

A METHOD OF BUILDING TO MINIMISE THE EMISSION OF GASES FROM CONCRETE SURFACES

This invention relates to a method of building to minimise the emission of gases from
5 concrete surfaces and in particular to a method of building that incorporates a
unique combination of surface treatments to minimise or exclude discharge or
emission of gas from concrete surfaces.

BACKGROUND TO THE INVENTION

10 It is well known that concrete surfaces can be a significant source of gas discharge or
emission for a long period following construction of a building. Ammonia is a typical
gas that is emitted from concrete.

This emission of gas is extremely undesirable in certain building applications
15 including clean rooms that are used in the manufacture of electronic components. For
such clean rooms, there is not only a need to minimise the physical dust
contamination, there is also a need to exclude those gases that would be deleterious
to the manufacture of high quality electronic components.

20 One way to reduce gas emission would be to not use concrete and instead use steel
framing as the major building component of both the floor column and upper floor
or ceiling portions of the building. However, some building regulations require a fire
proof coating to be applied to structural steel which itself has significant problems
with undesirable gas emissions.

25 Therefore, it is an aim of this invention to overcome the above-mentioned problems
and provide a method of building which minimises the emission of gases from
concrete surfaces.

SUMMARY OF THE INVENTION

In one aspect, the invention is a method of minimising the emission of gases from concrete surfaces in a building comprising:

- 5 coating the upper surface of a floor slab with a first gas impermeable layer,
- positioning a layer of gas impermeable material on the underside of an upper slab, and
- forming columns of the building between said floor slab and upper slab within a sheath of gas impermeable material.

10 The upper floor slab may comprise a floor surface on one side and the underside of the same slab may comprise the ceiling surface or the surface to which ceiling members are affixed. Accordingly, the upper surface comprises one side of the slab and the lower surface comprises the other side of a slab located below.

15 However, the two surfaces may be formed on independently separate slabs that are spaced from one another.

 Column members may be positioned in a spaced manner across and between each adjacent slab. The columns are moulded in situ by placing reinforcement bars and
20 formwork on an already completed floor. Once the columns are constructed, then the next slab can be formed above using formwork. The formwork is generally supported on scaffolding that can be removed once the concrete has set. This construction is continued until the required number of floors are formed.

25 The upper surface of the floor slab has a gas impermeable layer which preferably comprises a chemically curable resin such as an epoxy resin or some other form of setting resin which can be painted or trowelled onto the surface. Although this is preferred, the coating may also comprise some other form of gas impermeable sheet material.

The underside of the other slab also has a layer of gas impermeable material preferably comprising a roll formed sheet material which may also comprise lost formwork for casting the concrete slab. Typically, the roll formed sheet metal may have longitudinal corrugations spaced on the underside which are designed and
5 suitable for supporting hanging ceilings.

Preferably, the concrete column between adjacent slabs is moulded in situ with a gas impermeable layer. Such gas impermeable material may comprise a metal or plastic tube having a suitable cross section shape.

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In forming the column, reinforcement bars are secured to the lower slab. A tube of gas impermeable material is then placed around the reinforcement bars and metal formwork or bracing is in turn positioned around this tube. The concrete is poured into the mould and when set, the steel formwork or bracing is removed leaving
15 behind the tubular gas impermeable material.

In this method, gas impermeable layers can be applied to all concrete surfaces to thereby prevent or minimise emission of undesirable gases in a building.

20 BRIEF DESCRIPTION OF THE DRAWINGS

In order for the invention to be fully understood, a preferred embodiment will now be described, but it will be realised that the invention is not limited or restricted to the precise combination of features described in this embodiment.

25 This embodiment is illustrated in the accompanying drawings in which:

Figure 1 shows a cross sectional view of two floor slabs and a column located between the floor slabs with surface coatings, and

Figure 2 shows diagrammatically the construction of a column according to the invention.

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DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Figure 1 shows each of the elements for construction of multiple storey buildings using concrete slab and column construction. As seen in Figure 1, concrete slabs 10 are supported by columns 11. The structure is produced in the manner described
5 above.

As shown in this embodiment, the upper surface of the floor slab has a coating of epoxy resin 12 to form the gas impermeable layer. Preferably, this epoxy resin may comprise Epoall-1C-S which is manufactured by a Japanese company Dai Nihon
10 Toryo. This epoxy resin minimises the emission of gases from the concrete to a level which is acceptable for clean rooms involved in the manufacture of electronic components.

As seen in Figure 2, the column 11 is constructed using a combination of a tubular
15 sleeve 13 (which in this embodiment preferably comprises a metal tube) and reinforcement bars 16. Further formwork comprising semicircular halves 14 are positioned around the tubular sleeve 13 and clamped together. Concrete can then be poured into the tubular sleeve 13 and once set, the halves 14 can be removed.

20 The upper slab 10 is preferably formed using lost formwork comprising roll formed metal sheeting 15. Suitable sheeting may comprise Bondek™ sheeting manufactured by Bluescope Steel. This roll formed material has longitudinal ribs that are designed for locating structural support members for supporting a suspended ceiling.

25 The roll formed metal sheeting 15 may be used as lost formwork to form the underside of the upper slab 10. The roll formed metal sheeting 15 is supported in place using scaffolding and platforms prior to the pouring of concrete. The roll formed metal sheeting 15 therefore comprises a gas impermeable layer which is left behind on the under surface of the concrete slab 10.

Joint sealing may be applied between the tubular sleeve 13 and the epoxy resin layer 12. Likewise, joint sealing may be applied between the tubular sleeve 13 and the roll formed metal sheeting 15. The joint sealing ensures that there is complete sealing between all three components 12, 13 and 15 so as to provide a gas proof layer on all
5 concrete surfaces between concrete slabs 10.

As will be seen from the above description, the invention provides a building method which is much quicker and cheaper by comparison to conventional steel frame structures which are used for clean room construction. The construction
10 method uses the advantage of cheap and quickly produced moulded concrete sections while at the same time providing a means for preventing the escape of undesirable or out-gases from the concrete surfaces.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of minimising the emission of gases from concrete surfaces in a building comprising;

5 coating the upper surface of a floor slab with a first gas impermeable layer,
 positioning a layer of gas impermeable material on the underside of an upper slab, and

 forming columns of the building between said floor slab and upper slab within a sheath of gas impermeable material.

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2. A method according to claim 1 wherein said coating comprises a chemically curable resin.

3. A method according to claim 2 wherein said coating comprises an epoxy resin.

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4. A method according to claim 1 wherein said coating comprises a sheet material.

5. A method according to claim 1 wherein said layer on the underside comprises a chemically curable resin.

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6. A method according to claim 1 wherein said layer on the underside comprises a sheet material.

7. A method according to claim 6 wherein said sheet material comprises metal sheet material.

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8. A method according to claim 1 wherein said layer on the underside comprises a roll formed sheet material.

9. A method according to claim 8 wherein said coating comprises a chemically curable resin.

10. A method according to claim 1 wherein said sheet comprises a plastic tube.

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11. A method according to claim 1 wherein said sheet comprises a metal tube.

12. A method according to either claim 10 or 11 wherein said tube has a circular cross-section.

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13. A method according to either claim 10 or 11 wherein said tube has a rectilinear cross-section.

14. A method of construction of a building according to any one of the preceding claims.

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15. A building constructed in accordance with any one of the preceding claims.

16. A method of building substantially as described and illustrated herein.

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