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AN ENQUIRY INTO THE FREQUENCY OF
SPRINKLERED PREMISES

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SUMMARY

In order to assess the economic value of sprinklers it is first necessary to know the frequency of sprinklered premises in different types of occupancy. In this connection, a special survey was undertaken in 1965 with the help of the fire brigades. Results of the survey are discussed in this paper. Estimates of sprinklered establishments in different industries are also given.

KEY WORDS: Sprinkler, building, economics.

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MINISTRY OF TECHNOLOGY AND FIRE OFFICES' COMMITTEE
JOINT FIRE RESEARCH ORGANIZATION

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1. Introduction

Before any reasonably complete assessment can be made of the value of sprinklered systems in fire fighting it is necessary to know the frequency of sprinklered premises in different occupancy groups. As no information was available to the Organization on this point, a special enquiry was undertaken in 1965 with the help of fire brigades who were asked to provide information on sprinklered premises encountered during the course of their inspection work.

2. Occupancies in general

Table 1 gives the numbers of buildings visited and Table 2 the numbers with sprinkler installations for every thousand buildings in the various occupancy groups. In addition to the overall estimates, those derived individually from each of the three batches of returns from the three types of fire authorities are also given. This, to some extent, reflects the variation in the figures furnished.

Table 1

Numbers of buildings visited

Occupancy	County fire authorities	County Borough fire authorities	Scotland	Total
Dwellings	4198	2346	37	6,581
Office buildings	1280	1602	122	3,004
Institutional buildings	2295	1380	94	3,769
Schools	2639	1416	99	4,154
Shops and departmental stores	1754	2390	247	4,391
Assembly buildings	3611	1967	217	5,795
Factory buildings	5265	3182	384	8,831
Storage buildings	250	288	52	590
Total	21,292	14,571	1,252	37,115

Table 2

Frequency of sprinklered buildings

Occupancy	Number of sprinklered buildings per thousand visited in each occupancy			
	Overall estimate	County fire authorities	County borough fire authorities	Scottish fire authorities
Dwellings	1	1	1	Negligible
Offices	37	31	46	Negligible
Institutions	1	Negligible	4	Negligible
Schools	Negligible	Negligible	Negligible	Negligible
Shops and departmental stores	27	13	37	39
Assemblies	48	64	24	Negligible
Factories	151	121	187	258
Storage buildings	254	144	306	500

The buildings visited in each category could be regarded as samples from the entire population of buildings. Since the estimates in Table 2 come from these samples their accuracy depends upon the sizes of the samples in relation to the population sizes. But the number of buildings in the population is not known; the figures are primarily of use only for purposes of making comparisons.

It is worthwhile to note that the ranking of occupancies according to frequency of sprinklered buildings is the same in all three groups of fire authorities and in the overall figures. Practically no sprinklers have been installed in dwellings, institutions and school buildings. This may be because fires in any of these premises seldom become large and the general surveillance of the buildings is regarded as sufficiently effective to eliminate the need for sprinkler protection. Large fires in these buildings are rare occurrences according to J.F.R.O. statistics. (See Fire Research Technical Paper No. 16¹ and Fire Research Note No. 792²). Among those buildings which are commonly sprinklered the frequencies of sprinklered premises appear to be comparatively higher in Scotland especially in storage occupancies.

3. Sprinklers in industrial premises

The major fire losses tend to occur in industrial premises, (though they can occur in other occupancies such as warehouses, departmental stores etc); it is these premises therefore which mainly require sprinkler protection. It is also in connection with the fires in these buildings that it will be most worthwhile to assess the value of sprinklers. For a proper appreciation it is necessary to obtain estimates of the proportion of sprinklered premises individually within each major group of industries. Unfortunately, only nine brigades furnished the information in a form useful for this purpose. The estimates worked out from these regions are summarised in Table 3. These appear to be somewhat on the low side as indicated by the figure of 11 per cent for all industries compared with the estimate of 15 per cent revealed by the larger sample in Table 2. The upgraded percentages are shown in the last column of Table 3.

Table 3

Frequency of sprinklered buildings in different industries

Industry	Number of buildings visited	Percentage with sprinklers	Percentage with sprinklers (up graded)
Food, drink and tobacco	84	12	16
Chemical and allied trade	162	4	5
Metal manufacturing, engineering and electrical goods	547	5	7
Textiles	111	28	38
Clothes, footwear, leather and fur	182	21	29
Paper, printing	64	24	33
Furniture, timber and allied trade	57	9	12
Others	117	7	10
All industries	1,324	11	15

For certification purposes fire brigades normally visit only those premises employing more than ten persons. It can therefore be assumed that at least the commercial and industrial buildings inspected were mainly in this category. It can also be assumed that the only industrial establishments which would need and have sprinkler protection are likely to be those employing 11 or more persons. The Annual Abstract of Statistics³ indicates the number of such establishments and the figures are reproduced in Table 4. From these and the frequencies in the last column of Table 3 estimates have been made of the numbers of sprinklered establishments in the various industries and these are also given in Table 4. The figures are regarded as minimal estimates of numbers of buildings as it has not been possible to allow for the fact that many establishments will consist of more than one building.

The figures indicate the position in 1965 when the survey was conducted. Since then, however, it is probable that there has been an increase in the number of sprinkler installations. Growth of the use of sprinklers has been encouraged by the availability of grants under the Industrial Development Act, 1966, by tax allowances and by premium reductions offered by insurance companies. According to unofficial information received from a few stock-brokers, the overall increase in sprinkler installations may be between 10 and 15 per cent per annum for the period after 1965. However, the rate of increase in individual industries may vary widely.

Table 4

Number of sprinklered establishments in different industries

Industry	Number of estabs. employing 11 or more persons	No. of sprinklered estabs. (estimated)
Food, drink, tobacco	5,274	840
Chemical & allied trade	2,451	120
Metal manufacturing, engineering and electrical	17,885	1,250
Textiles	5,559	2,110
Clothes, footwear, leather and fur	7,195	2,090
Paper, printing	5,215	1,720
Others	11,582	1,270
Total	55,161	9,400

4. Effective sprinkler installations

Brigades were asked to indicate how many of the sprinklered premises inspected they considered to be fully and effectively protected. The frequencies of effective installations in sprinklered premises in the different occupancy groups are given in Table 5.

Table 5

Frequency of effective sprinkler installation

Occupancy	Frequency of effective installations (%)			
	Overall estimate	County fire authorities	County Borough fire authorities	Scotland
Dwellings		Neg. sprink. installation	Neg. sprink. installation	Neg. sprink. installation
Offices	89	74	97	"
Institutions		Neg. sprink. installation	Neg. sprink. installation	"
Schools		"	"	"
Shops and departmental stores	96	91	97	Not available
Assemblies	98	100	90	"
Factories	96	95	95	99
Storage Bldgs.	97	97	95	100

It appears that, except in office buildings more than 95% of the sprinkler systems were considered to be effectively installed.

5. Conclusions

Practically no sprinklers have been installed in dwellings, institutional and school buildings. The highest concentrations of sprinklers are in textile, paper and printing industries and a high risk of fire spread is associated with these establishments. Except in office buildings, more than 95% of the sprinkler systems appear to be effectively installed.

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