying in fact the possibility offered by measuring container bottles of simplified control by detecting the filling height.

As concerns our control service and subject to further inquiries, we are presently sticking to weight control with density determination; but it is certain that the fillers do as a general rule not proceed in this manner and thus are exposed to the risk mentioned above.

- The problem of dessication of products sold by weight

This problem arises mainly for the control authorities which operate in the retail trade on products such as cheese, meat, flour, etc. which are subject to loss of water.

Two positions can be taken in this case :

- the packer of these products shall take all necessary steps so that at the sale to the final consumer, the indicated weight is respected. This means that the packer shall take into account the dessication by overfilling the prepackages at the production.

./.

- the packer fills the packages in the normal way without foreseeing loss of weight by dessication. If, at the stage of retail sale, a lack of weight is found, it is up to the control authority to determine by chemical analysis if this lack can be fully explained by a loss of water.

The French regulations only takes into account the first procedure except in special cases.

However we are aware that this problem is not simply a matter of metrology.

To impose overfilling necessarily has economic implications for the manufacturer.

Therefore there must either be a choice between the concern of not too much penalizing the industry and the unconditional defense of the consumer or a compromise between these two extremes which practically leads to treating this problem separately product by product.

This rapid survey of the experience of some 10 years of prepackage control is no doubt incomplete.

However, if we thus have not brought about the solutions to the difficult problems but at least raised up some subjects to think over, we consider that this presentation has reached its goal.

Annexed document : Card for prepackage control

CONTROLE DES PREEMBALLAGES A QUANTITE NOMINALE CONSTANTE

1 SERVICE

1 — Réservé S.D.M

5 — Code bureau

9 — Numéro fiche

13 — Date du contrôle

15 — Contrôle effectué par (RENVOI 1)

2 PREEMBALLAGE

20–24 — Code produits

25 — Origine (RENVOI 2)

26 — Identification (RENVOI 3)

27 — Code officiel géographique

32 — Lettre distinctive (le cas échéant)

33 — Q.N. (en l. ou en kg)

40 — Unité: L: Litre K: kilogramme

41 — 1: Contrôle difficile 2: Tare variable

42 — Contrôle interne (RENVOI 4)

43 — lettre "e" 1: non 2: oui

44 — Remplissage (RENVOI 5)

3 CONTROLE

45 — Lieu (RENVOI 6)

46 — 1: sur stock 2: sur chaine

47 — 1: destructif 2: non destructif

48 — Effectif du lot

53 — Effectif de l'échant. (moyenne)

56 — Effectif de l'échant. (contenu minimal)

59 — Nb. de doseuses

61 — Rajustement instrument 1: non 2: oui

62 — Valeur de $\bar{x}$ (en l ou en kg)

70 — Valeur de s (en ml ou en g)

76 — 1: refusé 2: accepté

77 — Nombre de défectueux

80 — 1: refusé 2: accepté

81 — Sanction (RENVOI 7)

82 — Rajustement du lot (RENVOI 8)

CONTROLE de la MOYENNE | CONTROLE CONTENU MIN.

INFORMATIONS NON CODEES

NOM DE L'ETABLISSEMENT CONDITIONNEUR ou IMPORTATEUR

CONDITIONNE POUR

NOM DE LA COMMUNE CONDITIONNEUR ou IMPORTATEUR

NOM DU PRODUIT

DUREE DU STOCKAGE

RENVOI 1
1: S.I.M seul
2: S.I.M + Fraude
3: S.I.M + Prix
4: S.I.M + Autre

RENVOI 2
1: France
2: C.E.E
3: Europe
4: Amérique
5: Asie
6: Océanie
7: Afrique
8: Inconnu

RENVOI 3
1: Adresse en clair
2: Code officiel géographique
3: Code délivré par un autre service
4: Aucune identification

RENVOI 4
1: Par carte
2: Par trieuse
3: A 100%
4: De réception (importateurs)
5: Autre
6: Inexistant
7: Inconnu

RENVOI 5
1: Doseuse pondérale approuvée
2: Doseuse pondérale non approuvée
3: Doseuse volumétrique
4: Emplisseuse B.R.M
5: Autre emplisseuse
6: Compteuse
7: Manuel
8: Inconnu

RENVOI 6
1: Chez le conditionneur
2: Chez l'importateur
3: En entrepot
4: Au niveau du détail

RENVOI 7
1: Néant
2: Avertissement oral
3: Avertissement écrit
4: P.V.

RENVOI 8
1: Néant
2: Surdosage d'un nouveau lot
3: Tri
4: Modification de l'étiquetage
5: Destruction
6: Renvoi
7: Vente à un acheteur informé

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QN =

Tare moyenne =

Conversion $\bar{w}$ en s

$$s = \frac{\bar{w}}{2{,}326}$$

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77		
78		
79		
80		
TOT.		

$\Sigma \Delta x =$ _____ $\quad \bar{x} = QN + \frac{\Sigma \Delta x}{n} =$ _____

$\Sigma w_i =$ _____ $\quad \bar{w} =$ _____ $\quad s =$ _____

A CONTROLE DE LA MOYENNE : $\bar{x}$ =

1. Contrôle destructif — ACCEPTE

   n = 20 : QN − 0,64 s =

2. Contrôle non destructif — REFUSE

   n = 30 : QN − 0,503 s =

   n = 50 : QN − 0,379 s =

B − CONTROLE DU CONTENU MINIMAL

Effectif échantillon = — ACCEPTE

Erreur maximale tolérée E =

Nombre de défectueux = — REFUSE

C − RENSEIGNEMENTS EVENTUELS COMPLEMENTAIRES

(marque des doseuses − principe de mesurage − masse volumique − taux d'humidité − précisions sur le contrôle interne − lieu de contrôle − problèmes particuliers, etc...)

SEMINAIRE O.I.M.L. DU 6 AU 8 JUIN 1983

Exposé de Monsieur ZANKEVITCH

Expérience française dans le contrôle métrologique des préemballages

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La vente de produits conditionnés à l'avance et portant l'indication d'une quantité mesurée en dehors de la présence de l'acheteur est un phénomène commercial contemporain d'une grande ampleur. Aussi dès 1973, le Service de Métrologie Français s'est-il penché sur le problème du contrôle des produits préemballés. Les études ont été effectuées en tenant compte des positions prises tant à la Commission des Communautés Européennes que dans d'autres organismes internationaux tels que le comité du Codex Alimentarius.

Plus de dix ans après, il nous paraît intéressant de faire globalement le point sur les résultats obtenus dans le domaine du contrôle des préemballages par les services officiels, les problèmes posés et à résoudre, les difficultés rencontrées et les améliorations qui pourraient intervenir.

I - REMARQUES SUR LE CONTROLE STATISTIQUE PAR SONDAGE ALEATOIRE

Au début de l'organisation du contrôle des préemballages par les services officiels, le contrôle à 100 % n'était pratiquement pas envisageable compte tenu que la confection des préemballages est une fabrication en grande série caractérisée par des cadences élevées d'emplissage. Les méthodes statistiques par sondage sont donc apparues comme la solution la meilleure pour s'assurer que les conditionneurs respectaient loyalement les quantités annoncées.

Le Service de Métrologie Français utilise les tests statistiques prévus par la directive européenne 76/211/CEE du 20 janvier 1976. Je rappelle ci-après les caractéristiques essentielles de ces tests.

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Les tests appliqués sont de deux catégories :

- la première catégorie permet de vérifier que le critère de la moyenne est ou non respecté. C'est par conséquent un test de comparaison de la moyenne inconnue d'un lot de préemballages à la quantité nominale.

- la deuxième catégorie de tests permet de s'assurer que la proportion de préemballages sous-dosés dans un lot contrôlé est la plus faible possible. Il s'agit d'un ensemble de plans d'échantillonnage double dont l'efficacité est telle que le service officiel de contrôle est amené dans la plupart des cas à prononcer l'acceptation de lots comportant 2 % de préemballages défectueux.

A l'expérience il nous semble que des améliorations pourraient être apportées. La pratique de ces tests a mis en évidence une anomalie qui mérite d'être signalée. Nous remarquons en effet que les effectifs d'échantillons à prélever croissent avec la taille des lots. Il s'en suit que, l'efficacité d'un test statistique croissant notamment avec l'effectif de l'échantillon, les lots importants sont soumis à des tests relativement plus sévères que les lots plus petits. Cette situation nous paraît paradoxale, car souvent les fabrications en grande série se rapportent à des produits relativement peu coûteux, alors que les lots d'effectif réduit concernent des produits plus rares donc d'un coût plus élevé.

Nous pensons donc que la liaison qui a été introduite entre effectifs de lots et effectifs d'échantillons est très artificielle et n'a même aucune raison d'être.

Une confusion devrait être évitée entre le contrôle d'une série continue de lots issus d'une même fabrication et le contrôle d'un lot pris isolément dans cette fabrication. L'Administration se trouve placée le plus souvent, si ce n'est uniquement, dans le second cas où elle opère par contrôle inopiné. Le premier cas est celui qui est essentiellement retenu par la norme ISO 2859 d'où sont tirés d'ailleurs les plans d'échantillonnage pour le contrôle par comptage du nombre de défectueux.

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Il découle de cette confusion entre contrôle d'une série continue de lots et contrôle d'un lot pris isolément que les plans d'échantillonnage utilisés pour des contrôles de lots isolés sont relatifs, en partie, à des tirages exhaustifs, le rapport de l'effectif de l'échantillon à l'effectif du lot étant supérieur à 0,10.

Ce qui est le cas pour des lots d'effectifs compris entre 100 et 300 d'où l'on extrait un échantillon de taille 30. Elle est en réalité meilleure pour les mêmes critères d'acceptation et de rejet.

Il en résulte que dans ce cas particulier l'efficacité du test n'est pas celle qu'on attend.

Les possibilités offertes par l'ensemble de ces tests ne sont donc pas utilisées avec suffisamment de cohérence.

Sans nier l'effort louable qui à l'époque a permis de mettre de l'ordre dans le contrôle des préemballages, il nous apparaît souhaitable maintenant que la variété dans les effectifs de l'échantillon s'inscrive dans le cadre d'une procédure précise autre que la relation lot-échantillon pûrement artificielle dans le cas du contrôle d'un lot pris isolément.

On pourrait retenir dans le choix d'effectifs d'échantillon plus ou moins importants des critères plus réalistes tels que :

- Importance économique du produit préemballé
- Plus ou moins grande sévérité du contrôle en fonction de constatations antérieures : contrôle renforcé après un premier avertissement par exemple.

Ces remarques demanderaient à être approfondies tant sur la réalisation pratique des procédures envisagées que sur l'analyse proprement statistique.

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II - REMARQUES SUR LES LIEUX DE CONTROLE

80 % environ des contrôles sont exercés par l'administration chez les conditionneurs.

Contrôler à la "source" nous paraît indispensable, l'usine de conditionnement est le seul lieu où l'échantillonnage a la plus grande chance d'être représentatif d'une production donnée.

Néanmoins il ne faut pas négliger pour autant les contrôles dans le commerce de détail. Ces contrôles sont des indicateurs qui incitent à remonter à l'usine de conditionnement.

Sauf atteinte grave à la garantie publique, laquelle est évidemment sanctionnée immédiatement, l'expérience nous a montré qu'il était plus efficace d ser de la procédure ci-dessus plutôt que de sévir brutalement sans autre examen.

En effet, les lots qui sont exposés à la vente dans les magasins sont le plus souvent d'effectif très réduit. Compte tenu des systèmes de distribution le plus souvent très complexes qui interviennent entre la sortie d'usine et les rayons d'un magasin peut-on objectivement considérer de tels lots comme représentatifs de la production d'un fabricant ?

Par ailleurs si nous voulons être réalistes, nous savons très bien qu'un conditionneur, compte tenu des nombreux aléas qui interviennent dans une fabrication en grande série, a un risque non négligeable, même s'il exerce un contrôle sérieux sur sa production, de laisser échapper un pourcentage, sans doute minime, de préemballages non conformes qui peuvent se retrouver, selon les conditions de distribution, réunis en petits lots dans le commerce de détail.

Peut-on dans ce cas, en toute objectivité, accuser le commerçant de fraude caractérisée alors qu'il n'est pas responsable du conditionnement ? Peut-on de même considérer le conditionneur comme négligent alors que le fait constaté appartient au risque inhérent à toute fabrication en grande série ? Nous ne le pensons pas, c'est pourquoi en matière de contrôle au niveau du commerce de détail notre règle de base est la prudence.

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III - REMARQUES SUR LE CONTROLE INTERNE DU CONDITIONNEUR

Le contrôle chez le conditionneur présente un autre avantage : permettre de constater l'existence dans l'entreprise d'un matériel de contrôle adapté et de méthodes permettant au conditionneur de s'assurer lui-même que sa production est conforme aux spécifications réglementaires.

Dans ce domaine nous nous gardons absolument d'intervenir d'une manière autoritaire et d'imposer des systèmes de contrôle interne qui seraient satisfaisants selon nous alors qu'en fait ils seraient mal adaptés à une industrie particulière pour des raisons diverses qui peuvent ne pas être uniquement métrologiques.

L'agent d'un service de contrôle ne connaît pas à fond les problèmes d'une entreprise relatifs par exemple au personnel employé, aux machines utilisées, au coût minimal d'un système de contrôle.

Aussi comprenons-nous notre rôle dans ce domaine comme un rôle d'information et de conseil.

- Informations d'abord sur les textes réglementaires,
- Conseils, renseignements sur les possibilités de contrôle interne dans les entreprises qui seraient peu informées sur ce sujet.

Actuellement les conseils que l'on peut donner à un industriel sont axés sur deux points essentiels :

- les appareils de mesure pour le contrôle :

Ils doivent être adaptés à l'usage que l'utilisateur veut en faire et présentés notamment une précision telle que les erreurs dues à l'instrument de mesure soient pratiquement négligeables devant les erreurs tolérées sur les préemballages.

La réglementation fixe à cet égard des valeurs maximales d'échelon en fonction des charges pesées.

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- le système de contrôle statistique par cartes de contrôle.

Nous recommandons aux conditionneurs, sans l'imposer, la norme française NF X-06-031 ; cette norme donne les moyens d'établir à moindre frais, un système de contrôle statistique en cours de fabrication, système qui a fait ses preuves et qui consiste à suivre une fabrication en notant sur un graphique qu'on appelle carte de contrôle les fluctuations d'une fabrication afin de pouvoir intervenir dans les meilleurs délais lorsqu'une anomalie s'avère significative.

Nous remarquons, néanmoins que ces systèmes graphiques bien que simples et peu coûteux font place de plus en plus à des ensembles de contrôle beaucoup plus sophistiqués tendant à réduire, voire à supprimer l'intervention humaine dans le processus de surveillance d'une fabrication.

Dans le domaine du préemballage nous rencontrons deux formes de ces systèmes :

- l'un consiste en une balance de précision suffisante couplée à un mini-ordinateur programmé pour le contrôle statistique par sondage.

- l'autre est constitué essentiellement par un instrument qu'on appelle trieuse pondérale et qui réalise non plus un contrôle par sondage mais un contrôle à 100 %.

Nous nous réjouissons de l'évolution des techniques dans ce domaine et il serait peu réaliste de les ignorer et d'exiger de la part des utilisateurs un système de contrôle parallèle à ces systèmes qui sont vendus pour se suffire à eux-mêmes.

Cependant si nous considérons qu'un service de métrologie ne doit pas imposer tel ou tel système de contrôle, nous pensons qu'il est dans ses attributions d'évaluer la validité d'un système de contrôle interne quel qu'il soit tout comme on évalue le niveau de qualité métrologique d'un instrument de mesure.

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Or si l'évaluation d'un système classique par cartes de contrôle peut être envisagée avec une relative facilité celle de systèmes informatisés et automatisés apparaît plus complexe.

La seule solution que puisse raisonnablement adopter dans ce dernier cas un service officiel de contrôle nous semble se réduire à un contrôle approfondi des résultats obtenus par ces systèmes modernes.

Indépendamment des contrôles légaux prévus sur les instruments de mesure proprement dits inclus dans ces systèmes (balances, trieuses) il ne nous apparaît guère possible en effet, dans le cadre d'un contrôle de préemballages, d'effectuer des contrôles techniques de même nature sur les autres éléments de la chaîne de contrôle (vérification des programmes, fiabilité des automatismes,...etc ...).

Ce contrôle de résultats que nous envisageons pourrait être un contrôle statistique plus élaboré que les contrôles actuellement prévus par la directive européenne. Ces derniers sont relativement légers et supposent nécessairement de la part du conditionneur un contrôle préalable qui puisse être examiné et évalué le cas échéant par un service officiel de contrôle.

Le problème reste donc posé. En ce qui nous concerne, nous conseillons aux agents chargés du contrôle, de procéder de temps à autre à un test sur l'écart-type de la fabrication, c'est-à-dire comparer à un instant donné l'estimation de l'écart-type obtenue sur échantillon à l'écart-type retenu par le conditionneur pour construire son système de contrôle. Ce test peut être appliqué d'ailleurs, quel que soit le système employé par le conditionneur, la dispersion d'une fabrication restant de toute manière un paramètre essentiel qu'il importe de maîtriser le mieux possible.

IV - LE TRAITEMENT DES LOTS REFUSES

Le contrôle chez le conditionneur permet également d'éviter la commercialisation de lots dont l'irrégularité a été constatée.

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L'une des mesures ci-après peut être prise dans ce cas :

- Surdosage d'un autre lot que le conditionneur mélange au lot sous-dosé de manière à obtenir un nouveau lot dont la moyenne est au moins égale à la quantité nominale. Le service de contrôle vérifie évidemment par sondage qu'il en est bien ainsi.

- Le conditionneur est invité à trier le lot défectueux de manière à en éliminer les préemballages sous-dosés et à réaliser une moyenne répondant au critère de la réglementation.

- Faire modifier l'étiquetage de la quantité de manière à ce que cette indication corresponde à la quantité réelle, si toutefois le produit n'est pas soumis à une réglementation fixant des valeurs obligatoires de quantités nominales.

- Vente du lot irrégulier à un acheteur dûment informé. C'est en général une collectivité telle que hôpital, restaurant d'entreprise etc...

Si aucune des solutions ci-dessus ne peut être envisagée, le conditionneur détruit le lot afin de reconditionner le produit lorsque cela est possible. De toute façon l'agent apposera, si cette destruction ne peut se faire entièrement en sa présence, la mention "vente interdite" au moyen d'un cachet sur chacun des préemballages du lot incriminé.

V - EXPLOITATION DES RESULTATS DES CONTROLES

Chaque contrôle effectué chez le conditionneur fait l'objet d'une fiche portant différents renseignements destinés à être exploités sur ordinateur par le Service Technique Central.

Sans entrer dans le détail de ce document, cette fiche comprend globalement trois formes de renseignements :

- Renseignements relatifs au service qui a effectué le contrôle .
- Renseignements relatifs au conditionneur, en particulier les inscriptions portées sur l'emballage.
- Conditions et résultats du contrôle.

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L'exploitation informatique de ce document nous permet de suivre l'évolution du niveau de qualité métrologique des préemballages par principales catégories de produits et par région.

Nous citerons seulement quelques exemples qui nous paraissent significatifs.

Ainsi un bilan relatif à la période de début des contrôles (du 1/09/1974 au 1/02/1975) fait état des résultats suivants en pourcentage de lots ne respectant pas les critères retenus par la réglementation.

- huiles comestibles : 58 %
- huiles industrielles : 55 %
- cafés : 34 %
- lait : 38 %
- aliments pour bétail : 40 %.

En complément aux avertissements donnés aux responsables de chacune des entreprises, les responsables des fédérations professionnelles en cause ont été alertés et priés d'intervenir auprès de leurs mandants pour les conseiller utilement.

Un bilan relatif à l'année 1981 donne pour les mêmes produits les résultats suivants :

- huiles comestibles : 17,9 %
- huiles industrielles : 25,0 %
- Cafés : 20,5 %
- Lait : 13,6 %
- Aliments pour bétail : 29,5 %.

Ces derniers résultats ne sont évidemment pas encore satisfaisants ; ils mettent néanmoins en évidence la nécessité qu'il y avait de mettre de l'ordre dans ce domaine ; on constante une lente évolution, mais évolution quand même, vers une meilleure qualité métrologique.

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Mais il est indéniable qu'il reste beaucoup à faire et nous pouvons nous demander si le moment n'est pas venu pour les services de contrôle de mettre en oeuvre des méthodes de contrôle statistique ou autre plus élaborées, ce qui pourrait corrélativement inciter les industriels à étudier de plus près leur propre contrôle tant dans leur propre intérêt que dans celui du consommateur final.

VI - QUELQUES DIFFICULTES

Nous évoquerons succinctement à la suite des résultats présentés ci-dessus, les difficultés essentielles qui actuellement nous préoccupent et pour lesquelles nous ne trouvons pas de solutions véritablement satisfaisantes.

- L'utilisation des bouteilles récipients-mesures :

Le niveau de qualité métrologique de ces récipients devrait être tel que l'utilisateur puisse se fier aussi bien pour l'emplissage que pour le contrôle au niveau indiqué correspondant à la capacité nominale.

Or pour des raisons techniques, les verriers, bien qu'ils aient depuis l'application de la directive européenne de 1975, amélioré notablement leur fabrication ne sont pas parvenus à éliminer totalement le risque de mettre sur le marché quelques lots de bouteilles qui peuvent exposer l'utilisateur à des sous-dosages dont-il n'est pas directement responsable.

Doit-on en venir à imposer aux emplisseurs des formes de contrôles pondéraux niant en fait la possibilité qu'offre la bouteille récipient-mesure d'effectuer un contrôle simplifié par repérage d'un niveau ?

En ce qui nous concerne, service de contrôle, et sous réserve d'enquêtes ultérieures, nous nous en tenons actuellement à un contrôle pondérale par détermination d'une masse volumique ; mais il est certain que les emplisseurs d'une manière générale ne procèdent pas ainsi et s'exposent par conséquent au risque évoqué plus haut.

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- le problème de la dessiccation des produits vendus à la masse

Ce problème se pose essentiellement pour les services officiels de contrôle qui opèrent dans le commerce de détail, sur des produits tels que fromages, charcuteries, farine, etc... soumis à des pertes en eau.

Deux positions peuvent être prises en pareil cas :

- le conditionneur de ces produits doit prendre toutes ses dispositions pour qu'au moment de la vente au consommateur final, compte tenu d'un circuit commercial normal, le poids indiqué soit respecté. Cela signifie que le conditionneur doit tenir compte de la perte de poids par dessiccation en pratiquant un surdosage au cours de la fabrication des préemballages.

- le conditionneur dose normalement sans prévoir la perte en masse due à la dessiccation. Si au niveau du commerce de détail un déficit en poids est constaté, il s'agit alors pour le service de contrôle de déterminer par analyse chimique si ce manquant est totalement expliqué par une perte en eau.

La réglementation nationale française ne retient que la première procédure, sauf cas particulier.

Néanmoins nous sommes conscients que ce problème n'est pas uniquement métrologique.

Imposer le surdosage est une mesure qui a nécessairement des implications économiques qui peuvent être parfois lourdes pour l'industriel.

Il y a donc à opérer, soit un choix entre le souci de ne pas pénaliser exagérément l'industrie et la défense inconditionnelle du consommateur, soit un compromis entre ces deux extrêmes, ce qui suppose de traiter le problème pratiquement produit par produit.

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Ce tour d'horizon rapide des enseignements que l'on peut tirer de quelque 10 ans de contrôle en matière de préemballages est certes incomplet.

Mais si nous avons pu ainsi, sinon apporter des solutions aux problèmes difficiles, ce qui serait présomptueux, du moins susciter quelques thèmes de réflexion, nous considérons que ce court exposé a atteint son but.

Document joint : un modèle de fiche de contrôle.