The approval of fireworks in France

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THE APPROVAL OF FIREWORKS IN FRANCE

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ABSTRACT

Within INERIS (Institut National de l'Environnement Industriel et des Risques*) which succeeded CERCHAR (Centre d'Etudes et Recherches de Charbonnages de France) on 01/01/91, the LSEV (Laboratoire des Substances Explosives de Verneuil**) is the official laboratory responsible for approval tests on explosive products for civil use.

Since 01/10/90 an order has been in force, fixing the conditions for the approval and use of fireworks in France : no firework may be manufactured, used in or imported into France unless it conforms with an approved type.

This approval is obtained after an Interministerial Commission has examined the results of safety tests.

In parallel with this process, a technical committee, TC 212, within the European Committee for Standardisation, was created in 1989. Its object is the standardisation of ready-to-use fireworks, particularly from the aspect of their safety in use. The first elements of the Standard should be published in 1993.

* National Institute of Industrial Environment and Risks

** Verneuil Explosive Substances Laboratory

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INTRODUCTION

Since 1972, CERCHAR has, in the civil sector, been responsible for the approval tests to which all explosive products in France must be submitted.

This role of official laboratory has been assumed by INERIS since 01/01/91. This Institute has now taken over the main activities of CERCHAR, with its research teams and the installations in Verneuil. Its expertise extends to all major industrial hazards with the exception of those relating to nuclear power and transport. However, the transport of dangerous materials nevertheless constitutes an activity in which INERIS is increasingly involved.

In 1991, its role was extended to cover a further activity : the study of fireworks with a view to their approval.

In effect, an Interministerial Order (dated 01/10/90) establishes the conditions governing the approval and use of fireworks in France. Thus, since 01/04/91, no firework may be manufactured, used in, or imported into France unless it conforms to an approved type.

In parallel with this process, the European Technical Committee on Standardisation, CEN TC 212, was created in 1989 under the title of "fireworks". Its aim is the standardisation of ready-to-use fireworks, particularly from the aspect of their safety in use.

1./ APPROVAL OF FIREWORKS IN FRANCE.

The approval procedure is as follows :

a) The application for approval is presented to the Ministry for Industry, accompanied by a file, containing, for each product :

- the description of the product and of its variants,

- its trade name,

- proof of the applicant's ability to guarantee the subsequent conformity of the product with the model,

- the precaution to be observed in use, which will be printed on the product, on its wrapping or on the directions for use.

b) The Minister for Industry arranges for a laboratory approved by him to carry out the examinations and tests that he considers necessary. If appropriate, the results of tests or examinations giving equivalent guarantees and carried out in a member state of the European Economic Community may be taken into account.

c) The decision as to approval is taken by the Minister for Industry after consultation with the Commission on Explosive Substances, an Interministerial Commission in which INERIS takes part in its capacity as a reporter on the examinations and tests carried out on explosive products.

2./ CLASSIFICATION OF FIREWORKS.

With a view to their use, fireworks are classified in the 4 groups defined as follows :

K1 : fireworks presenting only a minimal risk and which may be sold to minors

K2 : fireworks, the use of which demands some simple precautions described in the directions for use

K3 : fireworks that can be handled without risk by persons not having the necessary certificate qualifying them to use fireworks of Group K4 and on condition that the rules given in the directions for use are obeyed

K4 : fireworks that can be handled only by persons holding the certificate of qualification or by persons under the direct control of persons holding this certificate. The certificate is

issued by the Prefect (Administrative Head) of the Department after an examination before a jury chaired by the Departmental Director of the Urban Police Forces. The training necessary for obtaining the qualification is given in a course run by a body approved by a joint decision of the Ministers responsible for Industry and Public Safety and after consultation with a technical commission.

Note : this classification is independent of the hazard divisions 1.1 to 1.4 imposed by the regulations governing the transport of dangerous goods.

3./ TESTS CARRIED OUT ON FIREWORKS WITH A VIEW TO THEIR APPROVAL AND CLASSIFICATION IN GROUPS K1 TO K3.

Approval for fireworks may be obtained after examination of the results of safety tests.

All types of fireworks undergo :

- a detailed visual examination, possibly dismantling and comparing the results with the date given in the technical file ;

- a check on how they function making it possible to assess whether the description or the directions for use ensure safety in use. The fireworks are likewise submitted to environmental tests (impacts, vibrations, temperature resistance) before a functional test, in order to assess the resistance of the firework to the usual stresses encountered when they are handled, transported or stored ;

- measurement of the duration of the ignition phase, in order to guarantee safety in the case of the firework going off by accident.

As a function of the type of firework, three types of test are then carried out :

- for aerial fireworks, examination of effects at a height and of possible dangerous fall-outs ;

- for fireworks designed to go off on the ground or over water, measurement of the range of possible projections and of the weight of these ;

- for small fireworks such as bangers and toy pistol caps, measurement of the noise level.

Finally, if there are any doubts as to the safety of the product, supplementary tests may be demanded :

- verification that, if the firework goes off accidentally in confinement, this does not cause detonation or any violent deflagration,

- examination of the behaviour in fire, of a box or heap of fireworks,

- examination of the effects obtained when one ignites an item in a box,

these latterly tests being particularly useful for assessing the safety at the places of use.

The total test results are incorporated in a report, then discussed by the Commission on Explosive Substances with a view to a proposition for approval by the Minister for Industry, if the overall results are satisfactory.

All information concerning the products will be recorded in a database and the design of the fireworks on an optical database.

See type list of fireworks in table 1, list of approval tests in tables 2 and 3.

4./ EUROPEAN STANDARDISATION OF FIREWORKS.

The technical committee CEN TC 212 on "fireworks" is made up of three working groups :

- the working group "classification and terminology" which has already compiled a trilingual glossary (English, French and German) of terms and definitions concerning fireworks, as well as a list of all types at present existing, as far as is known by the members of this working group ;

- the working group "marking" whose function is to define the terms in which warning notices and instructions for use will be expressed ;

- the working group "test methods" which has to define the conditions in which fireworks must be examined, both for type approval tests and for quality control tests.

Table 1

HOW THE SERIES PROPOSED BY THE FRENCH MANUFACTURERS CORRESPONDS WITH THE DIFFERENT TYPES DESCRIBED IN THE FUTURE EUROPEAN STANDARD (CEN/TC 212)

FRENCH MANUFACTURERS' SERIES		CEN SERIES	
1	SHELLS ONE BURST	1	SHELLS
2	MULTI-BURST	2	SHELLS IN MORTAR
3	BURST(S) + EFFECT(S)	3	AQUATIC SHELLS
4	SHELL TUBES		
5	FIREBALLS/FLARES, COMETS, VOLCANOES	4	MORTAR MINES
		5	MINES
		6	TABLE BOMB
6	ROMAN CANDLES	7	ROMAN CANDLES
7	OPEN, CLOSED JETS, JETS WITH BANGER	8	FOUNTAINS
		9	HAND-HELD FOUNTAINS
		10	FLYING PIGEONS
8	ROTATING FIREWORKS	11	AERIAL WHEELS
		12	GROUND SPINNERS
		13	WHEELS
		14	JUMPING WHEELS
		15	SPINNERS
		16	WHEELS
		17	HAND-HELD WHEELS
9	BANGERS WITH OR WITHOUT FUSE	18	DOUBLE BANGERS
		19	BANGERS
		20	FRICTION-IGNITED BANGERS
		21	JUMPING CRACKERS
		22	SNAPS
		23	WHISTLERS
		24	CHRISTMAS CRACKERS

HOW THE SERIES PROPOSED BY THE FRENCH MANUFACTURERS CORRESPONDS WITH THE DIFFERENT TYPES DESCRIBED IN THE FUTURE EUROPEAN STANDARD (CEN/TC 212)

FRENCH MANUFACTURERS' SERIES	CEN SERIES
10 CAPS	25 CAPS
11 FLAMES, BENGALS, FLARES FLAME-THROWERS COLOURED FLAMES	26 BENGAL FLAME 27 BENGAL MATCH 28 BENGAL STICK
12 ROCKETS	29 ROCKETS
13 COMPACTS	30 BATTERIES 31 COMBINATIONS 32 SELECTION PACKS
14 THEATRE AND CINEMA	NOT AFFECTED BY THE ECS STANDARD
15 OTHER PYROTECHNIC TOYS	33 PARTY-POPPER 34 FLASH PELLETS 35 CIGARETTE PLUG 36 CRACKLING GRANULES 37 FLYING SQUIBS 38 CRACKLING BALLS 39 FIRE PICTURES 40 FLASH COTTON 41 SNOW DEVICES 42 NOVELTY MATCHES 43 SERPENTS 44 SMOKE DEVICES 45 SPARKLERS 46 HAND-HELD SPARKLERS 47 THROWDOWNS

Table 2 :

LIST OF APPROVAL TESTS

No.	LSEV reference	DESIGNATION OF TEST	TEST OBJECTIVES								
			Characteristics			Stability		Sensitivity		Aptitude behaviour	
			Physical characteristics	Chemical characteristics	Explosive characteristics	Physical characteristics	Chemical characteristics	Thermal characteristics	Mechanical characteristics	Aptitude	Behaviour
5.01	A1	Description	X	X							
5.02	L4	Duration of ignition phase			X					X	
5.03	N1	Verification of functioning			X					X	
6.01	J7	Resistance to vibrations				X			X		
6.02	E2	Heating test at 50°C in atmosphere with 60 % rel. humidity					X	X			
7.01	I6	Drop test							X		
8.01	M5	Behaviour in fire								X	
8.02	M6	Risks of confining firework								X	
8.03	N2	Formation of projections								X	X
8.04	N3	Range of projections								X	X
8.05	N4	Observation of effects of fireworks designed to go off in the air								X	X
8.06	N5	Noise level			X					X	
8.07	Q3	Propagation test								X	X

Table 3 :

TABLE OF APPROVAL TESTS

TESTS Ref.	Designation	PRODUCTS Fireworks designed to go off above ground	Fireworks designed to go off at ground level	Fireworks liable to be included in Group K1	Observations
5.01	Description	0	0	0	
5.02	Duration of ignition phase	0	0	0	
5.03	Functional check	0	0	0	(1)
6.01	Resistance to vibrations	0	0	0	
6.02	Heating test at 50°C in atmosphere with 60 % rel. humidity	0	0	0	
7.01	Drop test	0	0	0	
8.01	Behaviour in fire	F	F	F	
8.02	Risks of confining firework	F	F	F	
8.03	Formation of projections			0	
8.04	Range of projections			0	(2)
8.05	Observation of effects of fireworks designed to go off in the air	0			
8.06	Noise level		0		
8.07	Propagation level	F	F	F	

(1) test to be carried out on

a) fireworks that have not undergone any previous test

b) fireworks that have previously been subjected to test 6.02

c) fireworks that have previously been subjected to test 7.01 and 6.01

(2) test to be carried out only if there have been projections in test 8.03

0 compulsory test

F optional test