

EVOLUTION OF IEC ELECTRODOMESTIC APPLIANCES NOISE STANDARDS

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1. INTRODUCTION

During last 25 years, noise standards underwent a complete change. Noise pressure measurements led in 70s to sound power determination, extended to time-averaged sound pressure level (and of course sound power level) and intensimetry.

Recently, IEC revised its basic noise standard 704-1, staying in line with ISO. The time-averaged concept and possibilities of noise measurements in hard-walled test rooms were introduced.

As a consequence of this revision, all existing Parts 2 (application of 704-1 to vacuum cleaners, forced draught convection heaters, dishwashers, washing machines and spin extractors, room heaters of the storage type, and tumble dryers) will have to be revised. And as well, IEC/TC59 already requested to create at least 5 other new documents (shavers, fans, kitchen machines, microwave ovens and ranges and ovens, range hoods).

2. SOUND POWER LEVEL FOR COMPARISON AND REGULATION

The first standardization of Sound Power Level comes from ISO : the working group 6 , created in 1970, prepared the well known ISO 3740 series.

In particular, ISO 3743 (1st Edition) is published in 1976 and ISO 3744 (1st Edition) in 1981.

These two standards state :

- Sound power level, expressed in dBA, with time constant S or F and a possibility of time-averaged measurements,
- Free-field over reflecting plane (ISO 3744) or special reverberation test room (ISO 3743), with engineering grade of accuracy.

3. APPLICATION TO ELECTRODOMESTIC APPLIANCES

Created in 1974 by IEC/TC59 - Performance of electrodomestic appliances, Working Group 2 - Noise is quickened by Pr O. Juhl Pedersen (Lingby University - DK). In 1980, he is replaced by Paul François (EDF - FR) and in 1990 by G  rald de Montille (LNE - FR).

The document 704-1 (1st Edition - 1982) has been prepared by WG2, based on the existing ISO documents : ISO 3743 and 3744. It is noticeable that WG2 started its work before the final issuing of ISO standards.

Applied to domestic appliances, this document 704-1 states the same general requirements for noise measurements as ISO 3743 and 3744.

Published in 1982, this general standard is followed in 1984 by a first document with particular requirements (IEC uses to call it a "Part 2"), concerning vacuum cleaners.

This is summarized in table 1

TABLE 1

	IEC	ISO
1970		Creation of ISO/TC43/SC1/WG6
1974	Creation of IEC/TC59/WG2	
1976	Circulation 1st project 704-1	ISO 3743 (Ed.1) SRR
1981		ISO 3744 (Ed.1) Free-field
1982	704-1 (Ed.1) General requirements	
1984	704-2-1 (vacuum cleaners)	
1985	704-2-2 (forced draught convection heaters)	

4. EEC DIRECTIVE ON NOISE OF DOMESTIC APPLIANCES

In 1986, EEC Directive (86/594) is published. It concerns :

- the publication of information on noise of domestic appliances,
- the measurement methods for determination of airborne noise,
- the conditions for verifying declared noise emission values.

As far as measurement methods are considered , the yet published IEC 704-1 meets the requirements of article 6 of this Directive .

To answer to the demand of noise declaration, WG2 undertook the preparation of a new standard to define procedure for determining and verifying declared noise emission values : IEC 704-3 is issued in 1992.

Meanwhile, new Parts 2 are elaborated by IEC (and by ISO for refrigerators). Three standards are published between 1987 and 1989 : IEC 704-2-3 (dishwashers), IEC 704-2-4 (washing machines and spin extractors) and IEC 704-2-5 (room heaters of the storage type). One standard is published in 1991 : ISO 8960 (refrigerators, frozen-food storage cabinets and food freezers).

This is summarized in table 2.

TABLE 2

	IEC	ISO
1986	EEC DIRECTIVE (86/594)	
1987	704-2-3 (dishwashers)	
1988		ISO 3743 (Ed.2)
1989	704-2-4 (washing machines and spin extractors) 704-2-5 (room heaters of the storage type)	
1991		ISO 8960 (refrigerators)
1992	704-3 (verification of declared noise values)	

5. REVISION OF ISO 3740 SERIES AND NEW EEC DIRECTIVES

In 1990, ISO/TC43/SC1/WG28 undertakes to revise ISO 3740 series, in order to meet the requirements of EEC Machine Directive. In particular, ISO 3743 is divided into two standards : the former ISO 3743 remains as ISO 3743 Part 2, for Special Reverberation Test Room and a new standard is created as ISO 3743 Part 1, for Hard-Walled Test Room.

IEC decided to revise IEC 704-1 and to incorporate this new particularly simple and economical method, adapted for small sources. It also decided to introduce the possibility of time-averaged measurements to be selected in each Part 2, in order to stick better to the measurement need. The second edition of IEC 704-1 is expected to be issued before the end of 1996.

Meanwhile, in 1992, EEC Directive 92/75 is published. It concerns consumer information related to household appliances : energy labelling and standard product information (noise is included as information in the labelling).

Several EEC Directives applying Directive 92/75 are published in 1994 and 1995 : Directive 94/2 for refrigerators, 95/12 for washing machines and 95/13 for tumble-dryers. All these directives refer to European Standards based on the IEC Publications prepared by WG2 (for refrigerators based on ISO 8960 Standard).

In 1994 is published a new Part 2, IEC 704-2-6 for tumble-dryers. This is summarized in table 3.

TABLE 3

	IEC	ISO
1992	EEC DIRECTIVE 92/75 (energy labelling, noise information)	
1994	704-2-6 (tumble-dryers)	ISO 3743-1 (Ed.1)
		ISO 3744 (Ed.2)
		ISO 3743-2 (Ed.1)
	EC DIRECTIVE 94/2 (refrigerators labelling)	
1995	EC DIRECTIVE 95/12 (washing machines labelling)	
	EC DIRECTIVE 95/13 (tumble-dryers labelling)	
1996	704-2-1 (Ed.2)	

6. NEW PROJECTS

In 1995 and 1996, WG2 completes 3 new Parts 2, based on 704-1, 2nd edition. These documents are circulating for voting : 704-2-7 (fans), 704-2-8 (shavers) and 704-2-11 (kitchen machines). The publication is expected in 1996 and 1997.

Other Parts 2 are under preparation and expected in 1998 :

- 704-2-10 (microwave ovens) and 704-2-12 (ranges and ovens) : both ovens projects will be dealt within a single document. As a matter of fact, the use of such appliances is similar and multifunction ovens are more and more present on the market.
- 704-2-13 (range hoods).

Another project (704-2-9 - hair dryers) has been cancelled by TC59, since no performance standard exists nor is in preparation.

As already mentioned, WG2 is in charge of aligning to 704-1, 2nd edition, the former Parts 2 (704-2-1 to 704-2-6) , including a revision of these documents.

At request of some countries, WG2 is preparing an amendment to 704-1 (2nd edition) in view of incorporating the possibility given by intensity methods. As a matter of fact, ISO published in 1993 ISO 9614-1 (1st Edition) on intensimetry. A second document, that seems to be better adapted to electrodomeestic appliances, is expected from ISO. It is already foreseen to use intensimetry in documents , at present under consideration in WG2 .

This is summarized in table 4.

TABLE 4

1993	Publication of ISO 9614-1 (Ed.1) on Intensimetry	
1996	704-2-8 (shavers)	Revision of 704-2-1 to 704-2-6
1997	704-2-7 (fans) 704-2-11 (kitchen machines) 704-1 (amendment)	
1998	704-2-10/12 (microwave ovens, ranges and ovens) 704-2-13 (range hoods)	

7. CONCLUSION

During the last quarter of this century, the coming out of noise measurement by mean of Sound Power Level has been a small revolution.

This was promptly introduced by IEC in its noise standards for electrodomestic appliances, applying the general ISO standards as soon as they are published.

The general requirements described in IEC 704-1(1st ed.- 1982) are followed by the issuing of 6 particular requirements (from 1984 to 1994), and a general requirement for verifying declared noise emission values in 1992 (IEC 704-3 - 1st ed.).

The revisions of ISO 3743 and 3744 published in 1994 led IEC to introduce the concepts of Hard-Walled Test Rooms method and Time-Averaged Sound Power Level in a second edition of 704-1, to be published in 1996, and in a near future completed with intensity methods.

Former Parts 2 will be revised and they will pass from 6 to 11 before next century.

This important job, in quality as in quantity, is only possible because of the efficiency and the cohesion between all members of WG2, the work done being the fruit of the whole working group.