CLAIMS

1. A connection system for connecting a first module and a structure, comprising one or more connectors wherein each connector comprises:
a first part and a second part,
the first part and the second part being separate from one another,
the first part being adapted for fixed attachment to the first module at a first location,
the second part being adapted for fixed attachment to the structure at a second location,
the second part having an anchoring portion for use in securely attaching the second part to the structure in the second location and a guiding portion extending from the anchoring portion,
the guiding portion for guiding movement of a fastener for joining the first module and the structure to one another,
the first location and the second location being arranged such that, when the first module and the structure are located in a preselected relative positions with respect to each other, the first part of the connection system and the second part of the connection system are in alignment with each other enabling the fastener to be guided by the guiding portion into cooperative engagement with the first part to interconnect the first module and the structure to one another and maintain the preselected relative positions of the first module and structure with respect to one another.

2. A connection system for connecting a first module to a structure, comprising one or more connectors wherein each connector comprises:
a first part, a second part, and a third part,
the first part and the second part being separate to one another,
the first part being adapted for fixed attachment to the first module at a first location,
the first part having a fixed engaging element oriented in a first direction,
the second part being adapted for fixed attachment to the structure at a second location to extend outwardly therefrom,
the third part provided on the first part or the second part,
the third part being a locking element movable between an extended position and a retracted position,
the extended position corresponding to a locked condition of the connection system,
the first location and the second location being arranged such that, when the first module and the structure are located in the preselected relative positions with respect to each other, the first part and the second part are in alignment with each other enabling the fixed engaging element to cooperatively engage with the second part to interconnect the first module and the structure to one another to maintain the preselected relative positions of the first module and the structure with respect to one another, and
the movable locking element extends between the first part and the second part to lock the first module with respect to the structure to inhibit relative movement of the first module and the structure.

3. A connection system for connecting a first module to a structure, comprising one or more connectors wherein each connector comprises:
a first part, a second part, and a projection,
the first part and the second part being separate to one another,
the first part being adapted for fixed attachment to the first module at a first location,
the first part having a fixed engaging element oriented in a first direction,
the second part being adapted for fixed attachment to the structure at a second location extending outwardly therefrom,
the projection element extending in a second direction,

the first direction and the second direction being different directions from one another,

the first location and the second location being arranged such that, when the first module and the structure are located in preselected relative positions with respect to each other, the first part and the second part of the connection system are in alignment with each other enabling the fixed engaging element of the first part to cooperatively engage with the second part to interconnect the first module and the structure to one another to maintain the preselected relative positions thereof, and

the projecting element is located intermediate the first part and second part to maintain the relative positions of the first module and the structure with respect to one another.

4. A connection system according to any preceding claim wherein ~~the connection system includes a connector having a~~the first part and ~~a~~ the second part are ~~which~~ cooperatively engageable with each other, wherein the ~~first~~ second part is a male part having one or more projections, typically in the form of protrusions, plugs, projections, bosses, extensions, pins, pegs, rods, spigots, or similar, and the ~~second~~ first part is a female part, typically in the form of a receiver, receptacle, or similar having one or more voids, cavities, spaces, gaps, chambers, grooves, channels, sockets, or the like.

5. A connection system according to claim 4 wherein, when the first module and the structure ~~two adjacent modules~~ are located in a correct position with respect to each other, the first and second parts of the connectors are in alignment allowing the projection of the first part of the connector to be received in the receiver of the second part of the connector to interconnect the adjacent modules.

6. A connection system according to any preceding claim wherein the ~~first~~ second part or male part is a tube, typically a main tube, more typically an open ended main tube, and more typically a double open ended main tube.

7. A connection system according to claim 6 wherein the main tube is provided with an auxiliary projection, typically located or secured to one side wall of the main tube, wherein the auxiliary projection is solid or hollow or tubular, such as a square section or rectangular section tube extending in a direction which is different to the lengthwise extending axis of the main tube.

8. A connection system according to claim 7 wherein a direction of extension of the auxiliary projection is substantially perpendicular to a central longitudinal axis of the main tube, wherein the central longitudinal axis is substantially vertical whereas the axis of the auxillary projection is substantially horizontal.

9. A connection system according to ~~any preceding~~ claim 2 or 3 wherein the connector includes a second part which includes an anchoring portion and a guiding portion, wherein the guiding portion extends outwardly from the anchoring portion.

10. A connection system according to claim 4 or 5 wherein the spigot is tubular or hollow, preferably of a square or rectangular profile or cross section and having an open end, more typically two open ends.

11. A connection system according to claim 10 wherein the spigot has a proximal portion in the form of a body and a distal portion in the form of an end portion wherein the end portion is an upper portion extending substantially vertically upwards from a column of a pod.

12. A connection system according to claim 11 wherein the proximal portion of the spigot is of constant size or cross section whereas the distal portion is of reduced size compared to the size of the body of the spigot, the distal portion being tapered, bevelled, conical, including reduced diameter or reduced width for facilitating entry of the spigot into the receiver portion of another pod, such as a floor beam of another pod, typically an upper pod in which the receiver portion extends outwardly from the floor beam.

13. A connection system according to claim 12 wherein the spigot further includes a lifting bracket or the like extending outwardly through an opening at an open end of the tapered distal portion of the spigot for facilitating lifting of a pod by using columns of the pod.

14. A connection system according to claim 13 wherein the lifting bracket is provided with an aperture for receiving therethrough a part of a lifting device such as for example a hook, cable, chain, or similar.

15. A connection system according to any one of claims 4, 5 or 6 to 14 when dependent on claim 4, the system further including a movable locking member which is movable between a retracted position and an extended position arranged such that, when the movable locking member is in the extended position, the spigot is locked in position with respect to the receiver of the second part of the connector of the connecting system.

16. A connection system according to claim 15 wherein the movable locking member is biased to be in the extended position at rest so as to extend outwardly from a side wall of a tubular body of the spigot wherein the bias is provided by a spring bias or a resilient bias for maintaining the movable locking member in the extended position when at rest.

17. A connection system according to claims 15 or 16 wherein the movable locking member is pushed inwards to the retracted position when the upper pod is being lowered onto an upwardly extending spigot of a lower pod, by the female part of the connection system being secured to the upper pod, typically to the floor beam of the upper pod, and more typically extending outwardly from the floor beam of the upper pod such that, when an aperture or slot or opening of the second part of the connection system, being the female part is aligned with the position of the movable locking member, the movable locking member is free to move under the effect of a biasing element to the extended position to lock the upper and lower pods to one another.

18. A connection system according to any one of claims 15 to 17 wherein the movable locking member is a spring loaded or spring biased latch or latch bolt or similar and is provided with a sloping, tapering or bevelled surface facilitating sliding movement of the latch from contact with the female part, typically in the form of a socket, collar or the rim of an open tube.

19. A connection system according to any one of claims 15 to 18wherein the connector is provided with two movable locking members, typically located in opposed relationship to one another so that one locking member is located on one side wall and the other locking member is located on the opposite side wall of the spigot.

20. A connection system according to any preceding claim 19, when dependent on claim 18, wherein two locking members are arranged so that the movable latch of each respective locking member moves in the same plane of movement as one another but in opposite directions from the respective retracted positions to the respective extended positions.

21. A connection system according to any one of claims 4, 5 or 6 to 20 when dependent on claim 4, wherein the connection system further comprises a joiner for joining adjacent modules to one another.

22. A connection system according to claim 21 wherein the joiner is a connecting plate, a shear interconnecting plate, a collar plate, a melding plate, a mending plate or joining plate in the form of a generally rectilinear shape, typically a square or rectangular shape, and more typically having a thickness in the range of 10mm to about 50mm, more typically in the range of 15mm to about 40mm, more typically in the range 18mm to 30mm, most typically about 20mm.

23. A connection system according to claim 22 wherein the connecting plate further comprises two apertures or holes, typically having a square or rectangular shape corresponding to the rectangular or square shape of the spigot, wherein a distance between the holes or apertures corresponds to a distance between the spigots being received in the holes or apertures and wherein the holes or apertures are located in aligned spaced apart collinear relationship or in off-set off-centred relationship to one another.

24. A connection system according to any one of claims 12, 13 or 14, or any one of claims 15 to 23 when dependent on claim 12, wherein dimensions of outer walls of the body of the spigot are less than the dimensions of inner walls of a corresponding column such that the spigot can be received within the corresponding column to anchor the spigot securely within the column and such that the outer walls of the body are in intimate contact with the inner walls of the column, wherein an upper end of spigot is received within a lower end of a column of the upper pod and a lower end of spigot is securely attached to a column of the lower pod.

25. A connection system according to any one of claims 12, 13 or 14, or any one of claims 15 to 24 when dependent on claim 12, wherein the spigot comprises a tapered distal or upper portion of a generally square shape optionally having a flat top surface to which is attached, or alternatively an aperture through which extends, a lifting element, typically in the form of a lifting bracket having an eyelet through the end thereof for receiving part of a lifting device, such as for example, a hook, cable, chain, rope or similar fitting for facilitating hoisting of the pod into place during construction of the building structure.

26. A connection system according to claim 25 in which the lifting bracket is permanently fixed in place, or wherein the lifting bracket is removable after the pod has been positioned within the building structure.

27. A connection system according to any one of claims 12, 13 or 14, or any one of claims 15 to 26 when dependent on claim 12, wherein the spigot is attached to the column in a manufacturing facility or at a building site either prior to or after installation of a lower individual building module.

28. A connection system according to any one of claims 15 to 20, or any one of claims 21 to 27 when dependent on claim 15, wherein the locking member further comprises a biasing means, wherein the biasing means is a spring having two generally vertically oriented leaves or arms arranged in a bifurcate configuration, with the upper distal ends of leaves or arms diverging away from a lower conjoined or common end.

29. A connection system according to any one of claims 15 to 20, or any one of claims 21 to 28 when dependent on claim 15, wherein the locking member further comprises an auxiliary spring extending directly between opposed latch bolts.

30. A connection system according to claim 18, or any one of claims 19 to 29 when dependent on claim 18, wherein the latch bolt includes a sloping or tapering or bevelled or inclined surface to assist in moving the latch from the extended position into the retracted position during installation of an upper pod on top of a lower pod, as the upper pod is lowered onto the spigot of the lower pod.

31. A connection system according to claim 24, or any one of claims 25 to 30 when dependent on claim 24, wherein a vertical framework member or column of the upper pod is provided with a receiver comprising a rim or collar located or formed at an open end of the column and one or more apertures in side walls of the column, wherein if two apertures are provided the apertures are located in the side walls of a lower part of the column of the upper pod on opposite sides of a square section column at or towards the lower end in use of the column, such that lowering of the upper pod enables the rim of the receiver of the upper pod to engage with a spigot of the column of the lower pod to guide the position and movement of the upper pod onto the lower pod, whereupon contact of the rim of the receiver on the tapered surface of the latch bolt attached to the lower pod moves the latch bolt inwardly to provide sufficient clearance for the column of the upper pod to slide over the spigot of the lower pod until the aperture of the sidewall of the column is aligned with the latch bolt, whereupon the latch bolt is released to move outwardly to be received fully through the aligned aperture of the column of the upper pod to lock the upper pod in position on the lower pod, with the distal portion of the spigot securely located in the lower end of column of the upper pod, thereby interconnecting the two pods together for inhibiting relative lateral and/or horizontal and/or vertical movement of one pod with respect to the other pod.

32. A connection system according to claim 18, or any one of claims 19 to 31 when dependent on claim 18, wherein the spigot extending upwardly from the upper end in use is encased in a covering or lagging material, such as for example, concrete, AAC, or other cementitious material, wherein external dimensions of the body portion of the spigot is maintained less than an internal bore of the column of the upper pod so that the spigot is of a size that can be received internally within the internal bore of the column during installation of the upper pod over the lower pod.

33. A connection system according to any preceding claim further comprising a dampening component for reducing transmission of vibration through the connector and/or module when the vibration is caused by noise, sound, impact, drumming or similar wherein the dampening component is a layer, a pad, a tile, a square or similar, typically made from a resilient material, to dampen the amplitude and/or frequency of vibration being transmitted from one module to another module, typically by and/or through the connector interconnecting the modules.

34. A connection system having a connector for interconnecting a first building module and a second building module comprising a structure, wherein the connector comprises:

a projection extending from an upper part of the first building module,

the projection including a body portion and an inclined upper portion located distally of the body portion,

a locking arrangement located in or on the body portion for locking engagement with the structure of the second building module,

the locking arrangement including a locking member or element movable between a locking position and a clearance position,

the locking arrangement being biased so that the locking member or element is in the locking position at rest,

the structure of the second building module including a receiver for receiving the projection of the first building module therein or thereon,

wherein

in response to movement of the structure of the second building module towards the first building module, the locking member or element moves from the locking position to the clearance position to facilitate further movement of the second building module with respect to the first building module, and in response to a further movement of the second building module the locking member or element moves from the clearance position to the locking position to interconnect the first building module to the second building module.

35. A building module for use in constructing a building structure from a multitude of building modules, the building module comprising the connection system of any of the preceding claims, the building module further comprising:

a framework for generally defining the dimensions and configuration of the building module,

characterised in that

the framework has a first set of framework members arranged for determining the dimension of the building module in one direction by extending from one part of the building module to another part of the building module, and

a second set of framework members located intermediate the locations of the first set of framework members, the second set of framework members being auxiliary framework members forming associated framework members,

at least one cover member,

the cover member associated with at least one of the associated framework members of the second set of auxiliary framework members, and

the connection system of any of the preceding claims is used to connect the building module,

the at least one cover member being made from a generally lightweight building material,

wherein

the cover member is connected or connectable to the associated framework member, and

the connecting system includes a first connector and a second connector that are complementary to one another for use in connecting the building module to another building module to form a building structure by cooperatively engaging with a main framework member.

36. A building structure that comprises the connection system of any of claims 1 to 34, the building structure including a multitude of individual building modules, the building module comprising

a framework for generally defining the dimensions and/or configuration of the building module,

characterised in that

the framework has a first set of framework members arranged for determining the dimension of the building module in one direction by extending from one part of the building module to another part of the building module, and

a second set of framework members located intermediate the locations of the first set of framework members,

at least one of the second set of framework members forming an associated framework member,

at least one cover member,

the cover member associated with the at least one of the associated framework members of the second set of framework members, and

a connector being part of the connection system of any of claims 1 to 34,

the at least one cover member being made from a generally lightweight building material,

wherein

the cover member is connected or connectable to the associated framework member of the second set of framework members, and

the connector is adapted for use for interconnecting the building modules to form the building structure.

37. A building module or a building structure according to claim 35 or 36 wherein the framework comprises individual metal framework members or sections interconnected to one another to define a shape of the module.

38. A building module or a building structure according to any one of claims 35 to 37 wherein the framework members or sections comprise a main, primary or first set of framework members in which the framework members or sections include 'C'-shaped studs, 'H'-shaped sections, or the like.

39. A building module or a building structure according to any one of claims 35 to 38 wherein the framework members or sections extend as a single piece having a length corresponding to the distance from the floor level of the module to the ceiling level of the module, wherein there are two conjoined framework members, three conjoined framework members, four conjoined framework members or similar in accordance with the level at which the module is to be located within the high rise building structure.

40. A building module or a building structure according to any one of claims 35 to 39 in which the height of an individual module, and accordingly, the length of individual framework members in the form of vertical columns or other vertical supports forming the module, are in the range from about 2 m to about 4m, typically from about 2.4m to about 3.6m, more typically from about 2.7m to about 3.3m, wherein the length of the vertical columns of the module correspond to a height of a room or area defined within the module formed by the vertical columns.

41. A building module or a building structure according to any one of claims 35 to 40 wherein the framework members or sections are provided with supports for supporting lightweight infill sheets or panels, wherein the support is a bracket, cleat, tongue, toothed edge, flange, ledge, notch, rebate, groove, channel, or the like.

42. A building module or a building structure according to any one of claims 35 to 41 further comprising a second set of framework members or sections.

43. A building module or a building structure according to any one of claims 35 to 42 wherein the main framework members or the first set of framework members or sections, typically in the form of columns, more typically tubes or tubular columns, and more typically square section tubes, are located at the corners of the building module, in which case the framework members are main members or vertical members or sections or are located intermediate the corners of the module, such as for example, at locations part way along the length of a wall or walls, typically at or about the midpoint of the walls of the module, in order to provide increased strength and rigidity to the module.

44. A building module or a building structure according to any one of claims 35 to 43 wherein the main framework members are in the form of horizontal beams, joists, bearers, or similar extending between adjacent columns.

45. A building module or a building structure according to any one of claims 35 to 44 wherein the second set of framework members or sections are secondary or associated framework members in the form of studs, purlins, girts or similar.

46. A building module or a building structure according to claim 45 wherein the secondary, associated, auxiliary or the second set of framework members are arranged in spaced apart substantially parallel relationship to one another, such as for example, all of the auxiliary framework members extend between the ceiling and floor of the module as part of a sidewall or end wall of the module.

47. A building module or a building structure according to claim 46 wherein, some of the framework members extend in one direction and others of the framework members extend in other directions, typically in a perpendicular direction to one another, such as for example, in a grid or grid-like array.

48. A building module or a building structure according to any one of claims 35 to 47 wherein some of the framework members extend substantially vertically whilst others extend substantially horizontally.

49. A building module or a building structure according to any one of claims 35 to 48 wherein some of the framework members are full length members extending from floor to ceiling or from wall to wall or from end to end, whilst others of the framework members are part length members extending to a lesser distance than the full length members.

50. A building module or a building structure according to claim 42, or any one of claims 43 to 49 when dependent on claim 42, wherein the second set of framework members, auxiliary framework members or associated framework members form an internal framework comprising a multitude of framework members interconnected to one another to generally define dimensions, shape and style of the individual building module, the associated framework members or secondary framework members being structural whereas other members are not structural or load bearing and are configured for attaching fittings, fixtures and other components thereto.

51. A building module or a building structure according to claim 42, or any one of claims 43 to 50 when dependent on claim 42, wherein there is an internal framework comprising columns and beams of the first set of framework members and the studs of the second set of framework members, and additionally a further set of framework members being an external or cosmetic framework in which the internal framework provides structural integrity to the building module and allows lightweight panels to be connected to the module, and the external framework is primarily decorative and/or cosmetic and/or provided to complete finishing of the individual building module, such as for example, to provide for the provision of doors, windows or similar in the walls of the building module and/or to provide architectural features or fittings and fixtures in accordance with the design of the building structure, typically for supporting fittings, fixtures or other componentry of services such as MEP services.

52. A building module or a building structure according to any one of claims 35 to 51 wherein a cover or infill of the individual building module is a single skin of lightweight material or is a double skin or multiple layered skin comprising two or more different layers of materials in accordance with requirements of the building structure, such as for example, materials for providing thermal conductivity, noise control, fire propagation resistance or the like.

53. A building module or a building structure according to any one of claims 35 to 52 wherein the module comprises different layers, in which the material of the different layers is the same, or is different having different properties, particularly different thermal transmission properties, insulation properties, noise transmission properties, fire retardation properties or similar.

54. A building module or a building structure according to any one of claims 35 to 53 wherein, when there is more than a single layer, the additional layer, being an external layer is a facade, covering, capping or similar located on an external face of the wall, or the additional layer is provided with a surface treatment or decorative treatment to enhance durability and/or aesthetic appeal of the building module, such as for example, an outer skin being a facade provided with a decorative or ornamental pattern or similar.

55. A building module or a building structure according to claim 51, or any one of claims 52 to 54 when dependent on claim 51, wherein the lightweight panel includes unreinforced materials or reinforced materials, such as autoclaved aerated concrete (AAC) including both non-reinforced and reinforced material.

56. A building module or a building structure according to claim 55 in which the AAC material is in the form of reinforced sheets, panels, blocks, slabs or similar in which the reinforcement has linear forms, rectilinear forms, cages, sheets, mesh or curved forms.

57. A building module or a building structure according to claim 55 or 56 wherein a thickness of the panel is in the range from about 35 mm to about 300 mm, more typically in the range from about 45 mm to about 150 mm, even more typically in the range from about nominally 50 mm to about nominally 100 mm, and most typically nominally about 50 mm or nominally about 75 mm or nominally about 100mm.

58. A building module or a building structure according to any one of claims 55 to 58 wherein a width of the AAC panel is in the range of up to about 900 mm, typically in the range from about 200 mm to about 700 mm, more typically in the range from about 300 mm to about 600 mm, and even more typically having a nominal width of about 300 mm, of about 450 mm, of about 600 mm.

59. A building module or a building structure according to any one of claims 55 to 58 wherein a length of the AAC panel is in a range from about 1.8 meter to about 4.2 meter or more, even up to about 6 meter, more typically, the length is in the range from about 2.2 meter to about 3.6 meter, even more typically in the range from about 2.4 meter to about 3.2 meter, such as in the range from about 2.7 meter to about 3.2 meter with typical lengths being nominally 2.2 meter, 2.4 meter, 2.7 meter, 3.0 meter, 3.2 meter, 3.3 meter, 3.6 meter.

60. A building module or a building structure according to any one of claims 35 to 59 wherein, when individual building modules are located in their respective final positions within the building structure in side-by-side relationship with an adjacent building module, there is a gap between the respective outer surfaces of the walls of the respective modules, wherein the gap between two adjacent modules is in the range of from about 2 mm to about 100 mm, typically in the range from about 5 mm to about 50 mm, more typically in the range from about 7 mm to about 30 mm, most typically in the range from about 8 mm to 20 mm, such as about 10 mm.

61. A building module or a building structure according to any one of claims 35 to 60 wherein a distance from an inner surface of an interior wall of one module to an inner surface of an interior wall of an adjacent module at the same level within the building structure is in a range from about 250 mm to about 600 mm, typically in the range from 300 mm to 500 mm, more typically in the range of from about 300 mm to 400 mm, even more typically nominally about 360 mm.