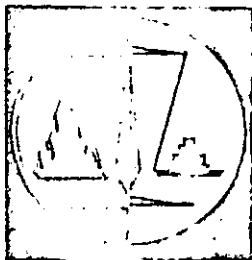


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Fire Research Note No. 883

THE IGNITION OF PLASTIC MATERIALS IN
DWELLINGS

by

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July 1971

FIRE RESEARCH STATION

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SUMMARY

An analysis has been made of the statistics of incidents involving the ignition of plastics in dwellings.

The estimated number of incidents in 1969 (based on a 1 in 2 sample of reports) was 396. This total does not include fires in which plastics were not the materials ignited first or fires involving woven fabrics.

One hundred and sixty eight incidents occurred in kitchens, 54 in living rooms and 52 in bedrooms.

The items most frequently ignited were bowls, buckets, containers, furniture, toys and games. In only 12 incidents were structural materials (e.g. walls and ceilings) ignited.

Cooking appliances provided the source of ignition in 100 incidents, and space heaters in 80.

In the 1-in-2 sample of reports seven incidents involved rescues and casualties (7 non-fatal, 5 fatal). All but one of these occurred in bedrooms.

KEY WORDS: Plastics, dwelling, fire statistics.

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FR Note 883
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S.E. Chandler

INTRODUCTION

There has been growing concern about fires involving the ignition of plastics materials in dwellings, generally because of the toxic products produced from them.

It is not possible to give a true figure of the number of fire incidents involving plastics because plastics are not always specifically mentioned on the reports of fire received or, if they are mentioned, they are often not the materials ignited first. Fires which spread to involve plastics materials are not identifiable in the statistical data recorded. This analysis is based on the 198 incidents observed in dwellings in a 1-in-2 sample of fire reports in which plastics materials were specifically mentioned as the material first ignited. Incidents involving woven fabrics (e.g. clothing) have been excluded.

Except in the section on rescues and casualties the data quoted are estimates based on the frequencies observed in the 1-in-2 sample.

PLACES OF ORIGIN

The place of origin is related to the articles ignited in Table 1.

Table 1

Plastics Articles ignited in relation to the place of origin

Plastic article ignited	TOTAL	Place of origin								
		Kitchen	Living room	Bedroom	Hall, corridor, stairs	External structure and fittings	Cloakroom, bathroom, etc	Airing cupboard	Usage of room not stated	Other
TOTAL	396	168	54	52	24	20	12	12	48	6
Bowl, bucket, container	74	50	10	10	-	2	-	-	2	-
Furniture, furnishings	36	6	18	6	-	-	-	6	-	-
Toys and games	30	-	10	4	4	-	2	10	-	-
Insulation*	26	2	4	6	8	-	2	2	2	-
Internal/external fittings	26	8	2	-	2	6	2	6	-	-
Sheet, covering	18	6	-	2	2	2	2	2	2	-
Waste bin	16	10	-	-	-	2	-	4	-	-
Packaging, wrapping	14	4	2	4	-	2	-	-	-	2
Tray	14	12	-	-	-	-	-	2	-	-
Walls and ceilings, linings	12	4	2	2	-	-	-	2	2	2
Electric plugs, switches etc	12	2	2	-	6	-	-	2	-	-
Domestic equipment components	12	12	-	-	-	-	-	-	-	-
Lagging	10	-	-	-	-	4	-	6	-	-
Fan	10	4	-	6	-	-	-	-	-	-
Hair curlers	8	6	-	-	-	-	-	2	-	-
Other (specified)	70	42	2	10	2	2	4	6	-	-
Unspecified or unknown	8	-	2	2	-	-	-	2	-	2

* Comprises fires confined to insulation and those for which there was no information on the material to which fire first spread from electrical insulation.

It can be seen that fires occurred in kitchens more often than in any other area (at least 43 per cent of the incidents) and nearly a third of these involved the ignition of buckets, bowls or similar containers. Of the 50 fires involving these items, 30 were ignited by cooking appliances.

In all incidents, buckets, etc., were the items most frequently ignited (74 incidents or 19 per cent of the total). Furniture and furnishings were ignited in 36 incidents (9½ per cent) and toys or games in 30 incidents (7½ per cent). Ignition of structure (walls or ceiling linings) was reported in only 12 incidents and the table shows that in general small domestic items were ignited.

SOURCES OF IGNITION

The most frequent sources of ignition of the fires were cooking appliances, (100 incidents or over 25 per cent) space heating appliances (80 incidents) and smoking (34 incidents). It is noticeable that in the 214 fires attributed to these three major sources of ignition there was an element of carelessness or ignorance. For example plastic bowls were placed too near naked flames or hot ashes were placed in buckets or waste bins. Full details of sources of ignition of fire are given in Table 2.

Table 2

Source of ignition of fires involving plastic articles

Source of ignition	No. of incidents	Per cent
TOTAL	396	100.0
Cooking appliances	100	25.2
- electric	56	14.1
- gas	44	11.1
Space heating	80	20.2
- electric	30	7.6
- solid fuel (fire in grate)	24	6.1
- gas	16	4.0
- oil	10	2.5
Electric appliances not elsewhere stated	78	19.7
- wire and cable	38	9.6
- washing machine	14	3.5
- immersion heater	6	1.5
- kettle	6	1.5
- other	14	3.5
Smoking materials	34	8.6
Ashes and soot	18	4.6
Candle	18	4.6
Children with fire	16	4.0
Chimney, stove pipe flue	12	3.0
Matches, naked lights	10	2.5
Other (known)	28	7.1
Unknown	2	0.5

RESCUES, ESCAPES AND CASUALTIES

In the 198 reports examined, only seven referred to rescues, escapes and/or casualties, and all but one of these occurred in bedrooms. Full details of the incidents are given in Table 3.

Table 3

Incidents involving rescues, escapes and casualties

No.	Place of origin	Source of ignition	Item ignited	Rescues, etc.
1	Bedroom	Electric fire	Plastic bath	1 rescue, 1 Non-fatal casualty
2	Bedroom	Candle	Plastic bowl	2 non-fatal casualties
3	Bedroom	Electric fire	Plastic sheet	1 fatal casualty
4	Living-room	Smoking materials	Upholstery	1 rescue, 2 non-fatal, 2 fatal casualties
5	Bedroom	Electric light	Plastic lampshade	1 fatal casualty
6	Bedroom	Candle	Fan (casing)	1 fatal casualty
7	Bedroom	Faulty battery-operated telephone system	Plastic models	2 non-fatal casualties

The table shows that there were seven non-fatal and five fatal casualties in incidents in dwellings in which plastics articles (other than woven fabrics) were the materials first ignited. It is not known how many casualties may have occurred in fires involving plastics where these were not the materials ignited first.

DISCUSSION AND CONCLUSIONS

It is difficult to compare the life risk from fires involving plastics with that from other fires owing to the insufficiency of the data available.

The majority of plastics items recorded as the materials ignited first are bowls, containers, trays, waste bins or toys and games or furniture. Often these items have been carelessly placed near sources of ignition.

Forty three per cent of the incidents are in kitchens, compared with 14 per cent in living rooms and 13 per cent in bedrooms. Six out of 26 fires reported in bedrooms involved casualties (5 fatal and 7 non-fatal), rescues and/or escapes.

The most frequent source of ignition is cooking appliances (25 per cent of fires), space heating appliances (20 per cent), wire and cable (10 per cent) and smoking materials (9 per cent).