Factory Premises.

ORDER, DATED THE 30TH DAY OF SEPTEMBER, 1939, MADE BY THE MINISTRY OF HOME AFFAIRS UNDER SECTION 11 OF THE CIVIL DEFENCE ACT (NORTHERN IRELAND), 1939.

1939. No. 140.

WHEREAS a Code for the guidance of occupiers and owners of factories, commercial buildings, and other persons concerned in providing air-raid shelter, was issued before the commencement of the Civil Defence Act (Northern Ireland), 1939, and published by His Majesty's Stationery Office under the title " Air-raid Shelters for Persons Working in Factories and Commercial Buildings."

AND WHEREAS it is expedient that the requirements prescribed in the said code should have effect in relation to shelter provided before the date of this Order :

NOW, THEREFORE, the Ministry of Home Affairs for Northern Ireland, in pursuance of the powers vested in it by section eleven of the Civil Defence Act (Northern Ireland), 1939, hereby by this Order approves the said Code for the purposes of the said Act :

AND WHEREAS it is expedient that the said Code should be revised :

NOW, THEREFORE, the Ministry of Home Affairs, in pursuance of the powers vested in it by the said section, hereby further orders and directs as follows :—

1.—That the said Code be revised by such revocation and variation of and addition to its provisions as are necessary to bring the said Code into conformity with the Revised Code set out in the Schedule hereto.

2.—The Interpretation Act, 1889, as applied to Northern Ireland by the Interpretation Act, 1921, shall apply for the purpose of the interpretation of this Order as it applies for the purpose of the interpretation of an Act of Parliament.

3.—This Order may be cited as " The Civil Defence (Approval and Revision of Code) Order (Northern Ireland), 1939."

Sealed with the Official Seal of the Ministry of Home Affairs for Northern Ireland this 30th day of September, One thousand nine hundred and thirty-nine, in the presence of

(L.S.)

A. Robinson,
Secretary

SCHEDULE.

REVISED CODE (SECTION 11 OF THE CIVIL DEFENCE ACT (N.I.), 1939) FOR THE GUIDANCE OF OCCUPIERS AND OWNERS OF FACTORY PREMISES, FACTORIES AND COMMERCIAL BUILDINGS, AND OTHER PERSONS CONCERNED.

PART I.

REQUIREMENTS WITH WHICH SHELTER MUST COMPLY.

1. *Definitions.*—For the purposes of this Code the following expressions shall have the meanings hereby respectively assigned to them:—

"Air Raid Shelter" means protection otherwise than by war-like means or by any article of apparel, from hostile attack from the air, and "an air raid shelter" means any premises, structure or excavation used or intended to be used to provide air raid shelter.

"Trench shelter" means an air raid shelter in the form of a covered trench or tunnel which, where above or partly above ground level, is covered with earth to a thickness of at least 12 inches at every part.

"Accommodation" relates to the number of persons to be accommodated in an air raid shelter or in any section or compartment thereof.

"Prescribed stresses" shall mean the maximum permissible working stresses specified,

(*a*) in respect of reinforced concrete, in the "Recommendations for a Code of Practice for the use of Reinforced Concrete in Buildings" of the Reinforced Concrete Structures Committee of the Building Research Board,

(*b*) in respect of steel, in British Standard Specification No. 449-1937 ("The Use of Structural Steelwork in Buildings"),

(*c*) in respect of pressures on load-bearing concrete and masonry (brick and stone), in "Notes on the Use of Materials and Construction in Connection with Steel Structures" appended to B.S.S. 449-1937,

(*d*) in respect of timber, in "By-laws for the Use of Timber" made by the London County Council on the 30th November, 1937.

"Sound brickwork" means brickwork consisting of sound, well-fired clay bricks, sand-lime bricks complying with the requirements of British Standard Specification 187-1934 for building bricks Class A, or cement concrete bricks having a crushing strength of not less than 1,500 lb. per sq. in. when tested in accordance with the methods laid down in the second schedule of Ministry of Health, Model Byelaws, Series IV, Buildings 1937, properly bonded and jointed in mortar which is properly set and hardened.

"Brickwork in cement mortar" means brickwork consisting of bricks as described above for sound brickwork, properly bonded and jointed in cement mortar not weaker than one volume of cement to three volumes of sand, or in cement lime mortar not weaker than two volumes of cement, to one of lime to nine of sand.

"Sound stonework" means coursed natural or cast stone masonry in sound condition.

"Ordinary concrete" means concrete mixed in the proportion of not less than 112 lb. of cement complying with the requirements of British Standard Specification No. 12-1931 or of British Standard Specification No. 146-1932 to 12 cubic feet of suitable coarse and fine aggregate measured as combined.

" Structural concrete " means concrete of a quality permissible under the recommended Code of Practice for the use of Reinforced Concrete in Buildings of the Reinforced Concrete Structures Committee of the Building Research Board, consisting of not less than 112 lb. of cement, complying with the requirements of British Standard Specification No. 12-1931 or of British Standard Specification No. 146-1932, to 2½ cubic feet of suitable fine aggregate and 5 cubic feet of suitable coarse aggregate.

"Reinforced concrete" means structural concrete as described above, reinforced in accordance with the Code of Practice, such reinforcement amounting in each cubic foot of concrete to not less than 2 lb. of steel total (exclusive of laps and hooks), suitably distributed in the concrete, of which total at least 0.7 lb. is distribution steel at right angles to the main steel.

2. *Lateral and overhead protection.*—An air raid shelter must be of such construction as to give

(*a*) Lateral protection by means of not less than :—

(i) 1½ in. thickness of mild steel plate or plates,
(ii) 12 in. thickness of reinforced concrete,
(iii) 13½ in. thickness of sound brickwork or sound stonework,
(iv) 15 in. thickness of ordinary or structural concrete, unreinforced,
(v) 2 ft. thickness of ballast or broken stone,
(vi) 2 ft. 6 in. thickness of earth or sand, or
(vii) a corresponding aggregate thickness of a proportionate combination of such materials ; and

(*b*) Overhead protection, subject to the requirements of paragraph 3 for protection from falling debris, by means of not less than :—

(i) ¼ in. thickness of mild steel plate,
(ii) 4 in. thickness of structural concrete reinforced if and as necessary or otherwise suitably strengthened or effectively supported,
(iii) 6 in. thickness of ordinary concrete, reinforced if and as necessary or otherwise suitably strengthened or effectively supported,
(iv) concrete in hollow type construction conforming with the requirements set out in the Appendix to Part I of this code,
(v) 8½ in. thickness of arching in sound brickwork or sound stonework,
(vi) 1 ft. 6 in. thickness of ballast, broken stone or earth,
(vii) a corresponding aggregate thickness of a proportionate combination of such materials, or
(viii) a substantial building overhead consisting of a roof and not less than two floors (including that covering the shelter) where such structure is enclosed with walls of brick, stone or concrete.

Provided that, subject to the approval of the Ministry, other materials, of such thickness as it may prescribe, may be used to give protection.

In the case of an external air raid shelter wholly or partly above ground, the material affording overhead protection must be such as to be a dead weight of not less than 60 lb. per sq. ft. of horizontal area or must be so fastened down as to resist an upward force of 300 lb. per sq. ft. of horizontal internal surface.

The lateral protection must extend throughout the height of the air raid shelter and similarly the overhead protection must extend over the whole area of the air raid shelter.

Provided that in the case of an air raid shelter wholly above ground where the aggregate area of door and window openings in any one wall of a shelter compartment does not exceed one-quarter the surface area of such wall and the total width of such openings does not exceed one-third the total length of such wall, it shall suffice if the protection in such openings extend to a height of 6 feet above the floor of the air raid shelter, subject to movable protection being provided to the space above, such protection consisting of timber shutters not less than 2 inches thick or mild steel shutters not less than ⅛ inch thick or other approved material or it shall

suffice if the openings are protected by a screen wall or walls giving the lateral protection required under section (2) above, situated not more than 12 feet from the face of the wall of the shelter and extending beyond such openings for a distance sufficient to prevent the entrance of splinters. This requirement will be deemed to be complied with where the extent of such screen beyond the opening is not less than its distance from the opening.

3. *Protection from falling debris.*—Adequate provision must be made to afford protection from falling loads due to the collapse of any structure over an air raid shelter or within a distance from such air raid shelter equal to one-half the height of such structure, by the provision of a floor or by the strengthening of the existing floor where necessary or by a suitable roof or other construction based on an estimated static loading as representing the effect of impact, to the satisfaction of the Ministry.

Provided that where such falling loads would not include heavy machinery, materials and goods of abnormal weight nor such constructions as chimney-shafts, towers, heavy colonnades, pediments or cornices, but would comprise only the loads of a normal structure and superimposed loading of ordinary goods or light plant and equipment, it shall suffice if, for purposes of calculation, the falling loads be deemed to be static loads in accordance with the following requirements :—

(*a*) For buildings wherein the loads are carried on load-bearing brickwork or stonework :—

Number of Storeys at a Higher Level than the Top of the Shelter.	Minimum Static Load (in addition to the Floor Load) to be assumed to represent the effect of the Debris. lb. per square foot of Floor Area.
1 or 2	200
3 or 4	300
over 4	400

(*b*) For buildings wherein the whole of the loads are carried on steel or reinforced concrete framing, the effect of the debris load may be assumed to be a static load of 200 lb. per sq. ft. of floor area (in addition to the floor load) irrespective of the number of storeys at a higher level than the top of the shelter.

For the purpose of this clause, the expression "floor load" means the combined dead and superimposed floor load calculated in accordance with the Ministry of Health Model Byelaws, Series IV—Buildings, 1939.

4. *Stability.*—All new constructions, extensions, additions and alterations in connection with air raid shelter must be so executed that all loading occasioned thereby shall be safely sustained and transmitted to the ground without exceeding the limitations of the prescribed stresses except as herein provided for in respect of linings to trench shelters.

Except where executed in hard rock or other self-retaining materials, trench shelters must be provided with linings consisting of concrete, brickwork, steel (suitably protected from corrosion), or any other suitable material. Such linings must be designed and constructed in accordance with normal engineering principles in such manner as safely to retain the earth without exceeding the limitations of the prescribed stresses in the materials employed, or (in the case of any other material) such limitation of stresses as may be approved by the Ministry.

Provided that where such trench shelter is at a distance from any building or structure of not less than one-half the height of such building or structure, the stresses in the materials employed in a lining of reinforced concrete or steel may exceed the prescribed stresses by not more than 25 per cent.

5. *Gas-proofing.*—Every air raid shelter providing accommodation for more than twelve persons must be so constructed as to permit of its being rendered gas-proof without structural alteration should the need arise.

6. *Space required in shelters.*—The accommodation of an air raid shelter must, subject to the ultimate limitations specified in paragraph 7, be determined in accordance with the following rules, that is to say :—

(1) (*a*) in the case of a shelter accommodating not more than twelve persons, or (*b*) in the case of a trench shelter having openings at both ends into the open air, it must have for every person accommodated a floor area of not less than 3¾ square feet.

(2) In the case of a shelter other than as described in rule (1) above, not intended to be permanently sealed against gas, and ventilated by the entrance and exit or otherwise efficiently ventilated by natural means, or by mechanical means at a rate of not less than 150 cu. ft. of air per hour, per person, it must have, for every person accommodated,

not less than 6 square feet of floor area,
not less than 50 cubic feet capacity,
not less than 25 square feet of surface area of walls, floor and ceiling or roof, excluding from this calculation the surface area of partition walls less than 8½ in. thick.

Provided that the floor area, capacity or internal surface area of any such shelter may be of less extent subject to the following conditions :—

(*a*) That the shelter is ventilated mechanically at a substantially higher rate than the normal (exceeding 450 cubic feet of air per hour for every person in the shelter) and provided that satisfactory arrangements are made for emergency operation of the ventilating plant, when it will be sufficient if there is a floor area of 3¾ sq. ft. for every person in the shelter, or

(*b*) that the shelter being entirely below ground level has abnormally massive construction with dividing walls not less than three feet thick and heavy slabs or vaulting over not less than three feet in thickness at any part inclusive of any solid filling, subject to authorisation of the Ministry.

(3) In the case of an unventilated shelter accommodating more than twelve persons intended to be permanently sealed against gas during the whole period of occupation, it must have, for every person accommodated,

not less than 6 square feet of floor area,
not less than 50 cubic feet capacity,
not less than 75 square feet of surface area of walls, floor and ceiling or roof, excluding from this calculation the surface area of partition walls less than 8½ in. thick.

For the purpose of computing the floor area, when there are seats beneath which the floor does not extend (as in a shelter in the form of a horizontal tube), the area of such seats may be deemed to be floor area.

Every trench shelter shall have a horizontal floor and a clear head-room, measured therefrom, of not less than 6 feet extending throughout the length of such shelter or of as much of its length as is intended to provide accommodation.

7. *Limits of accommodation.*—In order to minimise the number of casualties likely to result from a direct hit every shelter should, wherever the circumstances of the case make it possible, be divided into sections or compartments for the accommodation of not more than 50 persons.

Every trench shelter intended to accommodate more than 50 persons must be divided into sections. In the case of a continuous trench shelter such divisions must be effected by a change in direction through an angle of 80 to 100 degrees and extending in the new direction a distance of not less than 5 feet (measured clear of the width of the trench shelter) subject to such distance being not less than 25 feet in the case of a second change of direction involving a return parallel to and opposite the first section.