

**The care and maintenance of fittings and equipment in the modern house /
report of a Sub-Committee of the Central Housing Advisory Committee.**

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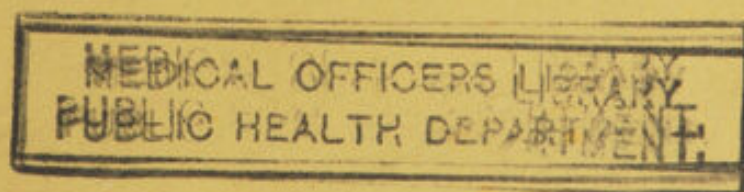


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CARE OF FITTINGS AND EQUIPMENT IN THE MODERN HOUSE



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THE CARE
AND MAINTENANCE OF
FITTINGS AND EQUIPMENT
IN THE
MODERN HOUSE

*Report of a Sub-Committee
of the Central Housing
Advisory Committee*



LONDON: H.M. STATIONERY OFFICE
1950

4955-652

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THE CARE AND MAINTENANCE OF FITTINGS AND EQUIPMENT IN THE MODERN HOUSE

INTRODUCTION

TERMS OF REFERENCE

1. We were appointed by the Central Housing Advisory Committee in May, 1948, to consider "what advice could be given to local authorities on the care and maintenance of new types of internal fittings and equipment", and we now beg to submit our report.

SCOPE OF THE ENQUIRY

2. It was made clear to us during the course of our investigations that the equipment now fitted in post-war houses built by local authorities represents a potential source of considerable future expenditure on maintenance, not only because some varieties (but not all) are new, but also because there is much more of it. The more lavish scale of the equipment in modern houses represents one of the chief differences between them and their pre-war counterparts, and more maintenance is bound to be required where more equipment is installed, whether it is familiar to tenant or not. We therefore interpreted our terms of reference as widely as we reasonably could, and have considered a number of fittings and materials which, although not by any means new to the market, were not so widely installed in local authority houses before the war. In the final choice of items for detailed examination (which could not attempt to be absolutely exhaustive) we were guided not a little by the evidence we received on the types of materials and fittings which have caused most trouble to local authorities and their tenants; a summary of the evidence on this point is reproduced as Appendix I to our report.

3. The amount of care required of the user of any item of equipment in a house and the extent of the possible future maintenance work in connection with it are obviously fundamentally affected by whether or not that item has been correctly chosen as the one which will give the service required in the circumstances in which it is to be used, and whether or not it has been correctly installed. We deemed that detailed advice on these points fell in theory outside our terms of reference, but found in practice that it was impossible to exclude them altogether. In some cases, therefore, we have briefly drawn local authorities' attention to particular points to be noted at the stages when equipment and fittings are being selected and installed.

4. The main portion of our work has been the formulation of advice for local authorities to transmit to their tenants on how certain pieces of equipment should be treated and looked after.* The people without whose positive co-operation all such advice would be quite valueless, however, are the tenants and their wives—especially their wives. Unless the advice which we could offer reached them in a form both understandable and memorable, our report would have little purpose. We have therefore considered, in Part II

* This advice is printed in italics.

of our report, ways in which local authorities might pass on to their tenants advice on the care and maintenance of the equipment and fittings in their houses.

5. With one exception which merited special treatment (solid fuel appliances), we have not attempted to frame our advice for tenants in any imperative set of words. This course has been taken partly because we feel that local authorities would have no difficulty in drafting, where necessary, their own suitable maxims, and partly because, as we explain later in Part II of our report, we place less reliance on the printed word than on practical demonstrations and verbal advice given in the tenant's own home.

PREVIOUS REPORTS

6. We have studied the reports of the Housing Management Sub-Committee of the Central Housing Advisory Committee and particularly the First Report of that Sub-Committee dated the 6th April, 1938. This report was sent to all housing authorities with the Ministry of Health Circular No. 1740 dated 31st October, 1938, but owing to the imminence of war at that time we doubt whether many authorities had much chance to act upon it until after 1945. In so far as that report touched on problems relating to the repair and maintenance of houses and equipment, its recommendations have been referred to in Part II of our report.

EVIDENCE

7. In all our work we have had the benefit of advice and information freely placed at our disposal by a large number of local authorities, associations and individual firms whose names are recorded in Appendix VIII, as well as from the Ministry of Works, the Ministry of Fuel and Power and the Department of Scientific and Industrial Research. To all these we would tender our grateful thanks for their assistance in the completion of our task. We are also greatly indebted to Messrs. Ward, Lock, & Co., Ltd., for permission to reprint certain quotations from an early edition of Mrs. Beeton's Book of Household Management. The passages are reproduced in order to give a brief glimpse of the treatment of our subject by one of our illustrious forerunners (and of course do not appear in the present edition which has been modernised and includes the latest information on such matters).

PART I

SPECIFIC FITTINGS AND ITEMS OF EQUIPMENT

STEEL AND ALUMINIUM EQUIPMENT

' When bright grates are once neglected, small rust-spots begin to show themselves, which a plain leather will not remove ; the following method of cleaning them must then be resorted to : First, thoroughly clean with emery-paper : then take a large smooth pebble from the road, sufficiently large to hold comfortably in the hand, with which rub the steel backwards and forwards one way, until the desired polish is obtained. It may appear at first to scratch, but continue rubbing, and the result will be success.'

MRS. BEETON'S BOOK OF HOUSEHOLD MANAGEMENT (1888 Edition).

8. The post-war years have seen notable extensions to new uses of both steel and aluminium, partly because technical advances in the process of their manufacture (particularly so far as aluminium is concerned) have made them abundantly available, and partly because shortages of timber and certain of the non-ferrous metals, such as copper, lead and zinc, have encouraged the use of alternative materials. Our terms of reference do not permit the discussion of the structural use of steel and aluminium in the walls, floors and roofs of houses, and our remarks are therefore restricted to those items which have been widely installed since the war and which appear to warrant some special advice on care and maintenance. We have accordingly given more detailed consideration to steel cupboards and cabinets, pressed steel baths, and sinks and windows of both steel and aluminium.

9. Assuming that they have been properly designed and manufactured in the first place, the maintenance problems which can arise in connection with any of these categories of equipment can be traced to three main causes:

- (a) Faulty installation.
- (b) Harsh or careless handling by tenants resulting in distortion, denting, scratching or even erosion of the metal.
- (c) Chemical attack by agents with which it comes into contact, i.e. corrosion.

In so far as (a) and (b) fall within our purview, they will be dealt with separately when we consider the various fittings in more detail, but it would be convenient at this juncture to consider in general terms the corrosion of metals.

Corrosion

10. Corrosion may be defined as the chemical change occurring when metal is attacked by agents with which it comes into contact. The possible number of conditions giving rise to corrosion is great and the extent to which metal is corroded will vary widely, depending on many circumstances. In the home, however, corrosion could be caused, among other ways, by the action of acids on metals (including such weak acids as occur in fruit juices, pickles, etc.), by the action of oxygen or dust particles in the presence of moisture (as when

steam condenses on a steel cupboard or pipe) or by minute electric currents set up in damp conditions between two dissimilar metals or between different areas of the same metal, parts of which are covered by the products of corrosion.

11. Corrosion causes the metal to be changed chemically into a fresh compound which is the result of the action of the agent on the metal. This new product forms a deposit on the surface which is frequently both easily visible and recognisable. The red rust which forms on iron and mild steel is a mixture of oxides and hydroxides of iron produced by the action of oxygen and water on the metal. Atmospheric exposure also produces on aluminium a dull grey film, aluminium oxide, and on copper the characteristic green "patina" to be seen, for example, on any copper roof. In some cases, corrosion leads to the formation of a tenacious tough skin or film which protects the metal from further attack, whereas in others, the product of corrosion is loose and presents no barrier to the continuing attack on the metal beneath so long as the corroding agent is present. Thus the scales of rust on steel are loose, will easily flake off and do not stop further corrosion; on the other hand, it is possible to protect steel either by alloying it with chromium (producing stainless steel) which ensures that any corrosive skin formed shall be hard and resistant to further action, or else artificially to produce a protective film of metal phosphate by immersing the steel in a bath of dilute phosphoric acid (with metal phosphate additions). The phosphate film thus formed not only gives protection against further corrosion but is also a useful base for subsequent painting. Aluminium in its pure form produces naturally, under ordinary atmospheric conditions, a film of aluminium oxide which protects the metal underneath, as the statue of Eros in Piccadilly continues to demonstrate.

12. Metals can also be protected by dipping, spraying or electro-plating so that they become coated with another metal of greater resistance to corrosion than the base; the coating of tin on tin plates or of zinc on galvanised steel is for this purpose. Alternatively, metals can be protected from corrosive action with a layer of paint, tar or some other applied surface coating.

13. The paint coating on factory-made steel furniture normally consists of a series of layers of enamel which, after being applied by dipping or spraying, are separately stoved in order to harden them. Before the paint is applied, the steel is usually phosphated (as described in paragraph 11 above), but for metal cupboards, dressers, etc., which are destined for kitchens or bathrooms, where conditions are likely to be more humid, the steel should first be given a metallic coating of zinc or aluminium. Three or four coats of paint are normally applied (primer, undercoating and gloss finish) each being stoved separately. The primer should be based on a suitable blend of rust-inhibiting pigments (e.g. a mixture of zinc chromate and red oxide of iron) and a water-resisting medium.

14. One cause of the corrosion of metals is attack by the oxygen in the atmosphere. As we have already mentioned and as everyone will have observed, corrosion is most prevalent under damp conditions, when metal is in contact with moisture and oxygen. Corrosion is particularly to be expected, therefore, in kitchens and bathrooms, where condensation is most likely to occur. In view of the fact that condensation plays such an important role in causing corrosion, the subject is more generally surveyed in the next eight paragraphs.

Condensation in general

15. A certain amount of moisture is always present in the atmosphere in the form of minute particles of water suspended in the air; its quantity (i.e., the absolute humidity of the atmosphere at any given moment) can be measured physically and expressed as a weight in terms of grains per cubic foot. The quantity of moisture which the air will hold depends on temperature—the warmer the atmosphere the more water it will hold. Normally, outside air contains between 4 and 5 grains of water vapour per cubic foot in summer, and between 2 and 3 grains in winter.

There is a point at any given temperature at which the air will hold no more moisture. When this point—the “dew-point”—is reached, it is said to be saturated, and if there is any further reduction in temperature, moisture will be deposited in liquid form.

16. The relationship between the quantity of moisture which the air actually contains at any given temperature and the maximum quantity which it could contain at the same temperature is known as the relative humidity. If the air is holding half as much moisture as its maximum capacity (at the same temperature), then the relative humidity would be 50%. Under ordinary conditions, humidity varies between 40% and 60%.

17. Relative humidity is important to an individual's feeling of comfort, especially when the weather is very hot or very cold, because as it rises, i.e., as saturation point is approached, the air takes up additional moisture less willingly and evaporation from the skin is much slower. High temperatures can be tolerated much more easily when the relative humidity is low because the moisture evaporates readily from the skin and in doing so has a cooling effect; but if the relative humidity is high, evaporation is slower and discomfort and lassitude follow. Similarly, when temperatures are low, the feeling of discomfort is greater when the relative humidity is high, and visitors from continental countries often feel colder in the moist British climate than they do at home even though the temperature here may in fact be higher than that to which they are accustomed.

Condensation in houses

18. Condensation, or the deposit of moisture on the surface of surrounding objects, will therefore occur either when so much moisture has been discharged into the atmosphere (without the temperature being raised) that the air becomes saturated and will hold no more, or when the temperature of the atmosphere drops so that the air can hold less moisture and must deposit it. The temperature of the air may fall generally, as it does at night, or it may be lowered locally by coming into contact with a cooler surface, as happens when condensation is seen on window panes, metal or other impervious surfaces.

19. Condensation in the house will result from these same two causes—either from a rise in the absolute humidity up to or beyond saturation point or by a rise in the relative humidity (generally or locally) as a result of a fall in temperature.

Prevention of condensation (a) by preventing the escape of moisture into the atmosphere

20. In the home, extra moisture is constantly sent into the atmosphere in the form of steam from cooking, from hot baths or from clothes drying in front of the fire, and if

condensation is to be lessened the first efforts must be directed towards cutting down as far as possible the amount of moisture thus discharged. Kettles should not be left steaming, clothes should not be dried indoors if they can possibly be dried outside and, above all, the steam which must inevitably result from many domestic activities should be allowed and encouraged to escape through windows and ventilators wherever possible.

Prevention of condensation (b) by heat conservation and by ventilation

21. Even after all efforts have been made to prevent the discharge of unnecessary moisture into the air, a considerable quantity must often remain and with it the possibility that, if the temperature falls or if it comes into contact with cooler surfaces, condensation will occur. The ordinary processes of living in a house generate considerable quantities of water vapour—one adult under sedentary conditions gives off by evaporation and respiration a pound of water in about 9 hours.

22. There are two ways in which condensation due to a drop in temperature can be mitigated, if not prevented. Firstly, a sharp drop in temperature, especially at night, should be guarded against by careful attention to the heating of the house and to the retention of the day-time heat. Where a heating system designed for all-night burning is installed, every effort should be made to see that it functions in the way that is intended so that the general temperature of the house is kept up. Secondly, as condensation in this context is due to the fact that previously warm air is now overloaded with moisture because, being cooled, its capacity to retain it is much less, this danger is greatly lessened if the air can circulate. Adequate ventilation will enable moist air to be diluted or replaced by drier air, so that there is less danger that dew-point will be reached if the temperature falls. There should be free circulation of air through built-in cupboards for the same reason, otherwise damp air could be trapped inside and, when cooled (as it will more easily be if the cupboard has been built against an outside wall), deposit its surplus moisture on clothes and walls. Circulation of air through cupboards will ensure at any rate that there is no more danger of condensation here than in other parts of the house.

STEEL CUPBOARDS, DRESSERS AND CABINETS

Care and maintenance

23. Steel fittings of this kind have been installed during the last few years in all types of houses, both permanent and temporary, and experience has shown that in kitchens and bathrooms condensation is liable to produce corrosion of the metal. The extent and rate of such corrosion will be influenced by the nature of the original paint treatment, the care with which the fittings have been installed and the way in which the tenant has looked after them. It goes without saying that rough treatment will bend and distort the metal; advice on this point would be unnecessary to most tenants, though not, we fear, to all. We would offer the following advice, however, on the care of metal equipment of this kind, chiefly with the object of minimising corrosion:

- (a) *The metal surfaces should be kept clean and dry. Condensation should be kept down to a minimum by careful attention to the points mentioned in paragraphs 20-22 above. Periodically the metal should be washed down and, where practicable, polished with furniture cream or wax polish. It has been found in practice that paper and other coverings on metal shelves tend to encourage corrosion beneath them by retaining moisture and dust, and for this reason they should not be used. Bottles, etc., should be carefully wiped before being placed on shelves.*

- (b) *Corrosive materials like vinegar, bleach, soda, pickles, fruit juices or anything containing acid should be kept away from the metal and, if accidentally spilled, should immediately be wiped off.*
- (c) *Hinges and catches should be kept oiled.*
- (d) *If signs of rust appear, the following procedure should be followed:*
 - (i) *Rub down the corroded patches with sandpaper or emery paper until a clean bright metal surface is exposed.*
 - (ii) *Clean these areas with white spirit or with soap and water, and dry thoroughly.*
 - (iii) *Paint the bared patches with a red oxide or zinc chromate rust-preventing primer, making sure the paint overlaps the edges of the original paint.*
 - (iv) *When the primer is dry (leave overnight where possible), paint over the primer coat with an under-coat.*
 - (v) *When the under-coat is dry (at least six hours should be allowed), apply a second coat over the same area.*
 - (vi) *When the second under-coat is dry, smooth the area by rubbing lightly with fine sandpaper and apply a hard gloss enamel.*

24. We would emphasise that paint applied after the fittings have been installed in a house is less effective than the baked coat of enamel which can be applied in a factory, while even the best quality enamel is improved as a protective coating if it follows a process which coats the steel with zinc, cadmium, aluminium or some other rust-resisting metal. Thus although the painting routine we have recommended above may appear complicated, it is in fact no more than the minimum necessary if the metal beneath is to be given protection for a reasonable time. *We would recommend that householders should be encouraged to consult a paint firm in selecting suitable paints for this purpose, but in Appendix II of this report we have reproduced a list of paints and their manufacturers prepared by the Ministry of Works for the assistance of local authorities with temporary houses. We understand the paints mentioned are still available.*

PRESSED STEEL BATHS

25. Pressed steel baths, because of their lightness when compared with cast-iron baths, must be treated with great care during the initial handling and fixing. Rough treatment or dropping can dent these baths, though once correctly installed, resting evenly on their four legs, they should be resistant to anything short of wilful misuse by tenants.

26. The most frequent cause of complaint has been the failure of the enamel, and on this point we have been informed that in the period which immediately followed the war, when paint ingredients were sometimes extremely scarce, the enamel finish could not always reach the standard which would have been attained under normal conditions. Careless handling and bad installation frequently led to paint being chipped, while the slight flexing of the bath in ordinary use and the difference between the rate of expansion under heat of the metal where the legs are fixed and the remainder of the bath has in some cases led to the flaking of the enamel. No finish either to a cast-iron or to a steel bath can be entirely proof against negligent use, but we understand that manufacturers are now no longer troubled by the shortage of materials which affect the quality of the surface finish, and complaints about enamel flaking from these baths have consequently been reduced.

Maintenance

27. *Where the enamel has flaked from the bath, it is possible to restore some measure of finish by cleaning carefully the exposed metal and painting first with a rust-inhibiting primer and then with two coats of bath enamel. We would not recommend this treatment as likely to be satisfactory unless only small areas or stray chips above the water line are being treated. A renewed paint finish of this type will not normally last long, and either the possibility of frequent repainting must be contemplated or the bath should be replaced.*

STAINLESS STEEL SINKS

28. Stainless steel sinks require considerate treatment during installation, but provided they are accurately fitted and drain properly (it is important that the bottom of the sink is not forced up when the waste pipe is attached), further problems should not arise. Naturally no sink is proof against a determined effort to damage it, but, generally speaking, normal use should not affect stainless steel.

29. *We recommend to tenants with stainless steel sinks only two general pieces of advice:*

- (a) The surface finish of stainless steel sinks can be damaged if pails or heavy saucepans with dirty bases are dragged about in the sink or on the drainer, and this should be avoided.*
- (b) The weak acids and alkalis normally used in the home will not affect stainless steel, but some materials, e.g., lime or plaster, may stain it. Soap and water should be adequate to keep the sink clean, but if necessary, any of the cleaning powders will remove stains.*

GALVANIZED STEEL SINKS

30. In the absence of other alternatives immediately available, the Ministry of Works were forced to install galvanized steel sinks in a number of temporary houses in order not to delay their completion. We understand that these sinks have in some cases been the subject of complaints, especially when the zinc surface has been worn away leaving exposed the steel underneath. The galvanized zinc coating protects the steel from corrosion and, once gone, leaves the steel liable to rust. *There is no way, however, in which the galvanizing can be renewed while the sink remains in the house, and we can only recommend that, in order to preserve the zinc coating as long as possible, tenants should be advised to refrain from using scouring powders to clean the sinks, as in so doing they will hasten the wearing away of the protective coating.*

STEEL WINDOWS

31. Certain preliminary points in connection with the handling and installation of metal windows deserve first to be mentioned because in many cases later maintenance work can be traced back to inaccurate fixing or prior damage to the window frames.

Fixing

32. Steel windows must be handled with care at all stages. Proper storage facilities should be provided for windows awaiting installation and they should be stacked vertically in a dry place. Particular care is needed in handling composite windows lest the coupling bolts become strained or the mastic pointing broken.

No horizontal members of windows, neither glazing bars nor transoms, should on any account be used as supports for scaffolding. Side hung windows should normally be kept closed during building work, both before and after glazing, to prevent the windows from being used as a means of entrance and to exclude plaster and mortar droppings from the contact faces.

33. No weight should be borne on the heads of the windows, whether they are built-in or fixed into framed openings; such openings must be large enough to avoid the need to force the windows into place. Windows must be secured dead-plumb and level in the openings and free from twist. When fixing to wood, care should be taken to see that the screws are not driven in so far as to distort the frame.

34. The joint between the metal frame and the surrounding masonry and also the joint formed by the coupling of two or more metal surfaces should be pointed with mastic in order to prevent rain from leaking in. Sills should have as steep a slope as possible, falling directly from the edge of the steel frame. Stone or framed openings should be formed with an efficient drip groove at the head. Weather bars are advisable in brick and concrete openings in exposed positions.

35. In areas near the sea or where there is serious atmospheric pollution, galvanized windows are advisable owing to their greater resistance to corrosion.

Maintenance: the paint finish

36. *If the galvanized windows are not being used or if the galvanizing has failed, the initial coat should be of good quality red oxide/zinc chromate rust-inhibiting primer. This should be followed by two coats of good quality finishing paint; the primer and finishing coats should all be made by the same manufacturer. Any rust which has formed should first be removed with a wire brush or sandpaper and the cleaned areas washed with soap and water or white spirit before the primer is applied. In no circumstances should painting of external work be undertaken in wet or misty weather, as paint applied to a wet surface will not last nearly so well as a coat applied when the surface is dry.*

37. *The life of the paintwork can be considerably prolonged if the exterior surfaces are washed down at the same time as the glass is cleaned. Bathrooms and kitchens, where there is greater humidity, are usually the places where corrosion first appears, and it pays to give windows in these places an extra initial coat of paint before installation. Because condensation here makes corrosion more likely and the use of the right paint more important, we recommend authorities to consider, when they are repainting the outsides of their houses, whether they should not also undertake to repaint the inner surfaces of steel window frames in bathrooms and kitchens, even though such work may be the responsibility of the tenant. It is important when painting the contact surfaces to avoid any excess of paint in order to prevent hinge binding.*

38. *If the original specification calls for a painted finish, maintenance repainting should be carried out not less than once every four years, though in coastal or industrial areas it may be necessary to repaint more often in order to maintain the paint film which is one of the windows' safeguards against rust. If galvanized windows have been fitted, the periods may sometimes safely be lengthened.*

39. *All hinges should be oiled twice a year—a light three-in-one oil should be used for this purpose. Handles and stays should also be oiled periodically.*

Maintenance: Window panes

40. It was suggested to us that many breakages of window panes are due to the lightness of the steel frames. We do not accept this as a general rule and think it likely that many cases of glass breakage in metal windows can be traced to the fact that the glass has not been properly bedded in putty and is in direct contact with the window at one or more points, or alternatively that the glass has been cut to fit too tightly and gives insufficient clearance for contraction and expansion.

ALUMINIUM

41. We have mentioned in paragraph 11 that, under ordinary atmospheric conditions, pure aluminium forms a surface coating of aluminium oxide which will protect the metal beneath from further deterioration. There are, however, two ways in which the metal may be attacked and damaged by corrosion in the house.

42. Firstly, corrosion may be caused by electro-chemical effect of the minute electric currents set up in damp conditions between aluminium (and its alloys) and certain other metals in juxtaposition with each other. The contact between aluminium and steel will not normally lead to corrosion of the aluminium, though if the steel is itself attacked and the rust comes into contact with the aluminium, the chance that the aluminium will also be attacked becomes much greater. For this reason it is important that, if steel rivets are used for securing aluminium, they should, especially in external work, always be either galvanized or suitably painted, e.g., with aluminium paint. Strictly speaking, our terms of reference do not cover this structural aspect of aluminium, but we would mention the much greater danger of galvanic corrosion which exists if aluminium is in contact with copper or any of its alloys (such as brass or bronze). In the presence of moisture, electrolytic action is almost certain to be set up by such contact, which should be rigorously avoided. Copper and brass are frequently used in the plumbing of houses and care should be taken to avoid direct contact with, for example, the aluminium sink, if one is installed, or aluminium used in the framework of the cooker or clothes boiler. Direct contact between aluminium and lead or zinc involves, we understand, far less risk of this form of corrosion.

43. Secondly, though it is not affected by weak acids such as are contained in vinegar or fruit juices, aluminium may corrode if brought into contact with alkalis. Most cements and plasters contain alkalis which, when damp, will corrode unprotected aluminium, while soda, soap and soap powders are alkalis in common use in the kitchen also capable of attacking the metal.

ALUMINIUM CUPBOARDS, DRESSERS AND CABINETS

44. *The advice contained in paragraphs 23 and 24 relating to steel cupboards and cabinets also applies to aluminium, although aluminium is not, as is steel, likely to be affected by acid materials. It is, however, subject to corrosion and a painting routine similar to that recommended for steel is also appropriate to aluminium fittings.*

ALUMINIUM SINKS AND DRAINING BOARDS

45. Aluminium alloy sinks and drainers, either cast or pressed from the sheet metal, are both in use but present no difference from the maintenance point

of view. Like steel sinks (which are mentioned in paragraph 28), their preliminary handling should be discreet and their installation accurate; *their surface will likewise be liable to damage if pails or other heavy objects are dragged about in the sink or on the drainer. Aluminium sinks will stain, however (and the stain here is the early mark of corrosion) if soap or soda is long left in contact with it. There is no harm to be feared in the ordinary use of these two indispensable kitchen commodities, but we would recommend that as soon as convenient the sink should be rinsed with plain water. Washing should not be left to steep in the sink overnight in soapy water or water with soda or washing powder dissolved in it. Stains if they appear should be removed with steel or aluminium wool or one of the cleaning powders before the corrosion which it represents has the chance to eat into and pit the surface of the metal. With ordinary care, the risk of serious deterioration of the aluminium from this cause is negligible.*

ALUMINIUM WINDOWS

46. Window frames, cast or made from extruded aluminium sections, have been, and are being, installed in large numbers. All that we have already noted in connection with the handling, storing and installation of steel windows (in paragraphs 32 to 34) applies equally to aluminium windows, but the amount of maintenance will depend on the type of finish which they have been given.

47. *In some areas, it is safe to leave these window-frames unpainted, in which case it is sufficient that they should be wiped down and washed when the glass is cleaned, in order to clean off any dirt, dust or other harmful matter. In industrial areas, where the atmosphere contains a certain amount of chemicals which may damage the surface of the aluminium, regular washing or the protection of a paint coat will be necessary.*

48. *If aluminium windows are painted, the regular maintenance of the paint film is the surest way to guard the metal below. As with steel windows, no painting on the outside should be attempted in wet or misty weather or unless the metal has been carefully cleaned. A primer containing zinc chromate, zinc oxide or red oxide of iron should first be applied, followed by two coats of finishing paint. An excessive thickness of paint on the contact surfaces must be avoided in order to prevent hinge binding.*

SOLID FUEL APPLIANCES

‘The first duty of the housemaid in winter is to open the shutters of all the lower rooms in the house, and take up the hearthrugs in those rooms which she is going to “do” before breakfast She should then lay a cloth (generally made of coarse wrapping) over the carpet in front of the stove, and on this should place her housemaid’s box, containing black-lead brushes, leathers, emery-paper, cloth, black-lead, and all utensils necessary for cleaning a grate, with the cinder-pail on the other side. She now sweeps up the ashes, and deposits them in her cinder-pail, which is a japanned tin pail, with a wire sifter inside, and a closely-fitting top. In this pail the cinders are sifted, and reserved for use in the kitchen or under the copper, the ashes only being thrown away. The cinders disposed of, she proceeds to black-lead the grate, producing the black-lead, the soft brush for laying it on, her blacking and polishing brushes, from the box which contains her tools. The housemaid’s box should be kept well stocked. Having blackened, brushed and polished every part and made all clean and bright, she now proceeds to lay the fire.’

MRS. BEETON, 1888.

49. We adopt this phrase "solid fuel appliances" partly because it has obtained wide and accepted currency in official reports published since the war, and partly because it is the most convenient short title which covers all open fires, stoves, grates, cookers and boilers designed to burn coal, coke or proprietary solid fuels. In considering the appliances, we have thought it proper to include the flues and heating systems which are normally associated with them.

Post-war developments

50. Abundant supplies of cheap coal, combined with the equanimity with which the Englishman (if not his wife) has in the past accepted a smoke-laden atmosphere and the burden of a vast amount of washing and cleaning, fetching and carrying, gave insufficient spur to research and improvement in solid fuel appliances. As a result, the great majority of the 13 million or so homes in this country are fitted with grates or stoves whose inefficiency is a constant source of wonder to visitors from abroad.

51. In post-war housing, however, the position is gradually changing. Recognition of the need to use more effectively the coal which is no longer either cheap or abundant led to the appointment of two Committees whose deliberations produced the Egerton Report on the Heating and Ventilation of Dwellings* and the Simon Report on Domestic Fuel Policy†.

52. The recommendations of the Simon Report included the suggestions that minimum standards be established as soon as possible for all the main types of solid fuel appliances, and that the Government should be responsible for testing appliances, for encouraging the manufacture of those which conform to the standards (especially multi-duty appliances) and for ensuring that only the recommended types were used in subsidised housing. The Simon Report did not confine itself to these recommendations, but it is sufficient to summarise the principal of its suggestions which are now being translated into practice.

53. Standards of performance have been agreed between the Ministry of Fuel and Power and the trade interests. Appliances are tested either by the Fuel Research Station or under approved conditions elsewhere. Generally speaking, appliances must give an adequate performance not only with bituminous coal but also with a smokeless fuel, either coke, anthracite or Welsh dry steam coal. The names of the appliances satisfying the test requirements have been commended to local authorities from time to time, and when the supply position had sufficiently improved the Minister of Health in Circular No. 170/48, dated 11th November, 1948, asked housing authorities, when submitting future housing proposals, to confirm that the appliances specified would be chosen from among those tested and proved efficient by current standards. (Lists of these appliances have been sent by the Ministry to all housing authorities.)

54. As a result of these steps, local authorities' houses are now being fitted with appliances which, while more efficient than their pre-war counterparts, are also more intricate in design and require greater care, attention and exactitude in their operation. In particular, there has been a very great increase in the use of slow-burning closeable appliances which produce certain special problems referred to in paragraphs 66 to 68 below. For this reason, it has become much more important that tenants should receive adequate

* *Post-War Building Studies* No. 19, 1945.

† Cmd. 6762, January, 1946.

instruction in the proper use of the appliances in their houses, although no amount of instruction or advice will be any use if the appliance has been badly selected or inaccurately fitted.

Essential conditions of satisfaction

55. Before a tenant can obtain complete satisfaction from a solid fuel appliance, three conditions must be fulfilled:

- (a) The appliance itself must be the right one for the job; it must be properly designed to provide the service required, whether it be cooking, water heating, space heating or any combination of these three.
- (b) The appliance must be correctly installed.
- (c) The tenant must know how to use it and must be able to obtain the fuel which the appliance is designed to burn.

Choice and installation of appliances

56. Adequate advice in general terms on the heating services of a house and on the choice of appliances is given in Chapter V of the new edition of the Housing Manual published in November, 1949. We have not thought it necessary to comment on this aspect of the problem, but would like to emphasise that local authorities should plan the heating services in each house as a whole and should consider the various appliances (solid fuel, gas and electric) not only from the point of view of their individual performances, but also in relation to the others installed in the house. We would suggest to local authorities that they should choose (and order) the solid fuel appliances for their houses at the earliest possible stage, and also that their technical officers should personally inspect the appliances referred to in the list circulated by the Ministry of Health and should satisfy themselves that the varieties finally selected provide the desired services, are of sufficient capacity to cope with their tenants' probable demands, and that they will function efficiently on the types of fuel available in the district. They should also satisfy themselves about such points of detail as the accessibility of the flue and of the boiler cleaning. When ordering combination grates, they are advised to specify self-contained oven and boiler flues, which are preferable to brick-built flues for such appliances. A range of appliances (if not a complete collection of those tested and recommended) will normally be on view at the local builders' merchants, but in order to assist authorities the Ministry of Fuel and Power periodically arrange conferences and lectures, while the Coal Utilisation Joint Council have, through the solid fuel appliance industry, organised a Service and Showroom Scheme which at present covers the north of England and North Wales and will, we understand, eventually be extended throughout Great Britain.

57. The installation of appliances is also dealt with in the technical appendices to the Housing Manual. Manufacturers of the tested and approved appliances are, however, being encouraged to prepare information sheets giving diagrams and installation details. These information sheets are designed primarily for the use of architects and builders. As they become available, they are being circulated by the Ministry of Fuel and Power to local authorities, who should make sure that their contractors have received copies and follow the instructions given.

The operation of solid fuel appliances; sources of assistance for the tenant

58. When the house is occupied, the problems of choice and installation will have been solved; it is now for the tenant, or more usually his wife, to make the most effective use of the appliance, and if she requires assistance there are three main sources from which she should be able to obtain it.

59. Firstly, all manufacturers have been asked to prepare instruction cards to accompany their appliances, and most of them have done so. These cards (not to be confused with the information sheets referred to in paragraph 57) give working instructions on the operation, as distinct from the installation, of the appliances. As some time may elapse between the installation of the stove or grate and the completion of the house, it is not sufficient merely that a card should be left tucked behind some convenient pipe, and we have accordingly recommended in paragraph 137 that local authorities should keep a stock of instruction cards in their offices and hand them personally to all new tenants—not only to the first tenants in new houses but also to subsequent tenants—when they first enter into occupation. In our opinion, the most useful sets of instructions are those printed on stiff card, preferably with a glazed grease-resisting surface, with the information they have to impart expressed in brief, clear and non-technical language, and illustrated with diagrams.

60. Secondly, tenants should receive personal instruction. We recommend local authorities to arrange for all new tenants to be visited soon after they move in by some qualified member of the authority's staff (e.g., the Housing Manager or a member of the maintenance staff) to make sure they understand the management of their appliances. The authority may be able to obtain advice and assistance for this work from the regional representative of the Women's Advisory Council on Solid Fuel or from the Domestic Fuel Efficiency Organiser of the Ministry of Fuel and Power. The Fuel Efficiency Organisers are attached to that Ministry's Regional Offices for the purpose of giving practical advice and encouragement on the best use of fuel in the house, and subject to other calls on their time would, we understand, be willing to help and advise tenants. The addresses of the Regional Offices of the Ministry of Fuel and Power appear as Appendix III to this report.

61. Thirdly, demonstrations should be arranged. We recommend authorities wherever possible to arrange for the correct use of appliances installed on new housing estates to be explained and demonstrated, preferably in an occupied house to which tenants from the surrounding houses have been invited. These demonstrations could be conducted either by a member of the authority's staff or, as mentioned above, by a representative of the Women's Advisory Council on Solid Fuel or of the Ministry of Fuel and Power, or by a representative of the manufacturers.

Main causes of unsatisfactory performance

62. There are four fruitful causes of unsatisfactory performance by a solid fuel appliance when once it has been installed, and a high proportion of complaints arise from one or other of them:

- (a) The use of the wrong fuel.
- (b) Stoking with too much or too little fuel.
- (c) Incorrect control of the draught through the appliance.
- (d) Failure to keep the appliance or the flue clean.

This is not an exhaustive list, however, and actual cases investigated by the Ministry of Fuel and Power show that poor performance can arise from a large number of causes; some of these are detailed in Appendix IV.

Hints to tenants

63. *We recommend the following hints as applicable to all normal solid fuel appliances. They could form the basis for a section on this subject in a tenants' handbook, or if for any reason no maker's instruction card is available, they could (after omitting (1)) be used as a substitute set of instructions:*

- (1) *Read and follow the maker's card; if it is missing, ask your local authority for another.*
- (2) *Use the most suitable fuel available.*
- (3) *Pay particular attention to the regulation of the draught by setting the dampers correctly (the instruction card gives advice on this); don't let the fire roar.*
- (4) *Empty the ash pan regularly and don't let the ash pile up to the bottom bars, otherwise the air supply to the fire will be stopped and the fire bars will burn and buckle.*
- (5) *Clean the flues of the appliance once a week and have the chimney swept regularly.*
- (6) *Don't poke the fire too hard or you will break the fire bricks.*
- (7) *Don't overheat the water or let it boil in the cistern; this will cause the pipes to fur up.*
- (8) *Take care of the removable parts of the appliance; they can easily get lost or broken.*
- (9) *Always use a fireguard if you have children, and have it fixed securely in position.*

Fuel

64. It is important that, wherever possible, an appliance should burn the fuel for which it has been designed—the working instructions should always contain advice on the best fuel to use. Appliances when they are tested are normally required to function efficiently on at least two fuels, so that most modern appliances will burn some kind of smokeless fuel. A table is reproduced as Appendix V of this report showing the sizes of smokeless fuels which should normally be ordered for various types of appliances. We should have liked strongly to recommend on grounds of both cleanliness and efficiency that every effort should be made by local authorities and their tenants to ensure that nothing but smokeless fuel is burned, but the supply position would prevent such a recommendation being generally acted upon. We recognise that anthracite and Welsh dry-steam coal are both extremely difficult for the average householder to obtain, while the supply of coke, though better than that of anthracite, depends on local circumstances. Bituminous coal will, therefore, necessarily be the main fuel for many households, but we would recommend authorities to inform themselves closely as to the fuel situation in their area and to pay particular attention, when choosing appliances, to the remarks on suitable fuels which are contained in the list circulated by the Ministry of Health. *We recommend, too, that tenants should ascertain from their Local Fuel Overseer or from their supplier what the possibilities are of obtaining supplies of a smokeless fuel suitable for their appliances: in all cases where it is available and suitable, smokeless fuel should be used in preference to ordinary bituminous coal.*

65. *Three matters relating to smokeless fuel might conveniently be mentioned here for local authorities to pass on to their tenants where necessary:*

- (a) *The technique of maintaining a low fire with a smokeless fuel is not to try to operate with less than the normal quantity of coke or anthracite in the fire box, but to use the normal amount of fuel and cut down the draught by regulating the air supply.*
- (b) *If coke is burned, the ashes must be prevented from accumulating in the fire box or grate, otherwise there is a danger of these ashes fusing with the heat of the fire and adhering to the fire bricks: sooner or later someone will try to chip the fire brick free again and it will almost certainly get damaged in the process.*
- (c) *Certain appliances will not keep alight all night on coke alone. This is likely to be true of the side oven and oven-over-fire types, but the difficulty can usually be overcome by using coke during the day and small coal for all-night burning.*

Condensation in flues and chimneys.

66. Condensation, which is dealt with in general terms in paragraphs 15 to 22 of this report, occurs under certain conditions in chimneys and flues, as well as on surfaces inside the house.* The gases which are given off when coal or coke are burnt contain some moisture in addition to materials such as sulphur compounds, tar, acids and ammonia. If the gases are cooled in their passage up the chimney, the moisture, together with the compounds dissolved in it, may be deposited on the chimney lining. This deposit may attack the mortar and brickwork and lead to the deterioration of the chimney, and may even pass right through the adjacent walls. In cast iron or asbestos cement flues, it may lead to corrosion and to the formation of a tarry deposit liable to burn fiercely if it catches alight. Condensation inside chimneys will not occur if the flue gases reach the chimney-pot before being cooled to dew-point. In the majority of cases in the past, especially with open fires of old-fashioned types, this normally happened, as most of the heat from the burning fuel escaped up the chimney with an abundant rush of air, and condensation was avoided. With the more efficient modern slow-burning closeable types of stoves and cookers, however, much more heat is extracted from the fuel, and as the draught is regulated more exactly, the gases which are discharged into the chimney are both cooler and less diluted with air at a lower relative humidity. These gases are much more likely to condense, especially if the chimney is on an outside wall.

67. As with other forms of condensation, the solution of the problem can be divided into two parts—the reduction to an absolute minimum of the moisture going up the chimney, and the avoidance of its condensation either by keeping it at a high temperature or by preventing its coming into contact with cool surfaces. The second part of the solution is normally outside the tenant's control, for the necessary steps must be taken when the house is built by placing the chimney in the centre of the house instead of against an outside wall and by constructing it in such a way that it is well insulated and heat losses are reduced. By these means, the gases are prevented from cooling and condensing inside the chimney.

* See *Building Research Station Digest No. 5, Condensation in Domestic Chimneys.*

68. *We recommend the following precautionary methods to tenants the chimneys of whose houses encourage condensation; they are steps primarily designed to prevent condensable vapour from entering the flue and they apply primarily to openable stoves, independent boilers and cookers:*

- (a) *Do not burn any damp rubbish such as potato peelings, tea leaves or anything likely to give off steam, e.g. green wood.*
- (b) *Make sure that coal or coke is kept dry; it should not be kept in the open but always in the fuel store—this applies particularly to coke, which can absorb a great deal of moisture.*
- (c) *Special efforts should be made to obtain smokeless fuels where condensation is likely to occur, since coal, especially when it is burned slowly in a closed appliance, gives off a certain amount of tarry vapour which condenses into a hard bituminous deposit. Ordinary chimney sweeping may not be sufficient to clear the flue or chimney where this deposit has formed, and it may be necessary to scrape it away. This is a difficult task and the best way to tackle it will depend on the circumstances in each case.*

Problems connected with convected warm air systems

69. Where warm air, heated in a jacket surrounding the appliance or the flue, is led through ducts either back into the same room or into other rooms, the walls are apt to become discoloured above the outlet vents. This discolouration is connected with the passage of warm air over the surface of the wall and can be seen, for instance, over hot water radiators even though these give off no gases or fumes. The presence of a discoloured patch does not of itself mean, therefore, that smoke is leaking from the appliance or the flue into the warm air ducts, although in some cases this may occur. Leakage of smoke is generally caused by faulty installation, and a local authority faced with this problem might bear in mind the following possible defects:

- (a) The inadequate sealing of the boiler flow and return pipes where they pass through the casing of the appliance.
- (b) The faulty assembly of the component parts of the appliance itself.
- (c) The base of the appliance may not be set squarely on the hearth (this applies only to appliances not fitted with a base plate).
- (d) Faults may have developed in the sealing of the sections of the flue pipe.

ELECTRICAL AND GAS INSTALLATIONS

70. Our treatment of electrical and gas installations must differ from that of solid fuel appliances not only because of the nature of the fuel burned but also because pre-war research and development by the electricity and gas industries had made much greater progress. The performance of electrical and gas appliances is, of course, subject to much more exact prediction than that of solid fuel appliances, which are so much affected by the way in which they are treated and stoked. Problems of choice are therefore simplified, and as installation in new houses is normally a matter for skilled technicians working to recognised Codes of Practice, we think it unnecessary to dwell further on problems of selection and fitting.

71. There remains the advice to be given to tenants on how to look after electrical and gas installations. Working instructions customarily accompany

cookers and refrigerators indicating how they should be operated. We have no intention of covering this ground, and the two sections which follow deal only with what the tenant should do or not do to keep the appliances in good working order. Whether the appliance will in fact then be used in the most efficient way is a matter which would be beyond our terms of reference to pursue.

ELECTRICAL INSTALLATIONS

'The chamber candlesticks should be brought down and cleaned, and the parlour lamps trimmed—and here the housemaid's utmost care is required. In cleaning candlesticks, as in every other cleaning, she should have cloths and brushes kept for that purpose alone; the knife used to scrape them should be applied to no other purpose; the tallow-grease should be thrown into a box kept for the purpose; the same with everything connected with the lamp-trimming; the best mode of doing which she may learn from directions given with different lamps, always bearing in mind, however, that without perfect cleanliness, . . . no lamp can be kept in order.'

MRS. BEETON, 1888.

72. Houses built or managed by local authorities now contain electrical equipment which is both more extensive and more elaborate than ever before. Quite apart from dwellings built by housing authorities themselves, the 125,000-odd bungalows provided in England and Wales under the temporary housing programme incorporate appliances covering a greater range of services than was previously attempted in publicly-owned houses in this country. Electric cookers, refrigerators, clothes boilers, water heaters, fires and radiators are all frequently to be found in local authority houses, and because of this great extension in the use of electrical appliances we have thought it proper to include a section on this subject in our report. The supply undertakings have, of course, contributed towards this extension in the use of electricity. While urging the more widespread use of electricity, they have at the same time developed an educational system of lectures, demonstrations, pamphlets and visits aimed at helping the housewife to use and look after her electrical appliances.

73. The increased use of electricity in modern houses, however, both in the appliances provided by local authorities and for such other amenities as tenants may provide for themselves (electric irons, portable fires, vacuum cleaners, wireless sets, etc.) brings in its train maintenance problems which differ almost in kind as well as in degree from those normally experienced before the war.

74. Two additional causes have, we think, contributed towards this extension of the problem. In the years immediately following the war, the demands for domestic electrical equipment necessarily found manufacturing firms ill-prepared. No criticism is implied in this statement; it was inevitable that it should be so, as the needs of war had dislocated peace-time schedules, some materials were in short supply and staffs were in many cases still with the Services. It may well be, however, that some of the maintenance problems reported by local authorities in connection with their electrical equipment can be traced back to the difficulties experienced by manufacturing firms during those years.

75. A further fruitful source of electrical failure is the well-meaning and optimistic efforts of tenants to improve upon or repair the electrical equipment in their houses. We note with regret that many tenants have a strong but

sadly misplaced confidence in their electrical ability; their handiwork is often highly unorthodox, and if it does not lead to the immediate creation of added hazard, it can easily overload the existing circuit and pave the way for additional maintenance work in the future.

76. While individual items of equipment are dealt with in later paragraphs, we recommend certain general rules for the guidance of tenants in their treatment of the electrical equipment in their houses. As a preliminary, however, we suggest that housing authorities should :

Firstly, make sure that all tenants are informed to whom they should write or telephone for assistance in electrical matters.

Secondly, consider what advice in simple terms should be available to all tenants on how to renew electric fuses.

Both these items of information might be printed either in a handbook for tenants (if one is prepared), or else on a card which could be kept in the meter cupboard. The various fuses on the distribution board should be labelled.

Local authorities will know that failures which can lead to the blowing of fuses are to be found most frequently in lighting fittings, switches and plug points, all of which will need to be replaced after a number of years—flex in lighting fittings probably after ten years; in temporary houses, connections in the kitchen control unit may work loose and cause trouble.

Advice to tenants

77. *For the guidance of tenants we commend these rules :*

- (a) *Make sure you know how to turn the current off at the main in case of emergency and where to apply if any help is needed.*
- (b) *If you have the slightest doubt about the safety of any electric appliance, fitting or connection, do not use it until it has been examined by a trained electrician.*
- (c) *Learn how to mend the fuses, but do not attempt any more elaborate repair work—let an electrician do that. If a fuse needs repairing, first turn off the current at the main, find the fault which has caused the fuse to blow and disconnect the faulty appliance or fitting, and then replace the burnt out fuse with another length of the correct type and size of wire. A fuse of the cartridge type must be replaced by a fresh one of the correct rating. It is of the utmost importance that nothing except the correct type of fuse wire or cartridge fuse be fitted. If the fuse blows again immediately and the cause is not obvious, get an electrician—don't think the fault can be cured by fitting a heavier fuse wire.*
- (d) *Do not try to run extra wires to extend the electricity supply without first consulting the Council. Such work, even when the existing wiring is strong enough to stand an extra load, should always be installed by a qualified electrician.*
- (e) *Never use the hanging light socket for portable appliances such as electric irons, fires, vacuum cleaners, toasters, etc.; these should always be plugged into the wall sockets. Heavy-duty appliances such as fires, electric kettles, etc., must always be plugged into the power circuit, never into lighting sockets.*
- (f) *Look after the flexible connections to your appliances; they contain fine wires which can be damaged if the connection gets kinked or strained. Never disconnect a plug by pulling the flex, but always take hold of the plug itself.*

- (g) *It is dangerous to let electrical connections or exposed elements get wet. Never touch appliances with wet hands or wipe plugs or switches with a damp cloth. Never take portable appliances into the bathroom.*
- (h) *If you have children in the house, make sure that electric fires are properly encased by guards. Many such fires have a bar to protect the element, but this is rarely enough to make it impossible for a child to burn himself or catch her frock in it. An efficient guard should be fixed at least 4-in. clear of the element.*

Electric cookers

78. *Instruction cards usually give advice on how to use an electric cooker. To keep it in good working order, the two points we would particularly recommend are:*

- (a) *Do not leave elements burning unnecessarily at full heat or they will soon burn out.*
- (b) *Keep the cooker (especially the oven) clean. It will clean more easily while it is still warm—but make sure the current is off first.*

Electric clothes boilers

79. (a) *Never leave the current switched on while the boiler is empty or the element and/or the boiler will be damaged. Some boilers—but not all—have automatic switches which prevent their being emptied while the current is still switched on.*

(b) *Do not let the water boil over; after use, rinse and dry the inside of the boiler, but do not use any scouring powder, which will in time wear away the galvanized surfaces.*

Electric refrigerators

80. *We would recommend that whoever is responsible for the maintenance of the internal fittings, whether it be the tenant or the housing authority, should arrange with a specialist firm for the regular checking and maintenance of refrigerators. On no account should tenants attempt to carry out repairs to refrigerators; if anything goes wrong, repair work should always be entrusted to a specialist.*

This advice does not imply that the care of the refrigerator is a matter over which the tenant has no control. Apart from the essential need to keep it clean both inside and out, the life and behaviour of the appliance will depend not a little on the way in which it is used. We therefore recommend the following advice to tenants—basically it is aimed at preventing the refrigerating mechanism from being overworked:

- (a) *Defrost the refrigerator regularly. A thick coating of ice on the coil does not necessarily mean efficient working, because the ice insulates the cooling coils and makes it very difficult for the heat to be extracted from the cabinet.*
- (b) *Never open the door unnecessarily or leave it open. Never put hot food into the refrigerator. Warm air introduced in this way will cause condensation on the coil and reduce the efficiency of the refrigerator until it is defrosted again.*
- (c) *Look after the seal of the door, as a faulty seal lowers the efficiency of the appliance. Grease and oil on a rubber seal will eventually cause it to deteriorate.*
- (d) *Where the refrigerator has an air cooled condenser, there should be a free flow of air over the fins. The refrigerator should not be placed in an enclosed space where such a flow would be impeded, and the fins should be brushed regularly with a light brush or feather duster to keep them clear of dust and fluff.*
- (e) *Do not keep the refrigerator running at a lower temperature than is necessary. The maker's instructions will give guidance on how the refrigerator is meant to be used, but domestic types are not normally intended to operate under about 40° F.*

Electrical installations in temporary houses

81. It was clear from evidence submitted to us that the installations in temporary houses have raised maintenance problems in an acute form. This is perhaps not surprising in view of the fact that not only were the specifications based on an estimated life of 10 years for each house, but the equipment, as we have mentioned in paragraph 74, was produced in the difficult post-war years and has in many cases been subjected to the experiments of tenants who were either unfamiliar with such appliances or to whom Service life during the war had given an exaggerated notion of their electrical understanding.

The advice already given about electrical equipment applies to temporary houses as much as to any other, but we would in addition advise authorities to make special arrangements for the regular inspection of circuits and appliances in these houses, with particular reference to the connections in the control unit and the earthing points.

GAS INSTALLATIONS

'The objections to the use of gas as a fuel exist only where the wrong appliances are selected, or when no trouble is taken to learn their proper use . . . Boiling burners must be kept clear and in good condition ; if choked with dirt and grease, they will fail and be as unsatisfactory as a lighting burner under the same conditions. Pans and kettles must be kept clean outside, or they make an unpleasant smell, and ovens must be kept clean inside for the same reason, and also for the sake of sweet flavours in the food.'

MRS. BEETON, 1888.

82. As in the case of electrical installations, we consider that gas appliances should be covered in our report because of the greatly increased scale on which they are now being fitted in local authority houses.

83. While there must be similarities in the advice which we can proffer concerning gas and electrical appliances, there is an important difference between the ways in which such appliances reach the public. Gas appliances are sold almost exclusively through the Gas Undertakings and their show-rooms, and installation and maintenance have remained similarly under their control. Partly because of this close supervision of the manufacture, sale and fitting of appliances by the Gas Undertakings, but even more because gas pipes are not nearly so easy to fit or tinker with as are electric wires, gas equipment affords little scope for the amateur.

84. The gas industry arranges demonstrations, home calls and lectures, and we would recommend local authorities to co-operate with their Area Gas Boards to promote any activity which will help tenants become skilled in the use and care of their equipment.

Advice to tenants

85. Local authorities should ensure that their tenants know where they should write or telephone if advice or repairs are needed in connection with gas installations.

86. *We would offer only three general rules to tenants:*

- (a) *Make sure you know how to turn the gas off at the main in case of emergency and where to apply if any help is needed.*
- (b) *Do not attempt to deal with serious faults yourself; call for expert assistance, especially if you suspect there is a leak.*

- (c) *Take special care of the flexible tubing which feeds appliances such as movable clothes boilers, portable fires, gas poker, etc.; do not let it get kinked or trodden on.*

Gas cookers

87. *Instruction on the care of gas cookers generally consists of hints on how to keep them clean. It is inevitable that saucepans will boil over sometime or other and that fat will splash on the grill frets and the walls of the oven—the important thing is to prevent it remaining there indefinitely. Dirt and fat will clog the burners and cake on the oven wall besides smelling abominably when the grill is lit. Ideally, the cooker should be wiped over immediately anything is spilled on it, and the oven is certainly kept clean most easily by wiping it out while it is still warm immediately after use. Periodically, however, the burners and the frets should all be removed and washed with soap and water and brushed with a stiff brush. Burner holes (and the air inlet holes on the insides of the burners) must all be kept clear, and if the worst befalls a hairpin may have to be called into play. The burners should be shaken free of water before they are replaced. The oven and oven shelves need washing from time to time with soap and water, and the job can often be conveniently tackled at the same time as the burners.*

In the U.S.A. temporary houses, the gas cookers are slightly different from British models. They should be kept clean in the same way, but care has to be taken not to alter the position of the fan-shaped shields on the base of the burners near the taps.

Gas clothes boilers

88. *Luckily there is little to go wrong here, though care must be taken not to damage the flexible connection (if there is one), and our only advice to the housewife is that when she has finished her wash she should rinse and dry the inside of the boiler. Scouring powder should not be used as it will eventually damage the lining.*

Gas refrigerators

89. *As with electric refrigerators, we would recommend that regular maintenance contracts be entered into with the Gas Undertaking or a specialist firm. Tenants should not attempt to carry out repairs to refrigerators but should always call in expert assistance.*

90. *All refrigerators must be kept clean both inside and out, and in addition the following rules apply to gas refrigerators with the same force and for the same reasons as to their electric counterparts:*

- (a) *The refrigerator should be defrosted regularly.*
- (b) *The door should not be opened or left open unnecessarily and hot food should never be put into the cabinet.*
- (c) *The rubber seal in the door should be treated with care and kept free from oil or grease.*
- (d) *If they are accessible, the fins of the condenser should be dusted regularly with a light brush or feather duster, and nothing should be placed on top of or in front of the ventilating louvres or grid in such a way as to impede the free flow of air over the condenser.*
- (e) *Do not keep the refrigerator running at a lower temperature than is necessary.*

Lastly, we would warn tenants:

- (f) *If the gas supply comes from a slot meter and the gas runs out, make sure the refrigerator burner is lit again as soon as the coin has been put into the meter.*

Gas water heaters

91. This description covers all types of water heater in which gas is the heating agent, from the old-fashioned geyser to the modern sink units or the larger multi-point varieties designed to serve both bathroom and kitchen. *We recommend tenants not to tamper with these appliances once they are set. They should periodically be serviced and cleaned, but it is a job for a skilled worker and expert assistance must be sought if any maintenance work is needed. This advice includes even the changing of washers, because those used in ordinary water taps will not normally fit water heaters.*

92. *In winter the danger of damage by frost at night can usually be guarded against by leaving the pilot jet alight, but if this is not done, or if the house is to be left unoccupied during very cold weather, the water should be drawn off in accordance with the directions on the instruction card.*

Gas fires

93. *From time to time these should be dusted. The fragile radiants should be removed with discretion and lightly brushed—if they are held in with a bar, this must be lifted away or unscrewed. The flue and inside of the fire should also be brushed, but the burners should first be covered with a cloth to keep them free from dust.*

A fireguard should always be used if there are children in the home.

FLOOR FINISHES

'To remove stains from boards—Take $\frac{1}{4}$ lb. of fullers' earth and $\frac{1}{4}$ lb. of pearlash ; make them into a paste with about a quart of boiling water ; spread a thick coating of this over the grease-stains and leave it for ten or twelve hours ; then wash it off with clean water, using sand if necessary . . . In washing boards never rub crossways ; but always up and down with the grain.'

MRS. BEETON, 1888.

94. Large blocks of flats governed by byelaws which require fire resisting floor constructions have for long used surface finishes other than timber. The popularity of the suspended timber floor with floor boards on timber joists received no serious challenge, however, until the post-war shortage of timber in effect forbade its use for ground floors in houses. The fact that practically all post-war houses have solid ground floors has involved a very sudden increase in the demand for surfacing materials to soften the chilly and unsympathetic hardness of concrete in the home.

Qualities of a floor

95. In selecting the material which will form the surface of the finished floor, the architect will have to consider its suitability in use in the particular building, or part of the building, he has in mind. It must, in appearance, harmonise with its surroundings and form an integral part of the room or passage where it is laid. It must be sufficiently durable to withstand not only normal wear, impact and pressure, but also some amount of anticipated misuse such as the application of unsuitable polishes or the excessive use of detergents. Lastly, and notwithstanding the need for durability, it must (especially in living rooms or bedrooms) be a comfortable floor for the household to live with ; it should be reasonably quiet to walk on and should not be slippery or give the sensation of coldness to the user.

Limitations of choice

96. The ideal floor possessing all the qualities we have mentioned has probably yet to be invented. It is necessary to select the best one can, though free selection of floor finishes since the war has been hampered by lack of materials, by the scarcity of specialist floor-laying labour and by the cost of the materials which have been available and could be laid. The situation has steadily improved, however, and a large number of different types of floors have been specified and laid in local authority houses and flats—more than we could attempt exhaustively to cover in our report. Certain varieties, such as granolithic concrete or quarry tiles, appear to us to present no particular maintenance problems because of their hardness and resistance to wear, while others, such as rubber sheet or cork tiles, have rarely been specified for council houses because of their high comparative cost. These types we thought it reasonable to omit from detailed consideration, and we have in paragraphs 101 to 124 concentrated on five varieties of flooring material:

Pitchmastic.

Mastic asphalt.

"Asphalt" or resin tiles.

Magnesite.

Wood blocks.

But before passing to them we would commend to the attention of local authorities certain general matters relating to the choice and laying of materials which cannot be wholly excluded when considering the care and maintenance of the complete floor.

The concrete base

97. A concrete base underlies the normal ground floor, and it is important that the cement should be given sufficient time to dry before the surfacing material is applied. If dampness remains, there may be a danger that the finish will not adhere permanently to the screed.

98. Again, dampness rising from the sub-soil will not be deterred by a concrete screed; concrete could indeed have a capillary action and attract moisture from the soil. The dampness could affect the adhesive of the surface finish, the finish itself or in certain circumstances could pass through the floor to damage the tenant's floor covering, particularly if it were linoleum. We have considered whether we should recommend tenants not to lay linoleum over solid floors but, doubting the effectiveness of such advice, we would recommend to local authorities that unless the floor finish or its adhesive is itself composed of a material used for damp-proofing (i.e., asphalt or pitchmastic), a damp-proof membrane should in all cases be incorporated as part of the construction of a solid floor.

99. Mastic floor finishes, and especially thin mastic tiles, normally require a level and sometimes even a highly finished trowelled screed. If this has not been properly laid, future maintenance costs may be increased by the floor finish conforming to any irregularities of the screed and either wearing unevenly or cracking.

Laying

100. Jointless floors often require to be laid by specialists in the art, and frequently demand expensive and complex plant for the process. If the plant

is defective or deficient, or if the attention of the operative is allowed to stray there may be a risk that the mastic will be unevenly mixed or will become over-heated. Either of these causes could affect fundamentally the subsequent condition of the floor. We realise that, after the initial choice of the specialist sub-contractor has been made, neither the main contractor nor the local authority will have much control over the actual laying operation, but we would urge on local authorities the importance of insisting upon a firm widely experienced in work of this kind.

COLOURED PITCHMASTIC

101. Coloured pitchmastic, to which so many local authorities turned after the war, is prepared from a mixture of coal tar pitch (derived from the low temperature distillation of coal) and an aggregate such as limestone, approximately in the proportion of 1 : 6 by weight, together with suitable pigments. The preparation, mixing and heating of the mastic on the site demands special plant and watchful vigilance on the part of those in charge to ensure that the mastic is evenly mixed and is not overheated. It is laid by hand on a prepared concrete screed to a thickness averaging, in houses, between $\frac{5}{8}$ in. and $\frac{3}{4}$ in.

102. Properly laid, a pitchmastic floor is dustless, damp-proof and resistant to most greases and oils. If, however, the preparation and laying of the floor have failed to command the requisite skill on the part of the operatives in charge, the mastic in its finished state may, if it has been overheated or insufficiently mixed, be either too hard and thus liable to crack, or may display an undue tendency to soften and dent, especially in warm places such as near fireplaces or cookers. Many of the complaints which have been voiced about pitchmastic floors arise, we think, from inadequate laying technique on the part of the flooring firm as often as from the qualities of pitchmastic as such. Local authorities are not now so restricted in their choice of firms in a position to accept contracts for flooring work, and we would therefore recommend that, in order to minimise maintenance work arising from badly laid floors, the employment of reputable firms with the necessary plant should be insisted upon.

Care and maintenance

103. *Pitchmastic floors are damp-proof and can without danger be washed and scrubbed. Soap and soda can be used without trepidation or risk. The appearance of the floor will be enhanced by regular polishing, and as pitchmastic is not affected by grease or oil, no special advice is needed on the choice of such polish. Unlike the housewife whose home has floors composed of asphalt, the possessor of a pitchmastic floor can choose either paste or liquid polishes without fear of damaging the flooring material. Tenants should, however, be warned against over-polishing any solid floor, and pitchmastic is no exception to this rule. An over-polished solid floor can be a menace to the user; for this reason, polishes which contain wax emulsified in water are preferable to those in which wax is carried in a spirit solvent, not because the floor would be affected by the spirit, but because the wax-in-water emulsion is usually harder and less slippery.*

104. *Pitchmastic floors are not proof against heavy blows or prolonged pressure. Tenants should therefore refrain from chopping wood on the kitchen floor or from dragging the piano across the living room. If any heavy piece of furniture is to stand permanently in one place, its weight should be spread, if possible, with furniture cups or some similar device.*

Repairing damage to floors

105. Repair work to a floor of this kind is, like its laying, essentially a matter for specialist firms, to whom we would recommend authorities to entrust all repair work. Considerable damage can be done to a floor by ill-advised attempts to cut out a cracked or damaged area with hammer and chisel, or to soften it with a blow-lamp. The correct method is to place hot pitchmastic over and around the affected areas until the floor in these parts has been sufficiently softened to be cut away and made good.

COLOURED MASTIC ASPHALT

106. After pitchmastic, the most commonly specified surfacing material for the ground floors of post-war houses has almost certainly been mastic asphalt. They closely resemble each other in appearance and (with one exception) in properties, but whereas the binder for the former is basically derived from coal tar, the binder for mastic asphalt is bitumen. The mastic is a mixture of bitumen with aggregates similar to those which would be used for pitchmastic.

107. All that we have noted concerning the choice, laying and repair of pitchmastic is also applicable to mastic asphalt. The one important particular in which the properties of the two materials differ is that mastic asphalt is less resistant to oils, greases and spirits than is pitchmastic. We would not wish to give the impression that the casual spots of grease which fly from the frying pan or drip from a bicycle standing in the passage will instantly ruin the floor, but grease and oil have a slow progressive softening action on mastic asphalt if allowed to remain in contact with the surface for long periods. The instructions on the care and maintenance of such floors must therefore take account of this point.

Care and maintenance

108. *Mastic asphalt floors are damp-proof and can be washed with soap and water, but soda or caustic compounds should not be used. Greases, fats or oils should be removed as soon as possible, if they are accidentally spilled. The choice of polishes is much more important than for pitchmastic floors, and polishes which contain mineral oils, acids, spirits, turpentine or any other solvents should be avoided. This list of prohibitions rules out the majority of ordinary household polishes and in effect allows the housewife the safe use only of those polishes which consist of wax emulsified with water. We have not felt competent to pronounce on the properties of every proprietary brand of polish on the market, but to avoid the charge of being wholly unhelpful on this score we would draw the attention of local authorities and their tenants to the advice given by the associations of laying firms and reproduced in Appendix VI of our report. We would further recommend to local authorities that they should consider approaching the grocers and hardware stores near any housing estates on which mastic asphalt floors have been laid, to ask that suitable polishes are stocked for the benefit of their tenants. As with other varieties of solid floors, tenants should be warned against the dangers of over-polishing mastic asphalt. We know of no satisfactory answer to a different complaint against polished pitch and asphalt floors—the complaint that they show footprints and dust. This is a complaint which can be levelled against any polished flooring material laid in plain dark colours.*

109. *The advice we have given in paragraph 104 concerning the susceptibility of pitchmastic floors to impact and pressure applies equally to mastic asphalt.*

MIXED PITCH AND BITUMEN FLOORS

110. We are informed that many floors now being laid under the name of "pitchmastic" are in fact composed of a mixture of pitch and bitumen with the usual aggregates. Long practical experience of these floors is lacking and a standard specification has yet to be drawn up, but it is claimed that they are less liable to crack and are more resistant to the softening effect of heat than either pitchmastic or mastic asphalt. *From the maintenance point of view little needs adding; owing to the presence of a certain amount of bitumen, these floors would not be wholly impervious to greases and fats, but the risk of serious damage from this cause, which is not great even with mastic asphalt, can be regarded as almost negligible.*

"ASPHALT" OR RESIN TILES

111. A thin tile using asphalt as a binder was originally developed in America, but its use has recently increased in this country. Asphalt has been displaced as the sole binding material and the tiles now use (in addition) bitumen or synthetic resins, plus fillers and pigments; they are also sometimes referred to as "decorative thermoplastic tiles". We have particularly in mind, in discussing tiles of this type, the Accotile (manufactured by the Armstrong Cork Co., Ltd.), the Marley floor tile (manufactured by the Marley Tile Co., Ltd.), and the Semastic decorative tile (manufactured by Messrs. Semtex, Ltd.).

112. These tiles, which are usually $\frac{1}{8}$ in. thick for domestic installation, or occasionally $\frac{3}{16}$ in. for particularly heavy wear, require a steel-trowelled screed if they are laid over a cement base. It is also important that the moisture in the concrete base and screed should have been allowed ample time to evaporate before the tiles are laid. If the tiles are laid before the concrete is properly dry, the adhesive with which they are fixed to the screed may fail, and the tiles will have to be relaid. The floor can be used immediately the tiles have been put down, but a fortnight or so should elapse before they are polished or washed, for until it is firmly set the adhesive can be affected by moisture penetrating the cracks between the tiles. The work of laying the tiles is a specialised task normally undertaken only by the makers themselves or by authorised laying firms.

Properties of the finished floor

113. The tiles, together with the adhesive in which they are bedded, constitute a damp-resisting layer, but it was noted that only one of the three main firms mentioned in paragraph 111 claimed in evidence that the need for a damp-proof course was eliminated by the use of their tiles. In no case was it suggested that these tiles would be sufficient to resist water under pressure from beneath. We would therefore recommend that, where these tiles are to be laid, the local authority should consider carefully, in conjunction with the flooring firm, whether a separate damp-proof membrane should be incorporated in the screed.

114. When laid, the standard grades of tiles share with mastic asphalt a comparatively poor resistance to greases, fats and oils, and tend to soften if they are in prolonged contact with these materials. It is therefore important to avoid polishes which incorporate greases, spirits or solvents; this point is mentioned again in the next paragraph.

Care and maintenance of asphalt tiles

115. (a) *The tiles should not be washed or polished for at least a fortnight (longer in cold weather) after they have been laid, in case water or polish gets between the tiles and loosens the adhesive.*

(b) *After this initial period, when the adhesive has set, the tiles can be washed and polished; ordinary soap and water will not harm them, but soda, caustic soda, soft soap and harsh scouring powders should not be used.*

(c) *Grease or oil should be cleaned from the floor as soon as possible.*

(d) *Polishes containing oils, spirits or solvents should be avoided; the only safe variety of polishes are those in which wax is emulsified in water, and in this connection we have reproduced the substance of the makers' advice on polishes in Appendix VI of this report. (Maintenance leaflets are produced by the makers and can be obtained from them or from the laying firms.) As we have suggested in the preceding section on mastic asphalt, local authorities would be well advised to approach the grocers and hardware stores near housing estates where these tiles are laid, to ask that suitable polishes should be stocked.*

(e) *Tenants should, where possible, minimise the risk of denting or scratching the tiles by spreading the weight of heavy furniture with furniture cups or some similar device, and by refraining from dragging the more solid items over the unprotected surface of the floor. The tiles will soften with heat, and for this reason no hot objects such as hot irons, saucepans or pails of boiling water should be stood on them.*

116. When repair work is required, it should be given to a flooring firm specialising in the laying of tiles of this type.

MAGNESITE (MAGNESIUM OXYCHLORIDE) FLOORS

117. Magnesite jointless floors are composed basically of a cement made with calcined magnesite and magnesium chloride solution. To the magnesite are added, according to the finish desired, pigments and a variety of fillers such as sawdust, wood flour or ground silica, with (sometimes) talc, asbestos or sand. Certain compositions also incorporate some bitumen in the form of an emulsion. The magnesite floors laid in this country commonly have a wood filler, however, and it is this type of floor which we have considered in the paragraphs which follow. The care and skill needed in mixing the ingredients (mechanical mixing of the dry ingredients before they are gauged with the magnesium chloride solution is desirable), checking the proper strength of the magnesium chloride and laying the final floor normally confines this work to specialist firms, and local authorities specifying magnesite floors would be well advised to employ one of them.

Initial precautions

118. Magnesite floors require at least three days after laying in which to dry and set before being used, but it is desirable that a longer time be given if practicable, as the hardening process continues for a period up to 14 days after setting.

It is noted later, in connection with wood block floors, that all timber is sensitive to moisture changes, and this sensitivity is shared by the sawdust or wood flour filler in magnesite floors. The cement, moreover, although not affected by oil or grease, is slightly soluble in water, and efflorescence, which

can be caused by alkali present in the mix (e.g., from impure magnesium chloride) can also result if the cement is exposed to alkalis, such as soda or any soap containing caustic. Finally, magnesite tends to corrode metal-work which passes through it or is in contact with it, although metal-work which is completely embedded in it (as wire mesh would be if incorporated in the floor for reinforcement) would not require protection.

119. Magnesite floors must therefore be protected against the possibility of continued or excessive dampness, and a damp-proof membrane beneath the floor is essential. As regards the absorption of moisture from above, the architect selecting a magnesite floor must have in mind the conditions under which it will be used and the probable extent of the maintenance it will receive. For this reason, we incline to the view that these floors are not to be recommended for kitchens or bathrooms in local authority houses. As the cement is hygroscopic, satisfactory service from magnesite floors in the relatively more humid conditions of these rooms would be obtained only if the floors were treated or polished with a regularity on which it would be unwise to rely.

Where metal-work is in contact with the floor or passes through it (e.g. gas or water pipes, or steel door frames), it must be isolated and protected from corrosion; it is usual in these circumstances to coat the metal with a bituminous paint as laid down in the Code of Practice.

Care and maintenance

120. *For satisfactory results the floor requires regular care and attention, and the maintenance of a dressing which will prevent the absorption of water. Raw linseed oil mixed with an equal volume of turpentine and/or wax polish is one of the best dressings for this purpose; for a domestic floor it should be sufficient to apply the dressing once a month for the first three months of the life of the floor and thereafter at regular though less frequent intervals. The floor should be clean and dry and the oil rubbed in until none remains standing on the surface. Alternatively, the floor can be waxed, and as magnesite is not affected by grease or fats, it is not necessary to avoid any particular varieties of floor polish though the liquid or semi-liquid polishes are to be preferred to the paste varieties as they suit the slightly absorbent nature of the magnesite. Tenants should be warned against going to extremes with floor polishes as these floors can be brought to a dangerously slippery condition.*

Soda and strong scouring powders should be rigorously avoided in washing magnesite, not only because of their action on the magnesium oxychloride cement, referred to in paragraph 118, but also because they will remove the wax or oil dressing and expose both the cement and the filler to the detrimental effect of the water. If the floor needs washing, plain tepid water should be used, but if it is very dirty the addition of a small quantity of paraffin to the water will usually be sufficient; marks can be removed with steel wool. After washing, the floor should be re-waxed and should be kept clean for as long as possible by brushing rather than by washing. The use of soap is ineffective for the removal of dirt which has become embedded in the oil or wax dressing.

WOOD BLOCKS

121. The performance of a wood-block floor, and especially its resistance to wear, depends not a little on the type of wood selected and on the way in which the blocks have been cut in relation to the grain. Into such details as these we have not felt ourselves required to explore, and leaving to one side

the differences between one kind of timber and another, the advice which we have to offer derives ultimately from a characteristic shared by all types of wood—namely, sensitiveness to moisture changes. If a finished floor of this kind is exposed to moisture or dampness, the blocks may in time swell and lift; if the percentage of moisture originally present in the blocks is driven out, they will shrink and tend either to split or come away from each other.

122. For these reasons, care must be taken when the blocks are laid to protect them from moisture rising from the concrete sub-floor. The screed must in any case be given adequate time thoroughly to dry, otherwise there may be a danger of the adhesive failing to bind permanently to it. In addition, however, a damp-proof membrane must be incorporated in the construction, and if a cold adhesive is to be used, this membrane should be made part of the sub-floor. More usually, the blocks are bedded in hot bitumen or pitch which, provided it is continuous and not less than $\frac{1}{16}$ in. thick, acts as a sufficient damp-proof course.

123. Precautions must be taken during installation to protect the blocks not only against future sources of dampness but also against possible causes of uneven or excessive drying, which could lead to shrinkage of the timber. Any special source of underground heat, such as hot-water pipes, should be lagged, while sources of heat inside the room at skirting board level, e.g., electric or hot water radiators, should be at least 6 inches clear of the floor.

Care and maintenance

124. Wood blocks, when laid, should be protected as far as possible from moisture changes. The exposed surface should be given an oil dressing and should then be waxed. The wax should be well rubbed in; any reputable make can be used. This wax surface helps to retard the absorption of moisture by the blocks and it is important that it should be regularly maintained. Even thus polished, however, wood blocks will not be completely waterproof, and for this reason they are not suitable for laying in bathrooms or kitchens where moisture cannot be avoided.

From the tenant's point of view, therefore, the essential points to remember are:

- (a) *The floor must be kept regularly polished with a wax polish (though not to a point where it becomes dangerously slippery).*
- (b) *The floor should be washed with water as little as possible; the housewife should on no account make a habit of washing a wood block floor.*

PLASTICS

' . . . its durability and cleanly appearance after being wiped over with a damp cloth render it cheaper in the long run.'

MRS. BEETON, 1888.

125. The term "plastics" covers an extraordinarily wide range of materials. In the housing field, uses such as door furniture, handles to cookers and wash boilers, electric light fittings and switches, are obvious examples which spring to mind; but plastics are also to be found as bath panels, splash backs, as the insulation of electric wiring, in certain varieties of adhesive incorporated in building boards and plywood and in some paints and varnishes.

Types and properties of plastics

126. The classification and manufacture of plastics have been described in detail in Post-War Building Studies No. 3 by a Committee convened by the British Plastics Federation. For our purpose, it has been sufficient to note that plastics can be broadly divided into two types, thermoplastic and thermosetting. The former soften on heating and harden on cooling, and this process can be repeated any number of times. The latter, however, are heated under pressure during their manufacture, but thereafter harden permanently and are not softened by further heating (though at high temperatures they will char). Most of the fittings or items of equipment in houses which are made of, or incorporate, plastics, use the thermosetting variety, though the plastic covering of electric cables is thermoplastic.

127. Plastics are produced by chemical processes from a large range of basic raw materials, and the possible number of finished varieties is extensive. Generalizations are dangerous, therefore, as the satisfaction given by the product will depend upon whether it has been made of a plastic of a suitable mix, whether the article has been properly designed for its purpose and whether the plastic has, where necessary, been reinforced. The breakage of a plastic component such as a door handle or a w.c. seat is less likely to arise, however, from the failure of the material than from poor design of the finished article.

If properly made and designed, plastics have the advantage of a clean finish, a wide range of colour, good dielectrical properties and freedom from corrosion. They can be painted without difficulty with ordinary paint.

Preliminary considerations

128. As maintenance depends to a great extent on the original choice of the material, we would offer these suggestions to local authorities to be borne in mind when components and fittings for new houses are being chosen:

- (a) Satisfactory performance depends on sound design and the use of the right materials; it is therefore a wise policy to use only the products of known and reputable makers. Some plastics bear the British Standards Institution's certification mark as a guarantee of their conformity with British Standard Specifications. So far as housing components are concerned, we understand that some makes of w.c. seats are certified in this way, and while regretting that this safeguard of the consumer has not yet spread further, we would recommend local authorities and their contractors to take advantage of this easy means of recognising a certified product.
- (b) Plastics tend to become brittle after prolonged exposure to strong sunlight, and certain colours will fade. This will soon be apparent to the tenant who hangs plastic curtains up on the south side of the house, but the effect will be the same on bath panels or splash backs in bathrooms with a southern aspect.
- (c) After a time, pliable plastics will tend to lose their mobility and become more rigid and brittle, whether exposed to bright light or not. This must be borne in mind by authorities whose houses have plastic insulated electric wiring, which will need renewing periodically. In addition, such plastics, being thermoplastic and liable to soften on heating, must be kept away from possible sources of heat.

Care and maintenance of plastics

129. Little general advice can be given to the tenant on care and maintenance. Very high temperatures will damage almost all plastics, as anyone will know who has stubbed a cigarette out in a plastic saucer. Plastic fittings can also be fractured by knocks or strains, but normally considerate treatment and such cleaning as is necessary (with a damp cloth or soap and water) will be sufficient for a properly designed article. Where desired, a final polish with a clean, dry cloth will help preserve a bright appearance.

FIBRE BUILDING BOARDS

' . . . The chair rail should not be a mere make-believe in paper or stencil or paint but a solid rail of wood projecting from the surface of the wall for at least an inch and a half so as to form a fender between the wall itself and any person or thing that may come or be brought into contact with it at that height.'

MRS. BEETON, 1888.

130. Under this heading we have considered those building boards which consist mainly or wholly of a mass of felted wood or other vegetable fibre. The boards may be either homogeneous or laminated and they vary in thickness and density. They fall into three main categories:

Insulating board (with a thickness of approximately $\frac{1}{2}$ in. and density which gives a weight of less than 25 lb. per cubic foot).

Building board (similar to insulating board in density but between $\frac{3}{16}$ in. to $\frac{3}{8}$ in. thick).

Hardboard ($\frac{1}{8}$ in. or $\frac{3}{16}$ in. thick but of a density giving a weight of 30 to 50 lb. per cubic foot).

131. The use of fibre building boards has greatly increased since the war, partly no doubt because of their own inherent qualities and partly because of the scarcity of some of the materials for which they are acceptable alternatives. Thus insulating boards have been extensively employed in wall and ceiling construction, owing not only to their heat retaining properties but also to their suitability as a surfacing material or for permanent shuttering; similarly, hardboards have been used for doors, cupboards, drawers, etc., in place of plywood.

Precautions to be taken when fixing

132. The boards should be unpacked and left freely exposed to the air for 24-48 hours in order that internal stresses which may have developed during manufacture are given a chance to even out before fixing. They should be provided with a rigid nailing base and all the edges should be supported. Where a decorative finish is needed for internal work, the joints, though they can never be entirely hidden unless plastered, can be masked with strips of other materials. The nails must be carefully chosen where the appearance of the finished job is important; we understand that many board manufacturers have developed special nails, but in general, unless these nails are being used, $1\frac{1}{4}$ in. to $1\frac{1}{2}$ in. panel pins, No. 6 brads, or specially cut clasp nails should be used. When there is likely to be dampness in the air (as in kitchens or bathrooms), rust-resisting nails should be used so that corrosion of the nail heads will be avoided.

Fibre boards are liable to be affected by moisture and are susceptible to dry rot. If, therefore, they are to be used as permanent shuttering, they

should contain a fungicide, while if they are used in the floor construction at ground floor level (e.g., insulation board as an underlying material for thermal insulation or hardboard as a surfacing material), a damp-proof course will be needed to prevent rising moisture.

Surface finishes

133. Fibre building boards are not normally fixed externally in this country, and probably the only extensive example of their use in this way is the cladding of the 8,000-odd American temporary bungalows erected under the temporary housing programme. In these circumstances, the boards must be regularly painted as a protection against the weather; a water-proof priming coat followed by two coats of finishing paint are recommended. For internal work, boards may, if desired, be painted or distempered, and a primer is recommended in either case—an under-coat for paint finish or a priming of size or petrifying liquid for distemper. A surface finish of flat oil paint or oil-bound water paint will of course reduce the rate of possible flame-spread in case of fire. If distempered insulation board is being used as a wall lining to combat condensation or where condensation is likely, an oil-bound distemper should be used.

If it is intended to cover the board with wallpaper, the joins should first be hidden with plaster over strips of galvanized wire mesh slightly recessed along the edges of the boards. Fibre boards can be plastered with gypsum plaster, but neither lime nor cement should be used. Most manufacturers of gypsum plaster prepare a special "board plaster," but it is advisable to consult the suppliers of the board as to the best plaster to use. Strips of galvanized wire mesh can be fixed over the joints.

Advice to tenants

134. *The following points of advice could usefully be passed on to tenants:*

(a) *Insulation board used as a wall or ceiling lining can be repainted or re-distempered in the normal way. If it is being painted or distempered for the first time, priming coats will be needed (as mentioned in paragraph 133 above).*

(b) *Insulation board is a comparatively soft material, and both the paint finish (if one has been applied) and the board itself can easily be damaged by rough treatment, e.g., by a blow from a chair back.*

(c) *No screws or nails should be driven into insulation board to suspend articles or pictures unless they can be so positioned that the screw or nail goes through into the supporting timber behind.*

(d) *Hardboard used for cupboards, doors, drawers, wall linings, etc., can be painted or distempered in the same way as plywood. If it is left in its natural state without any finish, it is best kept clean with a damp rag (though it should never be allowed to get soaked) and then polished with a wax polish.*

SUMMARY OF RECOMMENDATIONS IN PART I ON THE CARE AND MAINTENANCE OF EQUIPMENT BY TENANTS

135. We suggest that local authorities should as occasion demands transmit to their tenants the advice and recommendations we have given on:

(a) The prevention of condensation on metal fittings (paragraphs 20-22).

- (b) The careful use, cleaning, oiling and repainting of steel cupboards, dressers and fittings (paragraphs 23–24) and aluminium cupboards, dressers and fittings (paragraph 44).
- (c) The repainting of pressed steel baths (paragraph 27).
- (d) The precautions to be observed in looking after stainless steel sinks (paragraph 29), galvanized steel sinks (paragraph 30) and aluminium sinks (paragraph 45).
- (e) The cleaning, repainting, lubrication and re-glazing of steel windows (paragraphs 36–40) and aluminium windows (paragraphs 46–48).
- (f) The use and maintenance of solid fuel appliances (paragraph 63).
- (g) The choice of fuel for such appliances and its burning under certain conditions (paragraphs 64–65).
- (h) The prevention of condensation in chimneys and flues (paragraph 68).
- (i) The general rules to be borne in mind where electrical equipment is installed (paragraph 77) and similarly where gas equipment is installed (paragraph 86).
- (j) The particular steps to be taken when using and cleaning electric and gas cookers (paragraphs 78 and 87), clothes boilers (paragraphs 79 and 88) and refrigerators (paragraphs 80 and 90), gas water heaters (paragraphs 91–92) and gas fires (paragraph 93).
- (k) The cleaning, polishing and care of floors surfaced with coloured pitch mastic (paragraphs 103–104), coloured mastic asphalt (paragraphs 108–109), mixed pitch and bitumen (paragraph 110), “asphalt” resin tiles (paragraph 115), magnesium oxychloride (paragraph 120) and wood blocks (paragraph 124).
- (l) The cleaning and care of plastics (paragraph 129).
- (m) The cleaning and care of fibre building boards (paragraph 134).

PART II

ADVICE TO TENANTS

'As with the Commander of an Army, or the leader of an enterprise, so is it with the mistress of a house. Her spirit will be seen through the whole establishment ; and just in proportion as she performs her duties intelligently and thoroughly, so will her domestics follow in her path. Of all those acquirements, which more particularly belong to the feminine character, there are none which take a higher rank, in our estimation, than such as enter into a knowledge of household duties ; for on these are perpetually dependent the happiness, comfort, and well-being of a family.'

MRS. BEETON, 1888.

INSTRUCTION CARDS

136. Tenants of new houses will all be familiar with the printed cards which give them advice on the proper use of the gas stove, the best way to manage the refrigerator or the method by which the boiler can be encouraged to give of its best. In the same category come the sticky labels glued to the newly-laid floor or to the steel sink—labels which are sometimes supplemented with cards for more permanent use. Exactly how much tenants rely on or gain from these cards it is not easy to say. There is no doubt, however, that these cards do play some part in the education of tenants in the correct use of their equipment, and for this reason we think that more care should be taken to see that they reach the tenants safely.

137. Instruction cards are commonly to be discovered by the incoming tenants tucked behind some pipe convenient to the apparatus to which they relate, secreted in a nearby cupboard or hanging on an adjacent knob. It is thus that they are usually left by the fitter who brought them with the appliance, and they have generally been waiting throughout whatever period elapses between installation and occupation. Occasionally the instruction cards are forgotten altogether at the installation stage, while it also occasionally occurs that cards left for future tenants perish by mischance before the householder ever takes over. It appears to us that some precautions should be taken by local authorities to ensure that their tenants actually do have the benefit of the manufacturer's instructions, and we would therefore recommend that :

- (a) Authorities should find out in respect of each item of equipment fitted in their houses whether instruction cards have in fact been printed by the makers.
- (b) Where such instruction cards have been printed, local authorities should make certain that they are handed by the contractor to officers of the Council, so that they can be given personally to the tenant at the beginning of the tenancy.
- (c) A stock of instruction cards should be obtained from the makers and kept by authorities as replacements and for issue to second and subsequent tenants in their houses.

HANDBOOKS FOR TENANTS

138. The First Report of the Housing Management Sub-Committee in 1938 contained (paragraph 62) a recommendation that handbooks for tenants should be prepared and issued by local authorities. We have had before us several

such handbooks and have noted with interest that a number of authorities have found it convenient to produce a booklet through the medium of a publishing firm which specialises in this form of literature. Needless to say, these booklets all bear a close resemblance to each other, but, wherever they had been published, all the handbooks we inspected covered a large number of other topics besides equipment. Conditions of tenancy, care of gardens, details of local authority health, education, transport and other services were among the subjects described, though hints on the care and maintenance of houses and equipment found their place in such books, together with a large number of advertisements, which form the financial backbone of the publications.

We learnt that some authorities had contemplated the preparation of handbooks, but had found that they could not easily include advice about all the different types and varieties of equipment installed in their houses and therefore had abandoned the project.

139. The normal type of handbook, filled as it is with advertising matter, does not strike us as a volume which the average tenant would keep readily to hand for reference purposes. While we are of the opinion, therefore, that, if handbooks are printed and distributed, advice on the care and maintenance of equipment should most certainly be included, we are not entirely satisfied that in this field booklets have much educational value.

We understand that at least one local authority when it wishes to give special advice to its tenants on any subject of municipal activity (not only housing) finds it more profitable to prepare an information sheet confined to that subject alone and to circulate it to its tenants. We would recommend this suggestion to other authorities for their consideration.

DEMONSTRATIONS

140. A number of different kinds of demonstrations were mentioned and described during the course of our investigations; they were chiefly staged by the gas and electricity supply undertakings and to a lesser extent by makers or merchants of solid fuel appliances or by officers of the local authorities. Demonstrations in gas and electricity showrooms are, of course, held by the undertakings as part of their normal business, but in addition we learnt of demonstrations arranged on new estates, either in empty houses before occupation or in houses recently tenanted; to these demonstrations are invited occupants of the neighbouring houses. Solid fuel appliances are much less often the subject of demonstrations, and we feel that there is much scope here for extended activity in view of the fact that some modern coal and coke-burning stoves are, we know, giving trouble both to tenant and landlord.

We are aware that these group demonstrations are not always well attended, but we think they can be of value to those who are present, and as a source of help and assistance to tenants they should not be neglected. We would therefore recommend in this connection that:

- (a) Authorities should encourage tenants, so far as they can, to attend demonstrations by gas and electricity undertakings at their showrooms.
- (b) Authorities should co-operate with gas and electricity undertakings, and should permit and encourage them to stage demonstrations on new estates in freshly completed houses either before or soon after occupation—demonstrations to which neighbours should be invited.

- (c) Similarly with solid fuel appliances they should encourage and promote demonstrations by manufacturers, merchants or by representatives of the Women's Advisory Council on Solid Fuel or of the Ministry of Fuel and Power.
- (d) Authorities should, where possible, enlist the help of tenants' associations to popularise demonstrations and discussions about equipment in houses.

141. We attach much more importance, however, to demonstrations to people falling within two smaller groups: firstly, to those tenants who, even though they have attended larger demonstrations, still have difficulty with the appliances, and secondly, to the Housing Management staffs of local authorities, who are constantly in touch with tenants and should be in a position to explain the working of their equipment to them.

We would therefore further recommend that:

- (a) When a tenant expresses, either at the initial letting interview or at a later visit, a desire to have some piece of equipment demonstrated, or when it is apparent that a tenant is failing to make the best use of a piece of equipment, the local authority should arrange for the tenant to be visited in his or her house either by a competent officer of the authority itself or by a representative of the gas or electricity undertaking or (for solid fuel appliances) by a representative of one of the bodies mentioned in paragraph 140(c) above.
- (b) Special and more detailed demonstrations should be arranged for the benefit of those members of the staff of the authority's own Housing Department who will at any time come into contact with tenants or be asked for advice.

VISITS TO TENANTS

142. It quickly became clear to us in studying the evidence submitted by local authorities (and our conclusion was reinforced on hearing the representatives of the Society of Housing Managers and of the Institute of Housing) that while cards, booklets and demonstrations to groups of tenants all have their value in helping tenants to look after and get the best results from the equipment in their houses, the most valuable and effective way of assisting them is to visit them in their own homes. Special visits by demonstrators to explain the working of particular items have been mentioned and commended in the previous paragraph; but such visits would be made only on the special request of a tenant in difficulties, so that help of this kind might never reach other tenants whose need of advice might be even greater. To some extent, therefore, local authorities must take the initiative and make it their business to see that tenants do in fact understand how to use the apparatus and look after the fittings with which they are provided.

143. Nearly all local authorities who reported their practice to us mentioned that visits are made to new tenants in the early days of their occupation to find out whether the initial advice given on cards, in handbooks or by the Housing Manager or Clerk of Works has in fact sunk in, and to deal with individual problems with which tenants have been faced. Occasionally these visits are made by Welfare Officers of the Council, by Housing Inspectors or by the Clerk of Works, but in the majority of cases the link between the tenant

and the municipal landlord is the rent collector. We feel that contact maintained through the periodical visit of the rent collector is the most convenient and satisfactory one and we are in whole-hearted agreement with the First Report of the Housing Management Sub-Committee which recommended door-to-door collection of rents partly for this purpose. So far as the care and maintenance of equipment is concerned, regular and frequent visits of this nature have the additional advantage that they are not confined to the first few weeks or months of the tenancy, for we do not think that the need for advice necessarily ceases after a few weeks. We consider, therefore, that most local authorities will be amply repaid for strengthening this link and regarding the work of the collector as covering more than the weekly gathering of rents. As the officer whom tenants see more frequently, he is the person who would normally be approached for advice and told of breakages, deficiencies or the need for repairs. It is evident that the more competent rent collectors are to deal with points put before them on their rounds, the more speedily will defects and difficulties be dealt with to the satisfaction of both the tenant and the authority.

144. We therefore recommend that all local authorities who do not already adopt the practice should make their rent collectors responsible for watching the general condition of groups of houses and for advising the tenants in them. The acceptance of this recommendation would involve certain pre-conditions and consequences.

Firstly, it would need the avowed recognition by the authority that the work of a rent collector is regarded as important and responsible and as the first step towards the ultimate status of a trained Housing Manager. We think this must be made clear if the work is to attract keen and interested applicants.

Secondly, in order to carry out their wider duties, collectors would have to be given the opportunity of learning about elementary construction and housing equipment as well as such other subjects as are required of Housing Managers. To this end they should be expected to attend demonstrations on the use of equipment and to visit sites in the neighbourhood where new houses are being built.

Thirdly (and except where urgent repair work becomes necessary in an emergency), tenants should be encouraged to regard rent collectors as their normal channel of communication with the authority on housing matters.

Fourthly, rent collectors should not be given so many houses to look after that adequate supervision becomes impracticable.

145. We realise that many authorities, faced with this recommendation that rent collecting should be made a more responsible job, will see in it only a suggestion that they should employ more collectors at higher salaries. We would urge, however, that very solid advantages and economies are to be set against such an outlay:

- (a) Better and more continuous supervision would be exercised over the property and the equipment in it, thus producing economy in future maintenance expenses.
- (b) Better advice on the maintenance of equipment would be available to tenants from officers who would have the opportunity not only to repeat it regularly (and repetition is essential if advice is to be driven

home), but also to give such advice at the time when it is needed (e.g., advice on solid fuel appliances needs to be given during the winter and on immersion heaters during the summer).

- (c) Better and more accurate reports would be made to authorities when repairs are needed. In many cases, where minor repairs only are needed, this would save a later visit by a works foreman to assess the urgency and the precise nature of the work to be done, and would enable the correct craftsmen to visit the site with the correct equipment.
- (d) Because they visit every house, rent collectors can often pick up hints on the problems which tenants frequently encounter in managing their equipment and the way in which difficulties have been solved. The ingenuity of one tenant could thus be passed on for the benefit of others.
- (e) The tenant would be helped by having only one contact with the authority.

THE INSPECTION OF PROPERTIES BY THE MUNICIPAL LANDLORD

146. The Housing Management Sub-Committee in their First Report recommended that all properties should be regularly and thoroughly inspected, and we would record our agreement with this recommendation. It is unwise to leave it entirely to the tenant to report the development of defects or the need for repairs; not all tenants are equally interested, and few have the necessary knowledge to discern and recognise in their early stages faults which could, if neglected, lead later to the need for major repair work. Broken tiles, cracked gutters, the first suspicion of dry rot are examples of defects which are most easily tackled in their early stages, but it may require an expert's eye to detect them. These considerations apply not only to the main structure of the house but also to some of the fittings and equipment which we have considered in our report. Local authorities would be wise to ensure that a knowledgeable eye is periodically cast over the internal equipment of their houses to make sure, for instance, that the ground floor is not being polished with a type of wax which will later make it necessary completely to relay the surface, or that unauthorised additions have not brought the electricity circuit to the point of being overloaded.

147. All local authorities, of course, inspect their houses at the beginning of the first tenancy, and it is customary to inspect each property thoroughly when it falls vacant again. Inspection is also usual at the end of the six months' maintenance period provided for in the erection contract. Beyond this, however, practice varies between the extremes of those authorities who make no inspection unless called in by the tenant and those who employ special officers for the purpose of visiting and examining all their houses every six months or so.

While endorsing the principle of regular inspection, we would emphasise that a happy balance must be struck between inspections which are so infrequent as to be ineffective for the timely detection of defects and those which come round so often as to be a source of inconvenience to the tenants. We would, therefore, recommend that:

- (a) Every house be thoroughly inspected by a technical officer of the authority at the beginning of the first tenancy and on every subsequent

change of tenant as well as at the end of the six months' maintenance period.

- (b) Those authorities who undertake internal decoration should take the opportunity to inspect the property when it is being redecorated.
- (c) In between times, rent collectors should be enjoined, as part of their duties, to watch the condition of the houses within their jurisdiction, to inspect them from time to time (their knowledge of the tenants will enable them to use their discretion about the frequency of such inspections—some houses will require greater vigilance than others), and to arrange for a thorough inspection by a technical officer as and when it appears necessary.

NOTIFICATION OF DEFECTS BY TENANTS

148. Periodical inspection enables local authorities to make sure that their houses are in fact in a satisfactory state of repair and that defects are not remaining unreported and neglected. In the great majority of cases, defects will be reported by the tenants themselves. We would recommend that, except for urgent work, tenants should be encouraged to report the need for repair work to the rent collector. We think that this is more convenient for the tenant and more satisfactory for the authority than any system of notification in writing. As the minimum of effort is required of the tenant, there is less likelihood that defects will go unreported, while, as we have suggested in paragraph 145 above, the rent collector will in many cases, if only minor repairs are needed, be able to carry back a sufficiently accurate and detailed report to enable the work to be done without the need for an intervening inspection to discover the true basis of the tenant's complaint.

149. It was recommended in the First Report of the Sub-Committee on Housing Management that authorities should supply their tenants with cards for transmission through the post so that they could by this means notify their landlord when repairs become necessary. We have had reported to us the experience of a few local authorities who have followed this recommendation, and generally speaking their experience has not been entirely happy; many tenants failed to use the cards at all, even where urgent repairs were needed, while some others used them to report trivial defects or to complain about matters quite outside the sphere of housing defects, such as street lighting or the behaviour of their neighbours. Even where the cards were properly used to notify only the development of genuine defects which required attention, only in a small minority of cases was the description given sufficiently accurate to enable the authority, without any further inspection, to gain a clear idea of the extent or nature of the defect. In the light of the evidence submitted to us, we feel we cannot endorse the recommendation of our predecessors on this point. We think that verbal notification to the rent collector should be the normal method of reporting repairs, while if urgent attention is needed, e.g. to the gas, electricity or water systems, the inconvenience probably experienced by the tenant can be relied upon to drive him to the telephone or to find a piece of notepaper for himself.

CHARGES TO TENANTS FOR REPAIR WORK

150. Although a few local authorities leave almost all repair work to their tenants, this arrangement appears to be the exception rather than the rule.

It is more common for the authority to execute repairs but to place on the tenant an absolute liability to pay the cost of certain named types of work (e.g., reglazing broken windows or clearing stopped drains). Some authorities also make a charge to tenants in respect of damage attributable to gross negligence, and we think this practice should be seriously considered by all other local authorities. There is, of course, always the possibility that tenants would avoid reporting a breakage rather than be charged for it, but we think that authorities are more likely to gain in the long run for the trouble of making a charge and collecting it, as a more careful attitude on the part of the tenant would be reflected in lower subsequent maintenance costs.

DETAILED RECORDS OF REPAIR WORK CARRIED OUT

151. Many pieces of modern household equipment work admirably in the hands of the careful owner, but are prone to develop faults when used by a succession of tenants. We think that authorities should keep a careful watch on the types of equipment they have installed in their houses to discover, and later to avoid (so far as the supply of alternatives permits), those particular designs or materials which cause more than average trouble to their tenants. In this connection, we would support the recommendation of the First Report on Housing Management (paragraph 55) which urged authorities to keep card indexes in which would be recorded the history of each of their houses including the repairs and redecorations carried out. It is not strictly necessary that such records should be kept on cards (though in this form they should probably be more easily accessible than any other) so long as details are available for analysis of the comparative cost in maintenance of various fittings.

MACHINERY FOR CARRYING OUT REPAIRS

152. Most local authorities find direct labour the most convenient way of doing repairs, though larger jobs and painting work are frequently put out to contract. In most cases, repairs to gas and electricity installations are carried out by the supply undertakings. Local authorities will know for themselves what combination of direct labour and outside contract work suits best the needs of their housing estates.

In the great majority of cases, repair work to new forms of fittings or equipment falls within the normal arrangements already made, but we would make two recommendations in this connection:

- (a) Repairs to new forms of flooring materials (including those discussed by us in paragraphs 101 to 124 of this report) should usually be entrusted to specialist firms.
- (b) As regards more elaborate forms of gas and electrical equipment, (e.g., refrigerators or instantaneous water heaters) and the whole of the electrical installations in temporary houses, maintenance contracts should be extended to cover not only the repair of reported faults but also regular inspection of such equipment by specialists from the supply undertakings or from the firms supplying the equipment. We think it unlikely that the average local authority can regularly send round a technical officer competent to inspect these items.

SUMMARY OF RECOMMENDATIONS IN THIS SECTION

153. We recommend that:

- (a) Authorities should take steps to provide themselves with a stock of all makers' instruction cards on the care and maintenance of the equipment in their houses to hand to their tenants (paragraph 137).
- (b) If handbooks to tenants are prepared, instructions should be included on the care and maintenance of equipment, although information sheets or leaflets confined to separate and individual topics probably reach tenants' attention more effectively (paragraph 139).
- (c) Authorities should encourage their tenants to attend demonstrations of the equipment installed in their houses (paragraph 140) and should arrange for special demonstrations to tenants in particular difficulties and for the benefit of their own housing staffs (paragraph 141).
- (d) As advice on care and maintenance is most effectively given in person and on the spot by an officer calling at the tenant's house, authorities should ensure that their rent collectors, who are the normal link between the tenant and the municipal landlord, have sufficient knowledge and are of the right calibre to carry out this work effectively (paragraph 144).
- (e) Rent collectors should be given responsibility not only for advising on the care and maintenance of equipment, but also for keeping a watch on the general condition of houses on their rounds (paragraph 145), for the inspection of such houses as they think necessary (paragraph 147) and the reporting, after initial examination, of defects which they themselves observe or which are mentioned to them by tenants (paragraph 149).
- (f) Authorities should, in serious cases, make a charge towards the cost of repair work made necessary by negligence on the part of the tenant (paragraph 150).
- (g) Detailed records should be kept from which authorities can inform themselves of the comparative cost of maintaining different types and makes of equipment (paragraph 151).
- (h) Whereas most repair work to equipment will be covered by arrangements already made, specialist firms should be employed for repairs to new forms of floor surfacing materials and certain pieces of electrical and gas equipment should be regularly inspected by specialists (paragraph 152).

In conclusion we would like to express our thanks to the Secretary, Mr. C. J. Pearce, to Mr. M. W. Hudson, and to the Assistant Secretary, Mr. P. Benner for the valuable help they have given in assembling the large volume of evidence the Sub-Committee has had to consider and in the preparation of this Report.

(Signed) R. COPPOCK (*Chairman*)
C. DOUGLAS CALVERLEY
LANCELOT H. KEAY
J. M. MACKINTOSH
K. MARR-JOHNSON
EMILY MURRAY
STEWART SWIFT

C. J. PEARCE,
Secretary,
April, 1950

APPENDIX I

SUMMARY OF THE MORE COMMON FAILURES AND MAINTENANCE DIFFICULTIES REPORTED TO THE SUB-COMMITTEE

I. Solid Fuel Appliances (especially closed or closeable appliances)

1. Buckling and burning of firebars and cracking of fire backs and enamel exterior finish owing to overheating.
2. Clogging of flues with soot where smokeless fuel is not used in appliances designed for anthracite or coke.
3. Scaling of boilers, cisterns and pipes in hard-water areas, encouraged by overheating of the water.
4. Loss by the tenants of removable parts and tools.
5. In systems using convected heat for background heating through ducts:—
 - (a) smoke leakage through the flue joints;
 - (b) discoloration of walls above air-outlet panels.

I. Gas Installations

1. Clothes Boilers

- (a) Flexible tubes are easily broken.
- (b) Taps through which the water is drawn off become stiff and the handles break.

2. Clothes Boilers and Cookers

Plastic handles and knobs easily break if roughly treated.

3. Refrigerators

Thermostats are frequently faulty or are liable to become so.

III. Electrical Installations

1. General

- (a) Flexible connections are the most frequent source of trouble.
- (b) Cartridge fuses cause difficulty to tenants not accustomed to them and frequently have to be replaced by the electrical undertaking.
- (c) Where flush outlet sockets are not provided, breakages are frequent.
- (d) Amateur maintenance or additions to the electrical system frequently lead to repair work becoming necessary.

2. Clothes Boilers

Elements become damaged if left burning after the water has been drawn off.

3. Cookers

- (a) Thermostatic controls are frequently faulty or become faulty.
- (b) Hot-plates and elements become damaged:
 - (i) by being left to burn unnecessarily;
 - (ii) by the use of ill-adapted utensils which either boil over or lead to waste of heat.

IV. Pitchmastic and Bituminous Asphalt Floors

- (a) Such floors tend to scratch easily or take impressions from furniture, especially in the vicinity of fires.
- (b) They are cold and take condensation.
- (c) They are inclined to be slippery, especially if polished.
- (d) They may stain from oils or grease or from polishes which contain paraffin or oil.

V. Steel Kitchen Fitments (Draining boards, sinks and cupboards)

- (a) Rusting occurs where the enamel is either inadequate or is chipped off in use.
- (b) Where the sheet metal used in manufacture is light, the fitments easily become bent, distorted and liable to jam.
- (c) Steel sinks and draining boards become discoloured if not properly cleaned.

VI. Windows

Heavy breakages of glass attributed to:

- (a) light framework (both wood and metal) and fittings;
- (b) tenants' omission to use the fasteners in casement windows.

APPENDIX II

PAINTS FOR REPAINTING OF STEEL KITCHEN FITMENTS (SEE PARA. 24)

The schedule of paints reproduced below was prepared by the Ministry of Works for the assistance of local authorities with temporary houses. All paint required should be obtained from the same paint manufacturer.

LIST OF PAINTS

MANUFACTURER	Ordering Description			NOTES
	Priming	Undercoating	Finishing	
Docker Brothers, Ltd., 177, Corporation Street, Birmingham, 4. Tele: B'ham Central 3581	C.T.115 (Yellow) Contains lead	C.T.116 Lead-free	C.T.117 (Cream)	Note 1. With the exception of the I.C.I. finishing coat all the coats listed are for cream finish, but all manufacturers will be prepared to supply material of the same type and quality in the required shade of green, if so ordered.
Goodlass, Wall, & Co., Ltd., 70, Mill Lane, Old Swan, Liverpool, 13 Tele: Liverpool, Stonecroft 2348	Z.1003 (Red) Lead-free or Z.1004 (Red) Contains lead	Z.1005 Lead-free	Z.1006 (Cream) Lead-free	
Hadfields (Merton), Ltd., Western Road, Mitcham, SURREY Tele: Mitcham 2234	D.D.3544 A. (Red) Lead-free	D.D.3544 B. Contains lead	D.D.3544 C. Contains lead (Cream)	Note 2. Alternatives where listed are included in view of present raw materials supply difficulties and either may be ordered or offered at the discretion of user or maker.
Imperial Chemical Industries, Ltd., Paints Division, Wrexham Road, Slough, BUCKS. Tele: Slough 23851	170-692 (Red) Lead-free	178-41 Lead-free	101-33 (Cream) Lead-free	
International Paint & Compositions Co., Ltd., Grosvenor Gardens House, Grosvenor Gardens, London, S.W.1 Tele: Victoria 3161	M.W/P.1. (Red) Contains lead or M.W/P.2. (Green) Lead-free	M.W/U.C.I. Lead-free	M.W/F.2. (Cream) Lead-free	Note 3. Where alternative primers are listed, the user's preference (if any) should be indicated on the order.
Sherwoods Paints, Ltd., Barking, ESSEX Tele: Rippleway 3001	I.L.5072 (Red) Contains lead or I.L.5073 (Primrose) Contains lead	I.L.5093 Contains lead	I.L.5075 (Cream) Contains lead or I.L.5076 (Cream) Contains lead	
Smith & Walton, Ltd., Hadrian Works, Haltwhistle, NORTHUMBERLAND Tele: Haltwhistle 228	10598 (Buff) Contains lead or 10599 (Red) Lead-free	10600 Lead-free	10601 (Cream) Lead-free	Note 4. The description "lead-free" means lead-free within the meaning of the Home Office regulations.

APPENDIX III

ADDRESSES OF THE REGIONAL OFFICES OF THE MINISTRY OF FUEL AND POWER

(See para. 60)

REGION	ADDRESS
(1) NORTHERN (Northumberland, Durham, North Riding of Yorks.)	Ministry of Fuel and Power, Government Buildings, Kenton Bar, Newcastle-on-Tyne, 3. (Newcastle 25121)
(2) NORTH EASTERN (East and West Ridings of Yorks.)	Ministry of Fuel and Power, Century House, South Parade, Leeds, 1. (Leeds 30611)
(3) NORTH MIDLANDS (Derby, Notts., Lincs., Leics., Rutland, Northants.)	Ministry of Fuel and Power, Block 7, Government Buildings, Chalfont Drive, Nottingham. (Nottingham 77711)
(4) EASTERN (Norfolk, Suffolk, Cambs., Hunts., Beds., Herts., and Essex—excluding Greater London.)	Ministry of Fuel and Power, Shaftesbury Road, Brooklands Avenue, Cambridge. (Cambridge 54587 & 56268)
(5) LONDON (London, Middlesex, parts of Essex, Herts., Kent and Sur- rey, i.e., Greater London)	Ministry of Fuel and Power, Mill House, 87/89, Shaftesbury Avenue, London, W.1. (GERrard 9700)
(6) SOUTHERN (Bucks., Oxon, Berks., Hants., Dorset.)	Ministry of Fuel and Power, Whiteknights, Earley, Reading, (Reading 61491)
(7) SOUTH WESTERN (Gloucestershire, Wilts., Somerset, Devon, Cornwall)	Ministry of Fuel and Power, 12/14, Apsley Road, Clifton, Bristol, 8. (Bristol 38223)
(8) WALES (All Wales and Monmouth)	Ministry of Fuel and Power, 27, Newport Road, Cardiff. (Cardiff 9234)
(9) MIDLANDS (Staffs., Salop, Hereford, Worcs., Warwicks.)	Ministry of Fuel and Power, 63, Hagley Road West, Birmingham, 17. (Bearwood 3071)
(10) NORTH WESTERN (Cumberland, Westmorland, Lancs., Cheshire)	Ministry of Fuel and Power, Burton Road, West Didsbury, Manchester, 20. (Didsbury 5180)
(11) SCOTLAND (All Scotland)	Ministry of Fuel and Power, 24/26 Douglas Crescent, Edin- burgh, 1. (Edinburgh 34881) Fuel Advisory Service, 145, St. Vincent Street, Glasgow, C.2. (Glasgow City 7636)
(12) SOUTH EASTERN (Kent and Surrey—except Greater London, Sussex)	Ministry of Fuel and Power, Government Buildings, Forest Road, Hawkenbury, Tunbridge Wells. (Tunbridge Wells 2780)

APPENDIX IV

SOME COMPLAINTS VOICED IN CONNECTION WITH SOLID FUEL APPLIANCES AND THEIR POSSIBLE CAUSES

(See Para. 62)

The difficulties and shortcomings listed below are among those which have been actually investigated by officers of the Ministry of Fuel and Power since the war. The causes suggested are also based on experience and imply their own remedies.

1. **Unsatisfactory service**

(1) *Inadequate space heating, hot water and cooking facilities from a multi-duty appliance*

This may happen if a single appliance is expected to do too much at one time—e.g., cook, heat the room and produce hot water simultaneously. If the service load is abnormally high, it may be advisable to have two separate appliances.

(2) *Inadequate space heating*

Possible causes:

- (a) The appliance may be too small for the room.
- (b) The wrong type of appliance may be fitted, e.g., inset stove where free-standing stove is necessary.
- (c) Convection heating from the appliance may need to be led back into the same room.
- (d) The construction of the flues and air ducts may be wrong. There is a particular danger of this where the installation is a complicated one—e.g., with warm air ducts; the Ministry of Fuel and Power Bulletin on "The Gravity Warm Air System" has useful instructions on installation.

(3) *Inadequate heat to the oven of the cooker*

This may be due to:

- (a) The incorrect assembly of parts of the appliance.
- (b) The clogging of the flues of the appliance with soot.
- (c) Failure to use the dampers properly.

(4) *Inadequate hot water supply*

Possible causes:

- (a) The boiler may require cleaning either inside, to get rid of fur (in hard water districts) or outside, to prevent the accumulation of soot. Soot and fur will reduce the heat reaching the water.
- (b) The pipe runs may be excessive.
- (c) The pipes or hot water cylinder may need lagging.
- (d) There may be a fault in the plumbing system, e.g., the connection of the flow and return pipes may be reversed or the flow pipe may project into the boiler (the Standard Code of Practice should be adhered to in designing the hot water system).

(5) *Difficulty with overnight burning*

Frequently this is due to use of the wrong fuel.

(6) *Overheating of water*

Can be caused by an excessive air supply resulting from a badly fitting ashpit door or damage to the appliance. (Faults of this kind should be reported to the merchant or manufacturer).

2. **Excessive fuel consumption**

This is often due to an appliance being used for a purpose for which it was not intended. The use of free-standing cookers and independent boilers for space heating are examples of this; the fire doors are left open and large quantities of fuel used with poor results.

3. Difficulties with flues

(1) *Smoky flues*

Possible causes:

- (a) The chimney may be below the roof summit or high adjacent buildings, trees, etc. (The extension of the chimney or the addition of a special cowl might help).
- (b) The flue formation may be incorrect.
- (c) The connections between appliance and flue may not be properly made.
- (d) The appliance itself may be damaged or incorrectly assembled.

(2) *Formation of tarry deposits in cast-iron or asbestos flues.*

The main causes are:

- (a) Excessive use of bituminous coal in closed appliances which should use smokeless fuel. This is a particularly serious problem in mining areas.
- (b) Burning of damp household rubbish in closed appliances.

(3) *Flue sweeping difficulties*

Difficulties in flue cleaning can arise from:

- (a) The installation of stoves where the flue brush cannot pass through the appliance and up the chimney. A soot door may have to be provided at the back in some cases.
- (b) The use of bituminous coal in grates intended for smokeless fuels where the boiler flues are of special design and easily choked.

4. Breakage of parts

(1) *Firebricks*

Possible causes:

- (a) The bricks may be incorrectly fitted or not cemented in.
- (b) They may be of poor quality.
- (c) They may have been battered to death with the poker.

(2) *Firebars (particularly in appliances with closed firebox).*

Possible causes:

- (a) The overheating of the appliance, especially when the fire has just been lit or refuelled, through the dampers being left open too long or ashpit door removed.
- (b) The piling of ash up to the level of fire bars.
- (c) Failure to remove clinker.

APPENDIX V

ALTERNATIVE RECOMMENDED SMOKELESS FUEL SIZES FOR DOMESTIC APPLIANCES

(See para. 64)

	Gas Coke	Hard Coke	Anthracite	Welsh Dry Steam Coal
Open Fires— Modern types inc. Convactor fires fitted with bar grates	No. 2 Broken (1"-2") No. 2 Open Fire Coke (1"-2")	(1"-2") (1"-1½") (¾"-1")	French Nuts (1¾"-2½")	Small Nuts (1"-1½") Large Nuts (1½"-2½")
Stoves—Open- closed types	No. 2 Broken (1"-2") No. 3 Boiler Nuts (½"-1¼")	(1"-2") (1"-1½") (¾"-1")	French Nuts (1¾"-2½") Stove Nuts (1¼"-1¾")	Small Nuts (1"-1½") Large Nuts (1½"-2½")
Small Domestic Boilers	No. 3 Boiler Nuts (½"-1¼")	(¾"-1")	Boiler Nuts (¾"-1¼") Stove Nuts (1¼"-1¾")	Small Nuts (1"-1½")
Large Domestic Boilers Small Central Heat- ing Boilers 50,000 to 150,000 B.Th.U.s.	No. 2 Broken (1"-2")	(1"-2") (1"-1½")	French Nuts (1¾"-2½") Stove Nuts (1¼"-1¾")	Small Nuts (1"-1½") Large Nuts (1½"-2½")
Cookers, Freestand- ing (a) Heat Storage (b) „ Insulated	(a) and (b) No. 3 Boiler Nuts (½"-1¼") Some (b) use No. 2 (1"-2")	(¾"-1")	(a) Peas, Nuts or Stovesse (b) Stove Nuts (1¼"-1¾") Small Nuts (¾"-1¼")	(b) only Small Nuts (1"-1½") Large Nuts (1½"-2½")
Combination Grates	No. 2 Broken (1"-2")	(1"-2")	French Nuts (1¾"-2½") Stove Nuts (1¼"-1¾")	Small Nuts (1"-1½") Large Nuts (1½"-2½")

APPENDIX VI

FLOOR POLISHES

(see paragraphs 108 and 115)

The information below is reproduced from documents prepared by the Association and firms named; the Committee is unable to say whether the lists of polishes quoted are exhaustive.

Coloured Mastic Asphalt

The National Association of Master Asphalters recommend:

- Cobra White Wax Floor Polish
- Jester Asphalt Floor Polish
- Johnson's Glo-Coat
- Poliphalt
- Ronuk Asphalt Floor Polish
- Simmond's Sposs

Accotile

The Armstrong Cork Company Limited recommend:

- Armstrong's Accogloss
- Johnson's Glo-Coat
- Nova Self-Gloss
- Simmond's Sposs

Marley Decorative Floor Tiles

The Marley Tile Company recommend:

- Johnson's Glo-Coat
- Min Cream
- Nova Self-Gloss
- O'Cedar Wax Cream
- Ronuk S.F.
- Simmond's Sposs
- Scrubbs Furniture Cream

Semastick Decorative Tiles

Messrs. Semtex Limited recommend:

- Johnson's Glo-Coat
- Nova Self-Gloss
- Simmond's Sposs

APPENDIX VII

DIGEST OF EVIDENCE RECEIVED FROM LOCAL AUTHORITIES ON THE EDUCATION OF TENANTS AND THE REPORTING AND REPAIR OF DEFECTS

Thirty-two local authorities submitted replies to a questionnaire which requested information on the following points:

- (1) What steps does the authority take, and with what success, to educate its tenants, in both permanent and temporary houses, in the proper use and care of the equipment and fittings?
- (2) What means does the authority adopt for finding out whether the equipment in its houses remains in good working order or whether repairs are needed?
- (3) What machinery does the authority employ to carry out repair and maintenance work to its permanent and temporary houses?

I. Education of Tenants

The thirty-two replies received offer little scope for generalisation. A few local authorities said that they take no special steps to educate their tenants and that it does not seem necessary to do so. Others have comparatively elaborate organisations, but there seems to be no clear connection between the type of organisation and the size of the authority.

(1) WRITTEN ADVICE

(a) *Instruction Cards.* Nearly all the authorities who sent replies said that they distribute the instruction cards provided by manufacturers—this includes a few who do practically nothing else. But only about one-third of them appear to hold a stock of cards to replace those lost or destroyed or to distribute on a change of tenancy; one authority justified this by expressing the opinion that “by the time instruction cards have disintegrated, neighbours are sufficiently capable of instructing new tenants on the proper use of such appliances”.

(b) *Booklets.* Out of 32 authorities, 12 had produced or were producing booklets and 3 were considering doing so. Two authorities reported that, when difficulties had been met in connection with solid fuel appliances, a circular had been sent to all their tenants—but it was not clear with what success. Another authority had thought it wise to produce written advice on the care of solid floors; the circular was pasted inside one of the cupboard doors in each house to which it applied.

(2) PRACTICAL ADVICE

It was generally considered that written advice is by itself not enough; one authority, for example, wrote: “Periodical issue of circulars, handbooks, etc., operates, but it is felt that the only effective method is to employ sufficient qualified staff to get the proper training over to the tenants by calling on them in their own homes”.

Practical assistance is in general given either through demonstrations or through personal visits by officers of the local authority's Housing Department, and only four authorities out of 32 reported no activity of this sort.

(a) *Demonstrations.* About half the replies received referred to demonstrations of appliances arranged by the gas and/or electricity supply authority, which in the majority of cases take place in tenants' houses; one reply mentioned a mobile gas demonstration van. The local authorities generally encourage such demonstrations or (in one or two cases) ask the supply authority to arrange for demonstrations to selected tenants who lack experience of the equipment; occasionally, however, they appeared merely to acquiesce in the arrangements made by the supply authority, and some, in areas where demonstrations do not take place, expressed the opinion that they are unnecessary; two referred to poor attendance as a justification for this view.

Demonstrations in the handling of solid fuel appliances are arranged less generally—seven replies mentioned them; sometimes they are carried out by the gas undertaking and sometimes by trained rent collectors; one authority wrote: "Ministry of Fuel and Power representatives co-operated with the Housing Department in a series of demonstrations of solid fuel ranges in new houses on the estate. The demonstrations, during the morning and afternoon of two successive days, were well attended by the wives of tenants and were much appreciated".

(b) *Visits to tenants.* From the evidence submitted, it was clear that demonstrations are not considered to be effective alone; one authority specifically remarked on the need to arrange a "follow-up" to ensure that the advice given is being carried out. It was agreed that personal contact is needed, so that individual problems may be dealt with; the need was felt to be greatest with new tenants, though some authorities try to maintain contact at all times, while others concentrate on difficult tenants.

Four of five authorities make the letting interview an occasion for advising on the use and care of equipment, and one reported that tenants are asked if they would like gas and electricity demonstrators to call on them. Once the tenants are installed, it is usual for them to be visited by an official of the local authority; sometimes they are advised on the care and maintenance of equipment by the Clerk of Works who, during the maintenance period, may also be informed of all defects and asked to examine faulty equipment to ensure it is properly installed. Several authorities, especially the larger ones, employ Welfare Officers who are concerned among other things with the proper use of domestic equipment, and a typical arrangement was reported by one local authority as follows: "Welfare Visitors of the Housing Department make early visits to tenants and if considered desirable make periodic visits thereafter". Three authorities reported that they employ full-time officials who visit all tenants in rotation to advise them and also to inspect their houses, thereby maintaining constant contact; one of the three wrote as follows: "The Council appointed a Housing Inspector, whose duties include helping tenants of both old and new houses in the matter of care and maintenance of equipment and fittings. He also makes periodical inspection for general repairs and maintenance. The Inspector's work has been very successful and is appreciated by the tenants".

Rent collectors, however, are the main channel of communication between local authorities and their tenants, and four of five authorities indicated that they bore practically the whole burden of educative work. They may be called on to demonstrate the proper use of appliances, or to instruct new tenants in the use of their equipment (one Housing Manager reports: "My practice is to allocate the rent collection of new houses to one of the trained members of my staff, for at least the first six months of occupation"). Tenants are frequently told to apply to them for advice, and in addition (as explained later) collectors have to report defects, and sometimes to exercise general supervision and ensure that equipment is in good order and is being properly used. A few authorities take special steps to instruct their rent collectors and to ensure that they understand the use and care of domestic equipment. In general, however, little was said about staff training, though one authority reported: "Welfare Officers and others are sent on special courses run by the National Amenities Council, the Ministry of Fuel and Power and other bodies. The Officers so trained form a cadre of instructors for other officers".

(3) CHARGES

Two authorities stated that under certain circumstances tenants are charged with repairs to equipment, and one found that this is an effective method of education—"Regarding the care of fittings, the best way of impressing on the tenants that fittings must be treated with care is to charge them for fittings etc., damaged negligently".

II. Inspections and Notifications of Repairs

Practice here varies less widely. It is true that one local authority wrote: "The Corporation take no action regarding the maintenance of equipment. The tenant contacts the Gas or Electricity Board when repairs are required", but this was exceptional.

(1) INSPECTIONS

Half the authorities who replied to the questionnaire arrange for regular inspections of their properties. In seven cases, the task falls to the rent collectors, who are either told to examine houses regularly or made generally responsible for the houses under their care. In a further seven cases, the work is done by a special officer (who, as previously described, sometimes also has an advisory function). In addition, three authorities mentioned that all houses are inspected on a change of tenancy to ensure that everything is in order for the incoming family; two others said that inspections are made at irregular intervals—of these, one remarked: "Houses where trouble arises are visited fairly frequently", and the other: "No regular inspection of properties has been carried out recently, but when visits are made for other matters the whole of the house is inspected and the tenants advised on various matters as to equipment and general maintenance of the house".

One authority reported that all geysers are inspected annually; another have a contract with the gas undertaking for all gas appliances to be inspected regularly and repaired as necessary, while a third were considering entering into a maintenance contract in respect of gas refrigerators.

(2) REPORTING OF REPAIRS

Every authority except one indicated that machinery exists for the reporting of repairs; in nine cases out of ten, the report is made through the rent collector, to whom tenants generally make a verbal complaint during the weekly visit. (This is often additional to a system of regular inspections).

Only three authorities supply printed cards for the notification of repairs; in each case, they are provided on request by the rent collector—it is considered that, if each tenant were given a supply, they would usually be lost or destroyed by the time they were needed.

It is often possible for tenants to complain direct to the office of the Housing Department, and several authorities with large housing estates encourage tenants to use the Area Offices on the estates.

Existing methods of notification were apparently regarded as on the whole satisfactory, and no anxiety was expressed that defects might occur and not be reported by tenants.

III. Machinery for Repairs and Maintenance

Twenty-nine of the thirty-two local authorities employ direct labour; the remaining three place contracts with local firms as required—as might be expected, all three are among the smaller authorities, two being Rural Districts. No authority said that they rely on standing maintenance contracts, though a fair number invite tenders for exterior painting and a few other jobs. In general, direct labour is not used for work on gas and electric equipment, although some of the larger authorities carry out part of this work with their own labour. One local authority reported that repairs to electrical equipment are done by a private firm, but the others rely on the local gas or electricity supply authority. Fourteen of the replies mentioned that the services of specialist firms are called in on a few occasions, and the majority of them referred specifically to solid floors—indeed, the only other item of equipment mentioned by name (once) was refrigerators.

The degree of decentralisation in repairs organisations varies with the size of the local authority. Fourteen authorities with a population over 100,000 replied to the questionnaire, and six of these indicated that they had workshops, stores and sub-depots on their larger estates. Of the remaining fifteen authorities, only one reported this type of decentralisation.

Only two authorities mentioned the use of repairs history cards.

APPENDIX VIII

LIST OF LOCAL AUTHORITIES, BODIES AND FIRMS WHICH SUBMITTED EVIDENCE OR INFORMATION TO THE SUB-COMMITTEE:

The Association of Municipal Corporations
The Urban District Councils Association
The Rural District Councils Association
The Institution of Municipal Engineers
The Sanitary Inspectors Association
The Institute of Housing
The Society of Housing Managers
The London County Council

The following County Borough Councils:

Blackpool, Bolton, Brighton, Bristol, Coventry, Ipswich, Leeds, Leicester, Liverpool, Manchester, Middlesbrough, Oxford, Rotherham, St. Helens, Stoke-on-Trent, Sunderland, Swansea, Wakefield

The following Metropolitan Borough Councils:

Islington, St. Pancras, Wandsworth

The following Borough Councils:

Aylesbury, Bilston, Bury St. Edmunds, Harrogate, Neath, Rugby, Scarborough, Shrewsbury, Southall, Torquay, Tottenham

The following Urban District Councils:

Market Harborough, St. Austell.

The following Rural District Councils:

Chesterfield, Easington, East Elloe, Isle of Wight

The Aluminium Development Association
The British Metal Window Manufacturers Association
The English Joinery Manufacturers Association
Messrs. Allied Steel Pressings Ltd.
Messrs. Frays (Engineers), Ltd.
Messrs. Rubery Owen & Co., Ltd.
The Stainless Steel Sink Co., Ltd.
The Women's Advisory Council on Solid Fuel
The British Electrical Development Association
The Electrical Association for Women
The British Refrigeration Association
The British Gas Council
The Women's Gas Council
The Coloured Pitchmastic Association
The National Association of Master Asphalters
The London Master Asphalters Association
The Jointless Flooring (Oxychloride) Association
The Timber Development Association
The Association of Flooring Contractors
Messrs. Armstrong Cork Co., Ltd.
Messrs. E. J. Elgood, Ltd.
Messrs. Marley Tile Co., Ltd.
Messrs. Semtex, Ltd.
The British Plastics Federation
The Building Boards Joint Committee

DESIGN OF DWELLINGS

*Report of the
Design of Dwellings Sub-Committee
of the Central Housing Advisory Committee
Appointed by the Minister of Health
AND
Report of a Study Group of the
Ministry of Town and Country Planning
on Site Planning and Layout
in Relation to Housing*

The committee was set up in March 1942 "to make recommendations as to the design, planning, layout, standards of construction and equipment for the people throughout the country". While it confined its consideration to the types of permanent working-class dwellings commonly erected by local authorities the standards recommended are equally applicable to all kinds of houses. The committee was helped in the aspect of its work dealing with the layout of communities by a special Study Group appointed by the Minister of Town and Country Planning.

After surveying general questions, including the need for a reconsideration of the housing aims and building practice of local authorities, the report examines in detail various types of housing—rural cottages, terraced houses, flats, maisonettes, accommodation for old people—standards of construction, and of equipment and fittings. Part II of the Report consists of technical notes which expand the general standards set out in Part I.

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Choosing Council Tenants

A Report by the Scottish Housing Advisory Committee (1950) 2s. 6d. (2s. 8d.)

The Appearance of Housing Estates

Report of a Sub-Committee (Chairman: Lord Faringdon) of the C.H.A.C. on the Means of Improving the Appearance of Local Authority Housing Estates. Oct., 1947. 6d. (7d.)

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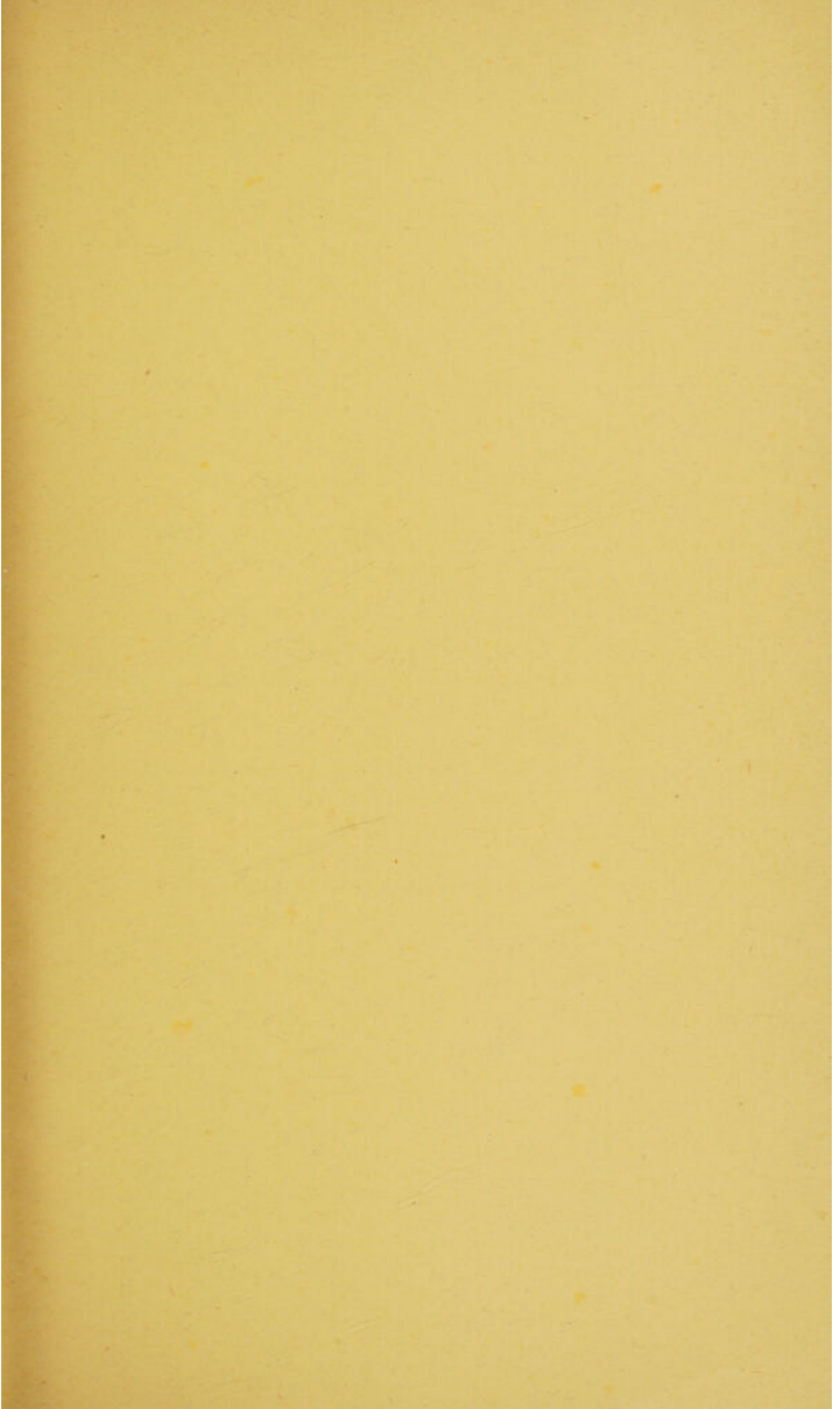
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