Healthy housing and the new standard of fitness: its formulation, interpretation and implementation

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The new standard of fitness introduced by the 1989 Housing and Local Government Act put the control of housing conditions in England and Wales on a fundamentally different footing from that which had previously prevailed. Until then, housing unfitness had been judged on the basis of broad 'common sense' notions of suitability for human habitation which had their origins in the sanitary reform concepts of the nineteenth century. Indeed, it was only in 1957 that a statutory standard was established and this remained very much in line with established tradition, drawing heavily as it did both for its wording and its interpretation on a Manual on Unfit Houses and Unhealthy Areas published by the Ministry of Health almost four decades before in 1919.(1) The statutory standard of fitness remained virtually unchanged until 1989 despite periodic attempts to update it, notably by the Denington Committee Report, Our Older Homes A Call for Action, (1966) and by the Building Research Establishment surveys of people's housing aspirations in the 1970's.(2) The simplicity and flexibility of the existing standard commended itself to many, since it permitted a large degree of subjective judgement in its interpretation and considerable variation in its application. From the mid 1980's, proposals for change were again the subject of debate, but the basic nature of the standard seemed set to endure. As late as 1988, David Ormandy and Roger Burridge began their definitive discussion of Environmental Health Standards in Housing with the assertion that

> Housing conditions in the United Kingdom are not controlled by the application of a detailed code of housing regulations specifying the minimum acceptable standard of each component part of the structure. Such an approach is adopted in the Building Regulations for the control of houses as they are built and in the Housing Codes adopted by many states in the USA, but unacceptable housing conditions in England and Wales are the subject of broad statutory norms, which are now contained in the Housing Act 1985 and the Public Health Act 1936.(3)

Ormandy and Burridge anticipated accurately some of the changes subsequently introduced into the fitness standard in the 1989 Housing and Local Government Act such as the inclusion of amenities and the exclusion of internal arrangement from the matters to be considered. They did not, however, apparently expect the change from broad statutory norms to the 'building component approach' in the interpretation of the new standard which is implied by the form and content of DOE Circular 6/90, Area Renewal, Unfitness, Slum Clearance and Enforcement Action, Annex A.

This paper will discuss the rationale for including British Standards and Building Regulations in Ministerial advice to guide local authorities in their implementation of the new fitness standard. It will seek to establish the value of the Standards and Regulations cited in Circular 6/90 and to distinguish those that appear to be most directly related to improving the healthfulness of dwellings. Those deemed to be particularly relevant will be discussed in detail in order to illustrate how they might be used to best effect during house inspections. The paper will assess the validity of incorporating British Standards and Regulations into the new fitness standard and how they can best be employed to reduce threats to health from the dwellings people occupy.

The Fitness Standard, Building Standards and Building Regulations

The new fitness standard is included in s604 of the Housing Act 1985 as amended by the Local Government and Housing Act 1989 (Schedule 9 Part V). The new s604 is based on a 'tolerable standard' as used in the Housing (Scotland) Act 1974 and sets out a 'fitness' rather than an 'unfitness' standard. A dwelling house is held to be fit unless in the opinion of the local housing authority it fails to meet one or more of the requirements set out below and, by reason of that failure, is not reasonably suitable for occupation. The requirements for a dwelling are as follows:-

a) it is structurally stable
b) it is free from serious disrepair
c) it is free from dampness prejudicial to the health of the occupants (if any)
d) it has adequate provision for lighting, heating and ventilation
e) it has an adequate piped supply of wholesome water
f) there are satisfactory facilities in the dwelling-house for the preparation and cooking of food, including a sink with a satisfactory supply of hot and cold water
g) it has a suitably located water-closet for the exclusive use of the occupants (if any)
h) it has, for the exclusive use of the occupants (if any), a suitably located fixed bath or shower and wash hand basin each of which is provided with a satisfactory supply of hot and cold water
i) it has an effective system for the draining of foul, waste and surface water

Circular 6/90 makes it clear that for a dwelling to fail one of these requirements there must be a danger to either the health and/or safety of the occupants or to the structure of the building. The Circular draws attention to specific Building Regulations, British Standards and Codes of Practice and other guides which while generally applicable to new buildings may be used to determine the nature and severity of defects in existing buildings. In order to make such judgements in practice, it is necessary for the inspecting officer firstly to correctly identify the nature of the problem; secondly, to appreciate the damage/danger already present and the likelihood and extent of any further deterioration if the fault is not remedied; and thirdly, to determine what remedial action is possible and the extent to which the defect can in fact be overcome. At all three stages, British Standards and Regulations can be useful.

Reference to the British Standards and Building Regulations would seem to offer a sensible way of ensuring objective and accurate assessments of fitness now that the standard has been designed to rest on individual elements of a dwelling and not on a combination of general matters as was the case prior to the 1985 Housing Act. Many of the Standards cited in Circular 6/90 can be used diagnostically to assist local authorities in determining whether an identified problem is likely to get worse and in identifying the most appropriate course of action where unfitness occurs. (BS 5572:1978 Code of Practice for Sanitary Pipework, BS 8301: 1985 Code of Practice for Building Drainage) Furthermore, the British Standards and Building Regulations are updated from time to time and this should also ensure the incremental up grading of the fitness standard to reflect contemporary requirements even though in the nature of things it would inevitably lag behind current standards to a greater or lesser degree. At the very least, reference to current Standards and Regulations would assist environmental health officers in keeping their inspection routines up to date.

In the light of these positive features, therefore, it is not surprising that it was a Working Party of the Institution of Environmental Health Officers that recommended the inclusion of British Standards and Regulations during consultation on the new fitness standard nor that the suggestion was taken up by the Department of Environment. However, there is evidence that the idea is not having the intended effect and that local authorities are either unaware or distinctly sceptical of their value. Indeed, the DOE itself has acknowledged that the selection of the Regulations was rather unscientific and it piloted the new fitness standard in some 16 local authorities without reference to the Regulations. Some local authorities have produced their own versions of the Guidance Notes omitting all reference to the Regulations while those that have attempted to acquire and use the ones recommended have found themselves overwhelmed by the sheer volume and in some cases the doubtful relevance of some Regulations cited in Circular 6/90. It is important to consider this trend and to try to establish whether a widespread failure to use Building Standards and Regulations will have a significant effect on the implementation of the new fitness standard, especially in terms of its impact on people's health. The next section of the paper will attempt to define where the impact on health is likely to be greatest and where the British

Standards and Regulations are most relevant.

Health and Building Regulations

Any discussion of health and housing has to recognise that while the association between poor housing and poor health has been continuously asserted in Britain over the past 150 years, the association has proved difficult to substantiate. Even as regards statistical significance, results are frequently inconclusive and actual causal links have rarely been demonstrated. (Ranson 1986) Interventions to improve housing conditions are nevertheless justified not only for their health effects but because they are an affront to accepted standards and to the dignity of the individual. For the purposes of this paper, however, it is important to seek to identify those aspects of housing which are demonstrably associated with illhealth so that particular British Standards and Building Regulations can be ranked according to their relevance and usefulness.

The evidence here has been usefully summarised in D C Mant and J A Muir Gray Building Regulation and Health (BRE 1986). Mant and Muir Gray looked at particular aspects of dwellings 'which are capable of control through building regulation' and assessed the strength of the medical evidence for their significance for health. They ranked these aspects

firstly according to their potential impact on disease and/ or well-being and

secondly according to the strength of the medical evidence of a link with illhealth

The aspects they studied were **temperature, noise, damp, sanitation, food storage and preparation, lighting, space, domestic waste, and indoor air quality.** (see Table 1)

They concluded that elements of dwellings with a plausible causal link with illhealth (Category A) were

* temperature (especially excess cold)
* noise
* dampness
* sanitation
* food preparation
* air quality

Other elements were placed in Category B - these were related to well-being rather than illhealth and though undoubtedly important, they were not capable of measurement and intervention in the same way as those where there was evidence of an actual health risk. We would argue that, on the same grounds, it is to those elements with a plausible causal health link where environmental health officers should pay most attention if they want to achieve maximum and measurable health effects in implementing the new standard of fitness.

Furthermore, within Category A, elements were graded according to their potential importance for health, and according to the strength of available evidence of an actual link between the element and illhealth, measured primarily by mortality. Morbidity was considered in so far as there was evidence that the effects were felt by wide social groups rather than 'a handful of very susceptible individuals'. Death and morbidity rates were reckoned to require intervention at levels between 1 in 100 and 1 in 1000.

On this basis, the conclusion was that there were two main factors in housing where building regulations could be employed to prevent serious health problems. These were

1a Excess cold associated with a 1 in 400 risk of morbidity plus associated risk of mortality
1b Excess dampness and mould growth where the risk of allergic symptoms in exposed individuals was in excess of 1 in 100

In addition, there were clear links between the following elements and illhealth but in these cases the numbers affected were small -

2a sanitation in the form of leaking or blocked soil pipes
2b air quality especially from carbon monoxide build up

In terms of the new fitness standard and the question of the value of British Standards and Building Regulations in its implementation with the object of enhancing health, it would seem that particular attention should be paid to the serviceability of a dwelling and especially its performance in terms of warmth and air quality, both as regards fungal spores and combustion gases. In the following section, a detailed analysis of some of the British Standards and Building Regulations specified in the new fitness standard that are relevant to these matters will be considered and their usefulness in decisions about unfitness bearing in mind the identified health effects will be assessed.

The Use of Building Regulations and the Fitness Standard

Annex A of Circular 6/90 provides guidance to local housing authorities on the application of the revised standard. The guidance is more comprehensive than the explanatory notes that accompanied the old standard (Ministry of Housing and Local Government Circular 69/67) and is specifically aimed at ensuring objectivity and consistency in determining fitness. The guidance, however, has only advisory force, and is not exclusive - local housing authorities are reminded that they must 'form their opinion in the light of all relevant circumstances' (para 1.5) For each of the statutory requirements, Annex A follows a standard format. After quoting the statutory standard, the Annex gives a background note setting out the basic health and safety issues that arise and some of the common causes and symptoms of defects. Each background note ends with a list of references intended to help local authorities to assess the nature and severity of defects, and it is here that the Building Regulations and British Standards are cited.

Health Category A: Disease issues:

		Importance	Evidence
TEMPERATURE	- excess heat	3	2
	- excess cold	1	2
NOISE		2	3
DAMPNESS	- mites/mould	2	2
SANITATION		1	1
FOOD STORAGE		3	1
AIR QUALITY	- CO	1	1
	- Radon	2	2
	- Formaldehyde	3	2
	- Tobacco smoke	2	2
	- Oxides of nitrogen	3	2
	- Organics	3	3
	- Fibres	3	2

KEY: Importance: 1. Very important. 2. Important. 3. Less important.
Evidence: 1. Definite 2. Probable 3. Possible

Health Category B: Well-being issues:

Domestic waste
Space requirements
Dampness - in itself
Air quality - odour
Noise - nuisance aspects
Lighting

Table 1: Summary assessment of health issues. Source: D.C. Mant and J.A. Muir Gray Building Regulation and Health, BRE 1986

The background note is followed in each case by a guidance note which in a separate section sets out typical defects that are found, the factors that the authority should consider in making its decision and general advice about the determination of fitness. In this section, some 'rules of thumb' are laid down as well as guidance derived from calculations given in the Building Regulations though specific attribution to the Regulations is rarely given. For the purposes of this analysis, attention will be focused on the guidance given in the Annex for the requirements relating to structural stability, heating, dampness and ventilation. For each of these, the Building Regulations and British Standards cited in Circular 6/90 and likely to prove most useful are identified, and additional ones not included but which are likely to prove valuable are discussed.

Structural Stability

Structural instability is recognised by Circular 6/90 as a major threat to health not least because of the hazards that may arise if the integrity of the building is threatened from cracked sewers, fractured damp proof courses and water and wind penetration. Under this head the Circular gives five references to regulations, standards and codes of practice. These are discussed below, and while they are all relevant, they need to be supplemented by other technical advice if the degree of damage is to be accurately and reliably assessed.

The Building Regulations, 1985, Manual and Approved Documents A1/2 Structure which is cited has a series of tables containing sectional sizes for most of the structural elements that are required in a new dwelling. It is therefore possible that the size of structural members can be checked to a certain extent with on site knowledge of span and loading. There is other useful guidance contained in the Building Regulations that can also be used in this context e.g. safe chimney proportions, heights and thickness of walls, lateral restraint and openings and recesses. There have been a large number of failures due to cavity wall failure and details of the present requirements can be found in Approved Document A1/2. The cavity wall may be examined internally by the use of a fibre optic borescope in order to determine condition.

The circular also lists four British Standards and Codes of Practice for timber, masonry and loadings which can be referred to, but if the structural problem is not of a 'simple' nature then specialist advise would become necessary. BS 5268 Pt. 3: 1985 Code of practice for the structural use of timber should be referred to when for example bracing of trussed rafters is being considered.

If the house being examined contains a series of cracks a judgement has to be made. The crack is either static or dynamic. The crack is either a representation of the full extent of the movement that will take place, or is a representation of the movement that has already taken place, but is no guide to the extent of the future movement that may occur. The crack may require further monitoring by tell-tales or better by vernier callipers. Recording other information will help to determine the severity of cracking. This will include the construction of the building e.g. a crack in a framed building may be less significant than one in traditional construction. The appearance of the crack can also help - whether it is clean or dirty and what direction the crack takes. Dirt build up on the interior face of a crack may give a guide as to its age.

In order to classify crack damage in a dwelling use could be made of BRE Digest 251 Assessment of damage in low-rise buildings, 1981. This is not mentioned in Circular 6/90 but it gives one of the most reliable methods for classifying damage and hence an indication of structural stability. BRE Digest 251 lays down a standard procedure for the survey of affected dwellings and assessing the severity of the defects.

The Digest suggests that failure can be classified into three categories:

1. Affecting the visual appearance of the property.
2. Affecting serviceability, e.g. thermal and sound insulation, weathertightness, fracturing services, jamming of doors and windows.
3. Affecting stability, i.e. where there is an unacceptable risk of failure which could cause collapse unless remedial work is undertaken.

This classification also includes a further six categories (0-5) to give an indication of the ease with which repairs may be carried out as shown in Table 2. The individual surveying the building may form some personal impression on the degree of damage suffered and it may vary between slight and moderate but the category classification should make the survey independent.

It is important that in assessing the degree of damage, account must be taken of the location in the dwelling where cracking occurs, and also the function of the building structure. The crack width is <u>one</u> of the factors in assessing the category of damage and should not be used on its own as a direct measure of it.

With category 4 and 5 it is important to note that a larger number of cracks, each not exceeding 2 or 3mm, may also indicate severe failure. The acceptability of cracks varies with the type of building e.g. a crack in a block of flats may be less likely to be repaired than a similar crack in a house. The survey of the building would need to record the size, location and direction of any cracks and a check on the levels and verticality. The frequency of the cracks should also be noted.

<u>Heating and Energy Efficiency</u>

The provision of adequate heating in dwellings is now a statutory requirement for fitness. After drawing attention to the 'Mant Report', Circular 6/90 requires fixed heating in at least one living room capable of efficiently maintaining the room at a temperature of 18°C or more when the outside

	Category of Damage	Degree of Damage	Description of Typical Damage	Approximate Crack Width mm
Visual	0	Negligible	Hairline cracks < 0.1mm classified as negligible. No effect on building use.	Up to 0.1
	1	Very slight	Fine cracks which can easily be treated during normal decoration. Isolated slight fracture in the building. Cracks rarely visible in external brickwork. No effect on building use.	Up to 1
	2	Slight	Cracks easily filled. Redecoration probably required. Recurrent cracks may be masked with a suitable lining. Cracks not necessarily visible externally. Some external pointing may be required. Doors and windows may stick slightly.	Up to 5
Serviceability	3	Moderate	The cracks require some opening up and can be patched by a bricklayer. Repointing will be required and possibly a small amount of brickwork to be replaced. Doors and windows now stick and there is a risk of service pipe fracturing. Weathertightness often impaired.	5 - 15 (Or a number of cracks up to 3)
	4	Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distorted, walls lean or bulge. N.B. Deviation of slope from the horizontal or vertical of more than 1:100 will normally be clearly visible. Deviations greater than 1: 150 are undesirable. The bearing of beams may be affected and service pipes disrupted. Stability now at risk.	15 - 25 (But also depends on number of cracks)
Stability	5	Very Severe	This requires a major job involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring, windows broken with distortion. Danger of instability	Greater than 25 (But also depends on number of cracks)

Table 2: Classification of Crack Damage. Source: Building Research Establishment. Assessment of damage in low rise buildings. BRE Digest 251, Garston, BRE, 1981.

temperature is -1^{0}C. In the other main habitable rooms the heating should be capable of maintaining a temperature of 16^{0}C or more. The fabric of a dwelling should prevent excessive heat loss and a 225 (1 brick) wall is considered adequate. The overall provision for heating when combined with adequate ventilation should be sufficient to prevent severe condensation and mould growth prejudicial to health. In our view, the guidance here is not sufficiently concerned with energy efficiency and thermal performance of dwellings. It does not go far enough in ensuring that occupants will be able to maintain the levels of warmth required without excessive cost.

The background note on the statutory requirement for heating details a series of references that can be taken into account in order to assess the scale of any deficiency. Surprisingly no reference has been made to the current Building Regulations Part L which is concerned with conservation of fuel and power. This part of the Building Regulations is supported by Approved Document L which covers:

Resistance to the passage of heat
Heating system controls
Insulation of heating services

Reference is, however, made to the Building Research Establishment's Domestic Energy Model BREDEM. Using this model it is possible to check the capacity of the heating system and whether or not condensation will occur. This model has also been further developed to give an energy rating for a dwelling NHER, National Home Energy Rating. Reference to this model would enable local housing authorities to determine whether the necessary temperature levels to maintain health are attainable at reasonable running costs.

The NHER is a measure of the energy efficiency of a dwelling in terms of energy running costs per m^2. It takes into account the design and form of construction of the house, its location, the efficiency of the heating system and its controls, the fuel used, the lighting system and appliances. The NHER sets out a scale ranging from 0-10, with 10 being the most energy efficient. Houses built to the current 1990 Building Regulations would achieve approximately a 7 while those built to 1982 Regulations approximately a 6. The UK average rating is approximately a 4 . The NHER is based on procedures developed for, and proven in the use of, the Milton Keynes Energy Cost Index. The index was initially developed in 1983/84 and first employed for assessing dwellings (for the Energy World Exhibition) in 1985/86. It has subsequently been extended to cover all dwellings constructed in Milton Keynes. The rating can also be extended with information on the size of the house and occupancy data to give an estimate of actual running costs of the dwelling. 'What if' analysis can then be performed to check what happens if certain measures are applied. The assessment can be made for new housing from drawings or existing housing by using a site survey. The scale can therefore be used to compare actual energy efficiency of houses across age and tenure divisors.
The National Home Energy Rating (NHER) was constructed in such a way as to fulfil 2 main objectives:

a) it should be directly related to the estimated running costs. Thus any feature of the dwelling that would have a significant effect on the running costs would be included.

b) the index should be directly related to the engineering concept of energy efficiency. Houses with the same level of insulation and heated by appliances with the same overall conversion efficiency should have the same rating. This means that the rating should be independent of the size of the dwelling.

If the index was related to the total energy used then it would be dominated by the size of the dwelling and this would either make it too difficult for larger houses to achieve a given standard or too easy for small houses to do so. By using a standard independent of size, the index encourages energy efficiency rather than changes to the size of the dwelling.

The obvious basis for the index is the total running costs/m^2 of floor area of the dwelling. However, this does not quite satisfy the requirements set out in b. There can be large variations in running costs per m^2 of floor area for a series of dwellings insulated to the same standards and fitted with the same heating systems and other appliances. This could be due to a difference in built form and the percentage of glazing. However the main problem is a steep rise in costs/m^2 for smaller dwellings due to the contribution of fixed costs in the total e.g. water heating, electrical appliances, lighting system etc; in smaller dwellings the fixed costs are apportioned over fewer square metres.

These variations were analysed in detail and it was found that the appropriate index to use was one in which the total costs had £150 subtracted before the division by the dwelling floor area. It would have been possible to avoid including fixed costs but this would not satisfy one of the main principles that it should relate to costs. Some of the fixed costs are however, avoidable - an instantaneous water heater does not suffer the same standing loss (which is one component in the £150) as a hot water cylinder. Within the NHER calculation the fixed cost component is calculated as the gas and electricity standing charges plus the cost of 120 therms of gas and 800 kwh of electricity. This ensures the subtraction term keeps track of the fixed cost elements. The reason for using a fuel price index is to counter the effect of general inflation. Then for example if all the fuels increased by the same percentage the indexing function would ensure that the NHER of all the houses would remain the same.

It was important that the scale reflected the need for an energy conservation measure which, whether applied to a 1950's house or a 1970's house, would have the same relative effect on the rating ie regardless of the initial level of insulation. A non linear scale was devised and the resulting curve analysed statistically. It would seem practicable that this model could be used to determine the energy rating of the dwelling (rather than stating as Circular 6/90 does that 'solid 9" walls would normally be adequate ' for the external fabric of a dwelling). This could then be stated as a minimum performance standard which dwellings would have to achieve. Reference to individual Building Regulations and British Standards cannot ensure that any particular dwelling will maintain the temperature levels necessary to avoid ill health. The NHER calculation on the other hand can give a meaningful result and would be a much better guide to local housing authorities in determining fitness in relation to the adequacy of heating.

The list of references cited in the background note to the statutory requirements on heating also includes the Building Regulations J1/2/3 Heat Producing Appliances: these are concerned with the safe installation of these services in buildings. In order that it may function safely a heat producing appliance needs an adequate supply of combustion air and it must be capable of discharging the products of combustion to outside air. This must be achieved without allowing noxious fumes to enter the building and causing damage by heat or fire to the fabric of the building. This reference could therefore be used to check ventilation provision for heat producing appliances, safety of construction in respect of fire, satisfactory lining and the general sizing of flues. In this Approved Document J there has also been an attempt at simplification from the previous Parts L and M of the 1976 Regulations which tended to be confusing.

There are also three Codes of Practice referred to in Circular 6/90 relating to the installation of pumped central heating, gas fires, convectors, backboilers and solid fuel boilers. These form no more than an interesting background for heating systems in the way that they should be fixed into a dwelling. BS 8211 Energy efficiency in housing details energy efficient refurbishment of housing which can be used to appraise energy conservation measures. In addition, however, reference should be made to a BRE publication that can also prove useful when dealing with thermal insulation - Thermal Insulation: avoiding risks, 1989. In terms of heating, the major threat to health arises from failures in efficiency and affordability. As currently drafted, the guidance addresses these issues only obliquely. The use of the NHER calculation is strongly recommended, and failure of a dwelling to reach a minimum energy rating should be a decisive factor in determining unfitness. The safety of appliances will also be important in particular cases, and here the Regulations and Standards cited are satisfactory.

Dampness

The main causes of dampness affecting dwellings includes rising, penetrating, condensation, leakage and spillage. Excessive dampness will affect the integrity and thermal performance of the structure, as well as the presence of mould spores, all of which have potentially serious consequences for the health of the inhabitants. The Building Regulations and British Standards cited under this head in circular 6/90 seem over elaborate and in some respects fail to fulfil the function necessary for inspecting unfit houses. Guidance needs to be simpler and more appropriate. For example, BRE Digest 245 Rising damp in walls: diagnosis and treatment shows the various ways that dpc's fail but this is not cited. This Digest also gives a useful description of appropriate tests.

The diagnosis of rising damp in walls has traditionally been by the use of an electrical moisture meter which usually has two prongs to be inserted into the material. As water is a high conductor of electricity the more water the higher the current passing and the lower the resistance measured. The results give a percentage moisture content in timber and comparative readings in other materials. A moisture content greater than 20% would give the conditions necessary for the propagation of *Serpula lacrymans* (dry rot). The main advantage of this type of equipment is that it is quick and easy to use with good accuracy in timber and hardly any damage is left in decorations. It can, however, also give false readings in walls due to foil backed plasterboard, the presence of salts or high levels of carbon used in some materials. This equipment cannot be used to measure hygroscopicity.

An alternative method to test for rising damp in walls is the use of a carbide moisture meter where a small sample of material is placed in the meter together with calcium carbide. The water in the materials reacts with the calcium carbide and a gas is given off, the pressure from which is transferred into a moisture content. It is also possible to do a hygroscopicity test with this equipment. The main advantages therefore of this type of equipment are that it is accurate for moisture content and hygroscopicity but the main disadvantage is that it is bulky, time consuming and is not a non destructive test. It is generally considered that walls with a moisture content of 5% at their base will not have a problem of severe rising damp. Where rising damp does exist it is most likely due to the absence, or to external and internal bridging, of an existing damp proof course. Rising dampness is generally identified by a tide mark which will eventually rise to a height of around 1m.

Penetrating dampness can obviously occur in solid masonry walls. In the more modern cavity wall the outer leaf of brickwork will not usually resist the passage of driving rain. Penetrating dampness can occur in these walls by passage over dirty or faulty wall ties, through cracks in brickwork or mortar joints and around cavity trays if incorrectly fixed or lacking weepholes.

The Building Regulations, 1985, Manual and Approved Document C4-Resistance to weather and ground moisture is cited in the fitness standard. The Approved Document gives specific examples of construction that is 'expected' in order to resist rising and penetrating dampness. The alternative approach for new buildings is given by reference to CP 102:1973 Code of practice for the protection of buildings against water from the ground. This is being revised at present and will be issued in the future as BS 8102. BS 5628: pt 3 1985 is the design part of the masonry code and may be used as the alternative approach to deal with rain penetration of external walls. BS 8200:1985 is the code of practice for the design of non-loadbearing external walls. Here, as in other statutory requirements, the overlap between the Building Regulations and the Codes of Practice can be confusing to EHO's especially where the guidance is contradictory, as it is in this case.

Condensation can also be a main source of dampness in a dwelling. Surface condensation can occur when there is a source of water vapour and a surface which is at or below dewpoint temperature on which it can condense. The shape and positions of damp or mould patches can show that condensation is the cause of dampness. This may be that the damp or mould occurs in an exposed corner of a room and is crescent shaped, the dampness outlines a cold bridge in the construction, or run off shows below a window. In order to reduce the risk of condensation the relative humidity should be kept between 40% and 70%. This RH and surface temperatures can be measured in a room by an electronic meter in order to check if condensation is occurring.

Interstitial condensation occurs within the structure of the fabric and is caused by the temperature of the material being too low to support the vapour in the air. The full method for calculating this is shown in BRE Digest 110 Condensation, 1972 which is not cited in Circular 6/90. Another publication which is very useful is a BRE Report Thermal Insulation: avoiding risks 1989. This explains the technical risks which may be associated with meeting the Building Regulations requirements for thermal insulation. It is designed to be used in conjunction with the Building Regulations but it is also very useful in showing potential defects and solutions in existing properties. Most useful of all is probably a very recent report from the BRE - Tackling Condensation: A guide to the causes of, and remedies for, surface condensation and mould in traditional housing (1991). The relevant sections of BS 5250 1989 Code of Practice for the control of condensation in buildings discusses different constructions e.g. timber joist flat roof, pitched roofs and the position of vapour barriers and checks. One important document that is not mentioned directly in the references is Building Regulations, 1985 Approved Documents F1: Ventilation and F2: Condensation which gives the current standard with respect to ventilation of rooms and roofs. This, however, is indirectly referred to under section 5.6 of the Guidance note. The likelihood of condensation occurring can also be checked with computer programs based on BREDEM. Using these any marginal performance of the heating system can also be determined.

Dampness and condensation problems in housing are a significant threat to health. This is an area where guidance to EHO's is particularly important, but the Building Regulations and British Standards cited in Circular 6/90 are unlikely to give unequivocal guidance. They do not aid the distinction between different kinds of dampness, nor the failures that can lead to their occurrence.

Ventilation

The need for adequate provision for ventilation has been recognised by building control legislation for a long time. Without adequate ventilation, even if the amount of heating is adequate, moisture leading to mould growth and pollutants from inside the dwelling may accumulate to such an extent that they become a hazard to the health of the users of the building. A supply of oxygen is obviously required for normal breathing activities but this is not usually the limiting factor when considering the amount of ventilation required. Ventilation can be by natural or mechanical means and if a habitable room, kitchen, bathroom or w.c is naturally ventilated the guidance note in the fitness standard calls for the total opening size of the ventilation opening to be not less than 1/20th of the floor area. In living rooms and kitchens some part of this opening should also normally be at least 1.75m above floor level. The minimum standard for mechanical ventilation is 1 air change per hour in habitable rooms and kitchens and 3 air changes per hour in bathrooms and w.c.s. This requirement is similar to that given by the Building Regulations 1985 (1990 ed) F1: Means of Ventilation but falls somewhat below this standard. In particular the Building Regulations have recognised the need to provide both background ventilation and mechanical extract ventilation in kitchens and bathrooms. Habitable rooms built to the current Building Regulations require ventilation opening of at least 1/20th of the floor area of the room, with some part of it above 1.75m above floor level and background ventilation having a total area of not less than 4000mm^2 e.g. a trickle ventilator. Kitchens in the Building Regulations require mechanical extract and background ventilation. The extract vent should be capable of rapid extract ventilation not less than 60 litres per second (l/s) or if in a cooker hood 30l/s and the background ventilation will be satisfied if there is either a controllable vent not less than 4000mm^2 or by mechanical means operating at 1 air change per hour. In bathrooms the Building Regulations will be satisfied by the provision of mechanical ventilation extracting at 15l/s which is capable of operating intermittently. In terms of room ventilation, the revised version of the Building Regulations will provide sound and useful advice on inspection.

BS 5925: 1980 Code of Practice for design of buildings: ventilation principles and designing for natural ventilation is given in the Building Regulations as an alternative approach for natural ventilation and this is also referenced in the fitness standard. The relevant clauses are 11 - 15 which describes the mathematical calculations to predict ventilation rates. BS 5720: 1979 Code of Practice for mechanical ventilation is similarly referenced and the relevant clauses are 2.3.2.1 which discusses the fresh air supply and 3.1.1.1 which describes mechanical extract and natural supply. Equally, it should be remembered that ventilation is also required for the efficient burning of fuel in heating appliances and reference is made to BS 5440: Code of Practice for flues and air supply for gas appliances, Part 1:1978 Flues, Part 2: 1976 Air Supply.

In order to limit the possibility of condensation occurring in roofs reference can be made to Building Regulation F2 and BS 5250 which are referred to in the guidance of Circular 6/90 and in our earlier discussion of dampness. Circular 6/90 goes on to cite Codes of Practice which are unduly complex and where much simpler guidance would be more appropriate.

Conclusions

While the Department of Environment explicitly states that the primary concern of local housing authorities in determining unfitness should lie 'in safeguarding the health and safety of any occupants,' the guidance given in Circular 6/90 fails to ensure that this will happen in practice. The main reason for this conclusion is that no priority or weighting is given to the individual requirements of the fitness standard despite the findings of the Mant survey that they can be ranked according to their seriousness for health and the reliability of the evidence. Instead, local authorities are advised that 'A dwelling house is equally likely to fail the standard if lacking a fixed bath or shower as if in serious disrepair' (para 1.10). The central importance for health of warmth and lack of dampness in houses is therefore not recognised.

Furthermore, the potential of the Building Regulations for improving decision making on the fitness of existing dwellings is not fully realised. The guidance given in Circular 6/90 is sometimes partial, sometimes overcomplicated and sometimes undermined by general guidance notes that cite out of date, rule of thumb and simplistic indicators such as those related to heating appliances. Circular 6/90 seems to steer an uneasy course between highly technical guides derived from Building Regulations and the broad common sense approach of the old standard. Unless the technical advice is understandable and well presented, local authorities will tend to ignore it and may well revert to old principles and practices. This paper has sought to point a way forward by concentrating on those aspects of older housing that are most significant for health and offering considered guidance on the most relevant and useful Building Regulations and BRE Digests. More work of this kind is needed if the potential for using Building Regulations to guide and update local authority decision making in relation to unfitness in housing is to be realised.

Footnotes

1. Ministry of Health, Manual on Unfit Houses and Unhealthy Areas, Volume 1. Policy and Practice Chapter V. London, HMSO, 1919.

2. Britten, J. The ten necessities were ranked as follows: 1. electric light; 2. hot water supply; 3. bathroom; 4. refuse disposal; 5. internal lavatory; 6. living room heating; 7. power points; 8. freedom from damp; 9. ventilation; 10. daylight. CP 1977/26.

3. Ormandy, D. and Burridge, R. Environmental Health Standards in Housing, London, Sweet and Maxwell, 1988 p xxxiii.

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2. **Department of the Environment and The Welsh Office.** Conservation of fuel and power. Approved Document L1 (1990 Edition), The Building Regulations 1985. London, HMSO, 1989.

3. **Department of the Environment and The Welsh Office.** Heat producing appliances. Approved Document J1/2/3 (1990 Edition), The Building Regulations 1985. London, HMSO, 1989.

4. **Department of the Environment and The Welsh Office.** Site preparation and moisture exclusion. Approved Document C4, The Building Regulations 1985. London, HMSO, 1985.

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8. **British Standards Institution.** Energy efficiency in housing, Part 1: 1988 Code of practice for energy efficient refurbishment of housing. British Standard BS 8211 , 1988.

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14. **British Standards Institution.** Code of practice for mechanical ventilation and air conditioning of buildings. British Standard BS 5720 1979, London, BSI, 1979.

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