



Ministry of Housing and Local Government
Whitehall, London S.W.1

15th November, 1968.

Sir,

**Flats constructed with pre-cast concrete panels.
Appraisal and strengthening of existing high blocks:
Design of new blocks.**

Appraisal and Strengthening

1. I am directed by the Minister of Housing and Local Government to refer to his statement in the House of Commons on 6th November on the report of the Tribunal which held a public inquiry into the collapse of part of a block of flats known as Ronan Point. A copy of the statement was sent to local authorities on the same day, with a copy of the Inquiry report.
2. The Tribunal recommended that all blocks over six storeys in height should be appraised by a structural engineer who should consider whether they were susceptible to progressive collapse; whether they were designed to resist adequately the maximum wind loadings which they may experience; and their behaviour in the event of fire. The Minister has accepted this recommendation, and now impresses most strongly on local authorities who have such buildings and who have not already started appraisals, the need to put the work in hand urgently.
3. The blocks which must be appraised are all blocks over six storeys in height built of large pre-cast concrete panels to form load-bearing walls or floors, or both.
4. Where local authorities do not have adequate structural engineering staff resources, they should at once engage consultant engineers to carry out the appraisals. It is important that there should be the fullest consultation between the authority's advisers and those of the builder responsible for the construction.

5. Technical advice about the standards to be applied in appraising buildings is contained in the Appendix to this Circular. This advice has been prepared following consultation with representatives of the local authorities and the builders. The Minister understands that the Institution of Structural Engineers will be advising their members along the same lines.

6. The Minister is immediately setting up a panel of professional advisers, which will include two members nominated by the President of the Institution of Structural Engineers, to advise generally on the application of the standards. They will also give advice where difficulties arise in deciding the measures to be taken to strengthen particular buildings.

7. The National Building Agency will be continuing the special arrangements which they made in August to give day-to-day advice to local authorities who may need it.

8. Proposals for strengthening buildings following appraisal should be submitted to the Regional Office, or where there is no Regional Office, to the Headquarters branch with which the local authority usually deals on housing matters. Cases where the local authorities find they need the advice of the professional panel should be dealt with in the same way. Decisions will be given promptly.

9. As an immediate precautionary measure it is the firm view of the Minister supported by the local authority associations that any gas supply must be cut off (if this has not already been done) in blocks to be appraised, unless after the most careful consideration the local authority is fully satisfied that they are not susceptible to progressive collapse. This must be done as soon as alternative methods of fuelling have been provided. Owing to the fire risk of liquid fuels, for all practical purposes this means electricity. This action should be regarded as temporary in the first instance, pending the decision about the need for, and method of, strengthening the building following appraisal.

New Buildings

10. The standards set out in the Appendix must, pending the revision of Building Regulations and Codes of Practice, be applied also to new design.

Other Measures

11. Local authorities should consider now the arrangements which they need to make if it should prove necessary to provide alternative accommodation for tenants while remedial work is being carried out.
12. In order to avoid needless anxiety, all tenants living in high blocks should be told whether the building they are living in has been or is to be appraised. In all cases, they should be told what the local authority are doing, and why.
13. Tenants should be warned of the risks which may result from keeping inflammable or potentially explosive substances or objects in their dwellings, and tenancy regulations for controlling the storage and use of such materials should be strictly enforced.
14. If there are in an authority's area any privately-owned buildings of the kind referred to in paragraph 3, local authorities should bring to the notice of the owner the advice in this circular.

I am, Sir, your obedient Servant,

R. BRAIN, *Deputy Secretary*

Clerk of the Authority
Local Authorities - England

STANDARDS TO AVOID PROGRESSIVE COLLAPSE LARGE-PANEL CONSTRUCTION

General

1. There are two basic methods of avoiding progressive collapse, namely:

Method A. By providing alternative paths of support to carry the load, assuming the removal of a critical section of the load-bearing walls.

Method B. By providing a form of construction of such stiffness and continuity so as to ensure the stability of the building against forces liable to damage the load supporting members.

2. For these purposes, the forces should be assumed as being equivalent to a standard static pressure of 5 p.s.i. (0.0345 N/mm²). This standard should be used in designing new buildings. Where residual risks are lessened by the control of the incidence of an explosion in magnitude or frequency, a corresponding reduction may be made in the pressure.

3. Measures must also be taken to provide safeguards against the overall and local effects of wind, differential expansion from fire or other thermal changes and incidental damage from vehicles.

Method A

4. Where reliance is placed solely on providing alternative lines of support, the following details represent the basic standard:

In load-bearing walls the critical section is represented by the distance between substantial walls at right angles to it or between a substantial wall and a return end, or the length of one precast wall panel whichever is the greater.

Steel connections should be provided in at least the following positions:

- (i) between floor or roof slab and the supporting external load-bearing wall panels,
- (ii) between adjacent floor or roof slabs over internal load-bearing walls, and
- (iii) between adjacent external load-bearing wall panels in at least the horizontal joints at the top of the panels.

Design stresses of up to $1\frac{1}{4}$ times the normal working values in the British Standards and British Standard Codes of Practice, which are referred to in the Building Regulations, may be used for these conditions.

5. The wall in the storey above the one assumed to be removed must be able to support itself and all normal loads by arching, beam or cantilever action, by the provision of suitable reinforcement. Vertical support to the wall in the storey above may be provided by the remaining length of wall, or by suitable transverse walls or by columns.
6. A tensile resistance of at least 3000 lbf/ft. width (44 kN/m width) should be provided continuously across the length and breadth of floors and roofs. Steel connectors should be provided between adjacent floor or roof slabs over internal supports and between the slabs and the supporting external walls, spaced at no greater distance than 2 ft. (600 mm). In the design of these connectors stresses appropriate to mild steel should be used. Connectors transverse to the span in one way slabs may be concentrated in the joints along the line of the supporting walls, and may be in high tensile or mild steel. In suitable cases this steel may provide both (a) horizontal continuity between adjacent wall panels and (b) the necessary reinforcement to develop beam or cantilever action (paragraph 2.)
7. The tensile resistance may be developed between panels (a) by welding together projecting reinforcement or (b) by closely overlapping projecting loop bars locked together by longitudinal dowel reinforcement. Lapped bars in in situ concrete jointing should not in general be used as a means of achieving continuity in tension or compression. However, lapping may be used for connections transverse to the span (paragraph 3) and for beam and cantilever action in walls (paragraph 2). Where continuity is developed by bond in in situ concrete the width of joint should be sufficient to ensure adequate compaction of the concrete and be not less than 3 in. (75 mm).
- - - - -

Wind Loads on Buildings

8. The Ronan Point Inquiry Report drew attention to the fact that the design rules for the wind loads on buildings, given in Code of Practice CP3, Chapter V (1952), are out-dated by the results of modern research. It was recommended in the report that all blocks of flats of large panel construction over 6-storeys in height should be assessed not only in respect of susceptibility to progressive collapse but also in relation to their resistance to wind (and fire). Further, all tall buildings over 100 ft. in height, of whatever construction, should be checked in relation to their resistance to wind loading.
9. The Minister has asked the Minister of Technology to arrange for a revision of CP3, Chapter V, "Loading", and it seems likely that a "Draft for Comment" may be available early in 1969. This revision may be expected to differ in some important respects from the current recommendations. An important change, shown by research to lead to a more realistic assessment of wind loads (particularly localised loads on cladding), may be the adoption of gust speeds as the basis of design instead of the 1-minute-mean wind speeds which have been the basis previously.
10. The probable wind speeds are likely to be assessed on a statistical basis in accordance with the current advice of the Meteorological Office, and wind loads determined on a probability of their being exceeded during the lifetime of the building.

11. It is recommended in the Report that, until the revised code becomes available, designers should take note of the results of research by reference to a paper by C. Scruton and C. W. Newberry "On the estimation of wind loads for building and structural design" in the Proceedings of the Institution of Civil Engineers for June 1963, and the Meteorological Office Climatological Memorandum No. 50 "Extreme wind speeds over the United Kingdom for periods ending 1963" by H. C. Shellard, B.Sc.

12. These papers do not include the latest research on wind loadings, and were not written to be of easy immediate practical use to designers. But in order to give more up-to-date and helpful guidance (and also having in mind the possibility that the revised code may not be finalised and published for several months after its issue as a draft for comment), the Building Research Station has prepared two B.R.S. Digests. The first of these, published on November 1st, gives information on the characteristics of wind and a simple explanation of wind action on a building. The second, to be published on January 1st 1969, will give advice on how to calculate wind loads and will include data on wind pressures relevant to some common shapes of structure. A document incorporating both Digests is now available to local authorities on application to the Building Research Station.