

AIR CONDITIONING ADAPTER FOR SHELTERS AND SAFE ROOMS

FIELD OF THE INVENTION

The present invention relates to an air conditioning adapter for use with wall
5 sleeves of shelters and safe rooms.

BACKGROUND OF THE INVENTION

It is known in life saving protection shelters and safe rooms, to use an air filtration
system in the ventilation path. For proper operation of the filtration system, it is required
that the protected space is air tight sealed and slightly over-pressured by forcing
10 ventilation through the filtration system. The over-pressure prevents entrance of potentially
contaminated air through a possible worn-out sealing of the protected space. Typically
there are provided an air intake wall sleeve fitted to an exterior wall of the building, and an
air exhaust wall sleeve fitted to a preferably opposite interior wall of the safe room. The
air intake wall sleeve is airflow coupled to the filtration system. And the air exhaust wall
15 sleeve is provided with an over-pressure relief valve. In modern installations the filtration
system is directly mounted to the air intake wall sleeve.

For general purpose use of the protection shelter or safe room during normal times,
it is desired that the space is air conditioned. However, installation of an air conditioning
system requires a wall opening to facilitate installation. Such a wall opening should enable
20 insertion of a flexible air duct of the kind typically used in central air conditioning
systems, or several pipes, cables and conduits such as used in cases of split air
conditioning systems. Such wall openings if incorrectly made violates defense regulations
and deteriorates the air tightness of the protected space.

For that purpose it is required and widely accepted to install an additional wall
25 sleeve having a flange on the internal side of the wall and a removable cover-plate fitted to
the flange with bolts and nuts. In cases where a central air conditioning system is installed,
a flexible air duct is directly attached to the external side of the wall sleeve and the cover-
plate is removed. The cover-plate should be kept in the protected space and may be refitted
in case of warfare hazard.

In cases where a split air conditioning system is installed, it is known to use dedicated fittings that enable a seal-able passage of the several pipes, cables and conduits through the wall sleeve. Such fitting is disclosed in Israeli patent 218946 to Skurnik, describing a resilient block of material with through holes for conduit passage and end
5 plates to press the resilient block of material and shrink the holes about the conduits. A draw back of the described solution is the need to install a dedicated wall sleeve during construction of the building.

Other known solutions for installation of a split air conditioning system include usage of several cable glands which are fitted to the removable cover-plate and tightened
10 over the several conduits, cables and pipes after installation.

In reality it was found that in most cases where a central air conditioning system was installed and the cover-plate removed, it was lost shortly after installation and was not available in an event of emergency.

Additionally it was found that in cases where a standard wall sleeve was fitted
15 during construction of the building and a split air conditioning system eventually installed, the cover-plate was removed and the pipes, cables and conduits were freely passed through the wall sleeve without any sealing. In such case even if the cover-plate is still available it is not possible to fit it back in an emergency due to the through passing conduits. Consequently, there is a need to improve the task of air conditioning shelters and safe
20 rooms.

SUMMARY OF THE INVENTION

Accordingly it is a principal object of the present invention to provide a comprehensive solution for both types of air conditioning installations that is persistently available. Such that in an event of an emergency, preparation elements are readily accessible and easy to implement. An air conditioning adapter for shelters and safe rooms made according to the invention renders one or more of the advantages below:

1. Multiple air conditioning installation options in a single device.
2. Simplicity in operation and error proof safety.
3. Accessibility of safety components being permanently secured to the device.
- 10 4. Readiness for installation in existing standard wall sleeves.

According to an embodiment, the air conditioning adapter comprises:

- a. A cover-plate having at least one aperture, the cover-plate being permanently secured to a flange of the wall sleeve at the inner side of the wall, the at least one aperture being smaller in area than a cross sectional area of the wall sleeve.
- 15 b. An airtight door fitted to the cover-plate on the side mating the flange, the airtight door covers and seals the at least one aperture when closed, and exposes the at least one aperture when open. And,
- c. a lock configured to affix the airtight door in the closed position.

Wherein the airtight door is selectively opened inwards the wall sleeve during normal times, permitting free airflow of a central air conditioning system, while preserving neat appearance of the protected space. The airtight door is closed and locked in an event of emergency, thereby providing blast protection and air tightness.

According to an aspect, the air conditioning adapter further includes a plurality of holes made to the cover-plate adjacent the at least one aperture. The holes are sized to accept cable glands for penetration of conduits, cables and pipes of a split air conditioning system, while maintaining blast protection and air tightness.

According to another aspect, the air conditioning adapter further comprises a separator sheet attached and extending into the wall sleeve. The separator sheet divides a volume of the wall sleeve into a first volume and a second volume, the first volume being

larger than the second volume. The separator sheet is partially cut-out or perforated and is perpendicularly attached to the cover-plate.

According to yet another aspect, the airtight door is attached to the cover plate by a hinge positioned adjacent the separator sheet, such that when the airtight door is open it is resting about the separator sheet and substantially blocking the cut-out or perforations of the separator sheet, thereby airflow separating the first volume and the second volume.

According to an embodiment, the air conditioning adapter further comprises a duct connector fitted to the wall sleeve at the outer side of the wall, the duct connector is airflow coupled to the first volume, while permitting free airflow from the second volume to the atmosphere, such that when the airtight door is closed, potentially contaminated air blown by a central air conditioning system is directed to the atmosphere through the cut-out or perforations of the separator sheet and the second volume.

According to an aspect, the lock further comprises a bolt fitted through and extending in front of the airtight door. A rotatable crossbar is fitted to the bolt, and a wing nut is fitted over the crossbar. Loosening the wing nut enables rotation of the crossbar to a position permitting passage of the crossbar through the at least one aperture and opening of the airtight door inwards the wall sleeve.

According to an embodiment, the airtight door is shaped as a round disk provided with a mounting bolt extending inwards the wall sleeve at the center of the airtight door and a locking handle fitted on the side facing the protected space. Rotation of the locking handle rotates the airtight door and the mounting bolt as well.

According to an aspect, the air conditioning adapter further comprises an airflow permitting mounting-frame carrying a central nut. The mounting frame being attached to the cover-plate at a set distance inwards the wall sleeve. Wherein the mounting bolt is assembled into the central nut of the mounting frame such that the mounting frame carries the airtight door in a rotate-able and axially movable manner about the central axis of the mounting bolt.

According to another aspect, the air conditioning adapter further comprises a funnel having a wide side fitted on top of the mounting frame and a narrow side extending inwards the wall sleeve, and a duct connector fitted to the outer side of the wall sleeve. The duct connector is cylindrical in shape, having a peripheral portion extending beyond

the wall sleeve to accommodate a flexible duct of a central air conditioning system. The duct connector further comprises an internal cylindrical hollow vessel open at one end. The cylindrical hollow vessel is airflow coupled to the narrow side of the funnel. The hollow vessel is attached to the peripheral portion of the duct connector and vented to the atmosphere by at least one radial passage.

According to yet another aspect, the funnel and the hollow vessel divides an internal volume of the wall sleeve into a first peripheral volume and a second central volume. The first peripheral volume serves as an entrance of air conditioned flow when the airtight door is open. And the second central volume, in conjunction with the at least one radial passage, is serving as a safety outlet of potentially contaminated air, when the airtight door is closed.

According to an embodiment, the air conditioning adapter comprises:

- a. A cover-plate having at least one aperture, permanently secured to a flange of the wall sleeve at the inner side of the wall.
- b. An airtight door fitted to the cover-plate on the side facing the protected space. The airtight door covers and seals the at least one aperture when closed, and exposes the at least one aperture when open.
- c. A lock configured to affix the airtight door in the closed position.
- d. A separator sheet attached to the cover plate, extending into the wall sleeve. The separator sheet divides a volume of the wall sleeve into a first volume and a second volume. The separator sheet is further provided with an air passage.
- e. A shutter being movable over the separator sheet. And
- f. a linkage linking the shutter and the airtight door.

Wherein the airtight door is selectively opened outwards the wall sleeve during normal times, permitting free airflow of a central air conditioning system, while preserving neat appearance of the protected space, and is closed and locked in an event of emergency, thus providing blast protection and air tightness. And wherein the linkage associates the location of the shutter to the position of the airtight door, such that when the airtight door is fully opened, the linkage pulls the shutter to fully cover the air passage thus airflow separating the first volume and the second volume.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention and the way it may be carried out in practice, will be understood with reference to the following illustrative figures, by way of non-limiting example only, in which like reference numerals identify like elements, and in which:

5 Fig. 1 is a perspective front view of an air conditioning adapter made according to an embodiment of the invention;

Fig. 2 is a perspective rear view of the air conditioning adapter of Fig. 1;

Fig. 3 is a perspective view as in Fig. 1, shown with a bar lock released;

Fig. 4 is a front perspective view of the air conditioning adapter as shown in Fig. 3, with
10 an airtight door opened to allow airflow of a central air conditioning system;

Fig. 5 is a rear perspective view of the air conditioning adapter as shown in Fig. 4;

Fig. 6 is a rear perspective view of the bottom side of the air conditioning adapter as shown in Fig. 2;

Fig. 7 is a front perspective view of an air conditioning adapter fitted in a standard wall
15 sleeve, including drain valve and cable glands, made according to an embodiment of the invention;

Fig. 8 is a rear perspective view of the air conditioning adapter and wall sleeve as shown in Fig. 7, shown with the airtight door open;

Fig. 9 is a rear perspective view of the air conditioning adapter and wall sleeve as shown
20 in Fig. 8, with a duct connector fitted to the outer side of the wall sleeve;

Fig. 10 is a sectional view through a concrete wall of a protected space fitted with a standard wall sleeve and an air conditioning adapter made according to an embodiment of the invention, shown with the air tight door in the open position;

Fig. 11 is a sectional view as shown in Fig. 10, shown with the air tight door in the closed
25 position;

Fig. 12 is an exploded perspective view of the air conditioning adapter demonstrating the various parts;

Fig. 13 is a perspective view of an air conditioning adapter being used with a split air conditioning system, the dotted lines represent an outline of an indoor unit;

Fig. 14 is a front perspective view of an air conditioning adapter fitted in a standard wall sleeve, made according to another embodiment of the present invention;

5 Fig. 15 is a front perspective view of the air conditioning adapter as shown in Fig. 14, with an airtight door opened to allow airflow of a central air conditioning system;

Fig. 16 is a rear perspective view of the air conditioning adapter of Fig. 15, shown without the wall sleeve;

Fig. 17 is a rear perspective view of the air conditioning adapter as shown in Fig. 16,
10 shown with the airtight door closed;

Fig. 18 is a rear perspective view of the air conditioning adapter of Fig. 17, fitted in a wall sleeve, including a duct connector fitted to the outer side of the wall sleeve;

Fig. 19 is a sectional view through a concrete wall of a protected space and a standard wall sleeve as shown in Fig. 10, fitted with an air conditioning adapter made according to an
15 embodiment of the invention shown in Fig. 14, with the air tight door in the closed position;

Fig. 20 is a front perspective view of an air conditioning adapter fitted in a standard wall sleeve, made according to yet another embodiment of the present invention;

Fig. 21 is a front perspective view of the air conditioning adapter as shown in Fig. 20, with
20 an airtight door opened to allow airflow of a central air conditioning system;

Fig. 22 is a rear perspective view of the air conditioning adapter of Fig. 21, shown without the wall sleeve;

Fig. 23 is a rear perspective view of the air conditioning adapter as shown in Fig. 22, including a duct connector fitted to the rear side of the adapter;

25 Fig. 24 is a rear perspective view of the air conditioning adapter as shown in Fig. 23, fitted in a wall sleeve; and

Fig. 25 is a sectional view through a concrete wall of a protected space and a standard wall sleeve as shown in Fig. 10, fitted with an air conditioning adapter made according to an embodiment of the invention shown in Fig. 20, with the air tight door in the closed position.

5 DETAILED DESCRIPTION OF EMBODIMENTS

Several terms relating to the present invention will be defined prior to describing the invention in detail. It should be noted that the following definitions are used throughout this application.

For the purposes of the present invention, directional terms such as “top”, “bottom”, “below”, “left”, “right”, “horizontal”, “vertical”, “upper”, “lower”, “down”, etc. are merely used for convenience in describing the various implementations of the present invention. The assemblies demonstrating the present invention may be oriented in various ways. For example, the assemblies shown in the figures may be flipped over, inclined or rotated by 90° in any direction.

For the purposes of the present invention, the term “adapter” refers to an attachment for adapting apparatus for uses not originally intended.

For the purposes of the present invention, the term “wall-sleeve” refers to a sleeve that allows penetration of walls with air tightness ensured.

For the purposes of the present invention, the term “cover-plate” refers to a plate of any shape that is fitted to a wall sleeve on the internal side of the wall with air tightness ensured.

For the purposes of the present invention, the term “aperture” refers to an opening of any shape.

For the purposes of the present invention, the term “door” refers to a barrier of any material, by which an entrance way into an apparatus or space is closed and opened.

For the purposes of the present invention, the term “flange” refers to a rib or rim for strength, for guiding, or for attachment to another object.

The term NBC, standing for “Nuclear Biological Chemical”, is used throughout this patent application at the broad interpretation, meaning at least one of: Radiological, Nuclear, Biological and Chemical. Accordingly NBC does not mean that all of the capabilities are necessary for the application, for example a filter unit providing Biological and Chemical attack protection, but none or only partial Nuclear attack protection, is yet
5 considered an NBC filter unit for the purpose of this application.

With reference to the figures, according to an embodiment of the present invention, there is shown in Figs. 1 to 6, an air conditioning adapter generally referenced 10, to be fitted on a wall sleeve 30 (Fig. 7) of a protected space. The air conditioning adapter 10 is
10 based on a cover-plate 20 having an aperture 22 or a plurality of apertures, the cover-plate 20 is permanently secured, typically by bolts 24 and nuts 26, (Figs. 7 to 11) to a flange 32 of the wall sleeve 30 at the inner side of the wall. It will be noted that the heads of bolts 24 may extend backwards into the concrete wall as shown in the sectional view of Figs. 10 and 11. The bolts 24 heads are anchored in the concrete for additional strength. A seal 28
15 shown as a cut sheet of elastomer, by way of example only, is provided between the cover plate 20 and the flange 32. According to the embodiment, the area of the aperture 22, or the total area of the apertures, if plurality of apertures are provided, is smaller than a cross sectional area of the internal passage 34 (fig. 8) of the wall sleeve 30.

The air conditioning adapter 10 further includes an airtight door 40 hinged or
20 otherwise attached to the cover-plate 20 on the side mating the flange 32. The airtight door 40 covers and seals the aperture 22 or apertures when closed, as depicted in Figs. 1 and 2, and exposes the aperture 22 or apertures when open, as depicted in Figs. 4 and 5. A lock generally referenced 50 is configured to affix the airtight door 40 in the closed position.

According to the embodiment, the airtight door 40 is selectively opened inwards
25 the wall sleeve 30 during normal times, permitting airflow introduced into the protected space, by a central air conditioning system (not shown), while preserving neat appearance of the protected space by the airtight door 40 opening inwards the wall sleeve 30. The airtight door 40 is selectively closed and locked in an event of emergency, thus providing blast protection and air tightness. It will be noted that according to the embodiment, in
30 addition to the neat appearance, positioning of the airtight door 40 behind the cover plate 20, when viewed from the protected space, contributes to the airtight sealing of the airtight

door in an event of a blast wave. In such an event the airtight door is further pressing the seal 28 between the airtight door 40 and cover plate 20 and a better sealing is attained.

The lock 50 may accept several constructions. One embodiment is explained with reference to Figs. 1 to 6 and Fig. 12, depicting an exploded view of the air conditioning adapter 10. As shown in the Figures, the lock 50 includes a bolt 52 fitted through and extending in front of the airtight door 40, a rotatable crossbar 54 with through hole 55 (Fig. 12), fitted on the bolt 52, and a wing nut 56 fitted on the bolt 52 over the crossbar. In operation, loosening the wing nut 56 enables rotation of the crossbar 54 to a diagonal or vertical position permitting passage of the crossbar 54 through the aperture 20. The aperture may accept a rectangular, oval or an arch gate shape. Such that when the crossbar 54 is horizontal, it bridges both edges of the aperture 22 in front of the cover plate 20, thus it can be used to tighten the airtight door 40 towards the cover plate 20. When the crossbar 54 is rotated to a diagonal or vertical state, it may pass through the aperture 22 since the diagonal or vertical dimensions of the aperture 22 are bigger than the width dimension. Consequently, there is no need to remove the wing nut 56 in order to open the airtight door 40, slackening the wing nut 56 a few turns releases the tension and the crossbar may be freely rotated by hand. After rotation of the crossbar 54 as described above to a position permitting passage of the crossbar 54 through the aperture 20, the airtight door 40 is opened inwards the wall sleeve 30. It will be noted that the wing nut 56 may be secured to the bolt 52 such that it can only be slackened few turns but not completely removed in order to avoid loss of the nut 56.

A crossbar lock 50 as described above does not require usage of an accurate hinge for the airtight door 40. The hinge pins 42 (Fig. 12) may loosely pass through the side walls of a separator sheet 70 as will be explained below, or through any right angle brackets attached to the cover plate 20. The crossbar pulls the airtight door approximately at the center such that the seal 28 is pressed evenly all around the airtight door 40. It will be understood however that any lock arrangement may be alternately used such as: standard spring loaded slam lock, rotation lock, toggle clamp, magnetic clamp and others.

With reference to Figs. 3, 4 and 7, the air conditioning adapter 10 may further comprise a plurality of holes 60, typically threaded holes, made to the cover-plate 20 adjacent the aperture 22 or apertures. The holes 60 are sized to accept cable glands 62 for

penetration of conduits, cables and pipes of a split air conditioning system, while maintaining blast protection and air tightness. One of the holes, typically a lower one, may be fitted with a water drain valve 66 (Fig. 7). The drain valve 66 being part of condensate water drain line of a split air conditioning system. The holes may be populated with plugs 5 64 if a central air conditioning system is used, thus enabling the option to choose between split or central air conditioning system in a single device. There is no need to decide in advance which air conditioning system will be installed, since the air conditioning adapter 10 may accept both installations.

As known in the art of split air conditioning systems, typical installation of a split 10 air conditioning system requires at least four holes 60, made to the cover plate 20, two holes for the refrigerant supply and return lines, one for an electric cable and one for condensate water drain line. The cover plate 20 may accept six holes as shown in the figures, to enable easy installation in any desired orientation of the internal unit with respect to the location of the wall sleeve. The additional two holes are fitted with plugs 64 15 as shown in Fig. 7 by way of example. It will be understood that the airtight door 40 is permanently closed and locked when a split air conditioning system is installed.

With reference to Fig. 13, there is shown an illustrative installation of an indoors unit 94 (represented by dashed lines) of a split air conditioning system. The air conditioning adapter 10 is shown with the pipes, cable and conduits passing through the 20 cover plate 20 to facilitate standard installation of a split air conditioning system. Water drain line is fluidly attached to the water drain valve 66, which is visible under the indoor unit 94, enabling shut off of the drain line from within the protected space in event of emergency.

For example as shown in Fig. 13, the cover plate is provided with six holes, two of 25 which are located below the aperture, one populated with a drain valve 66 of the water drain line and the other plugged with plug 64. Another two holes are located at one side of the aperture 22, fitted with cable glands 62 for refrigerant supply and return lines. Another two holes are located at the other side of the aperture 22, one of which is fitted with cable gland 62, for an electric cable and the other plugged. It will be understood that an opposite 30 direction assembly may be performed by simply populating the holes with cable glands and plugs in a mirror pattern.

In cases where a central air conditioning system is installed, the airtight door 40 is normally left open. It is closed by the occupants of the protected space in an event of emergency declaration. However in such situations, if the central air conditioning system is not turned off, as may happen by confusion and stress in an event of emergency, it may
5 force pressurized air towards the closed airtight door 40. The pressurized air is potentially contaminated, and although the airtight door is closed, this situation is undesired. Since the blow pressure of the air conditioning unit may overcome the preset over-pressure in the protected space. A faulty or leaking seal 28 of the airtight door 40 may let a small amount of contaminated air pass into the protected space.

10 In order to avoid such incident, the air conditioning adapter 10 may further comprise a separator sheet 70 partially cut out or perforated as will be further explained. The separator sheet is attached to the cover plate 20 on the side mating the flange 32 of the wall sleeve 30, extending into the wall sleeve 30 perpendicularly to the cover-plate 20. As illustrated in the figures, the separator sheet may be attached to the cover plate 20 by bolts
15 78 fitted through holes made to a rim 79 of the separator sheet 70 and into threaded holes made to the cover plate 20. The separator sheet 70 divides an internal volume of the wall sleeve 30 into a first typically upper volume 34 and a second typically lower volume 36. The first volume 34 serving as an entrance of air conditioned flow is preferably larger than the second volume 36 serving as a safety outlet of potentially contaminated air, as will be
20 further explained below.

In addition to the above, the hinge 42 (Figs. 10 to 12) of the airtight door 40 is positioned adjacent the separator sheet 70, such that when the airtight door 40 is open it is resting about the separator sheet 70 and substantially blocking the cut out or perforations 72 of the separator sheet 70, thus airflow separating the first volume 34 and the second
25 volume 36. It should be noted that the cut out or perforations 72 of the separator sheet 70 are made only to a region of the separator sheet which is covered by the airtight door when rested over the separator sheet. As mentioned above, the first volume 34 may be positioned above the second volume 36 such that when the airtight door 40 is opened and rested about the separator sheet 70, it remains open by the own weight of the airtight door
30 40.

While the airtight door 40 is in the open position, it permits air conditioning of the protected space by an air duct (not shown) which is connected at the outer side of the wall sleeve 30. The air duct is airflow coupled to the first volume 34 thus blowing air through the first volume 34, the open aperture 22 located in front of the first volume 34, and into
5 the protected space as shown by dashed line with arrows marked 90 in Fig.10. In case of emergency the airtight door 40 is manually lifted from the rest position to the closed position and the cut out or perforations 72 of the separator sheet 70 are exposed, enabling free air flow between the first volume 34 and the second volume 36.

Accordingly, even if the central air conditioning system is left operative when the
10 airtight door is closed, the airflow is turned back through the cut out or perforations 72 of the separator sheet 70, into the second volume 36 which is vented to the atmosphere, thus significantly reducing the risk of penetration of potentially contaminated air into the protected space. The pattern of airflow is demonstrated by dashed line with arrows marked 92 in Fig. 11.

15 The separator sheet 70 may further comprise upwardly bent edges 74 and elastomer seals 76 fitted between the bent edged of the separator sheet 70 and the internal face of the wall sleeve 30. The seals 76 prevent escape of air conditioned airflow to the atmosphere during normal times while the airtight door 40 is open and the cut out or perforations 72 are blocked by the airtight door 40.

20 The air conditioning adapter 10 may further include a duct connector 80 fitted to the wall sleeve 30 at the outer side of the wall, as shown in Figs. 9 to 11. The duct connector is airflow coupled to the first volume 34, while permitting free airflow from the second volume 36 to the atmosphere, such that when the airtight door 40 is closed, potentially contaminated air blown by a central air conditioning system is directed to the
25 atmosphere through the separator sheet 70 and the second volume 36 as explained above.

The duct connector 80 is provided with a cylindrical portion 82 sized to accept a flexible duct of the central air conditioning system. And a semi cylindrical portion 84 sized to fit above the separator sheet 70 for example, by tapping the duct connector 80 into the wall sleeve 33. Upon installation airflow is directed to the first volume 34. A slanted face
30 86 is connecting the flat side of the semi cylindrical portion 84 to the cylindrical portion

82, permitting the second volume 36 to be vented to the atmosphere as explained above. The pattern of airflow is demonstrated by dashed line with arrows marked 92 in Fig. 11.

The air conditioning adapter 10 may be fitted in a standard tubular 8" wall sleeve as known in the art of protection shelters and safe rooms. There is no need to make particular decisions in advance during architectural design and construction of the building, regarding the air conditioning installation. Such early decisions are required according to prior art systems as described in the background section. When fitted to such 8" standard wall sleeve, the aperture is preferably shaped as an arch gate, width of the arch gate is selected between 130mm to 150mm and height of the arch gate is selected between 140mm to 160mm respectively.

With reference to Figs. 14 to 19, there is shown another embodiment of the invention demonstrating an air conditioning adapter generally referenced 12, to be fitted on a wall sleeve 30 of a protected space. The air conditioning adapter 12 is based on a cover-plate 120 having an aperture 122 or a plurality of apertures. The cover-plate 120 is permanently secured, typically by bolts 24 and nuts 26, to a flange 32 of the wall sleeve 30 at the inner side of the wall. A first seal 128, is provided between the cover plate 120 and the flange 32, and a second peripheral seal 148, is surrounding the aperture 122 or plurality of apertures, on the side of the cover plate 120 facing the protected space.

The air conditioning adapter 12 further includes an airtight door 140 hinged or otherwise attached to the cover-plate 120 on the side facing the protected space. The airtight door 40 covers and seals the aperture 122 or plurality of apertures when closed, as depicted in Figs. 14, 17 and 19, and exposes the aperture 122 or apertures when open, as depicted in Figs. 15 and 16. A lock or locking handle 150 is configured to affix the airtight door 40 in the closed position.

The airtight door 140 is selectively opened outwards the wall sleeve 30 during normal times, permitting airflow introduced into the protected space by a central air conditioning system, and is selectively closed and locked in an event of emergency, thus providing blast protection and air tightness.

According to one embodiment shown in the figures by a way of example only, the airtight door 140 is hinged by a pivot pin 142 to a mounting bracket 144 fitted on top of

the cover plate 120. The mounting bracket is attached to the cover plate 120 for example by sharing three of the eight bolts attaching the cover plate 120 to the flange 32 of wall sleeve 30. It will be understood that any hinge of any type can be used including for example weld hinges which are permanently welded to the cover plate 120 and to the
5 airtight door 140. Alternately the cover plate and airtight door may be produced by steel or aluminum cast to form integral hinges.

The lock or locking handle 150 may accept several constructions. One optional embodiment is shown in Figs. 14 and 15, demonstrating a swivel locking handle 150 and a mating slot 149 (Fig. 15) made to the airtight door 140 near an edge distal from the hinge
10 side. The locking handle 150 is mounted in a rotatable manner over a fixed pin or bolt fitted to the cover plate 120. The locking handle 150 is provided with a lock bar 152, narrow enough to pass through the slot 149 of the airtight door 140, when the lock bar is vertically positioned. The lock bar 152 is longer than the slot 149 width, such that when the lock bar is rotated to the horizontal position it rests over the edges of slot 149 and
15 locks the airtight door in the closed position. The lock bar 152 may be provided with slopes on the side mating the airtight door such that during rotation of the locking handle 150 and lock bar 152, the airtight door is pressed against the peripheral seal 148.

Yet with reference to Figs. 14 and 15, the air conditioning adapter 12 may further comprise a plurality of holes, typically threaded holes, made to the airtight door 140. The
20 holes are sized to accept cable glands for penetration of conduits, cables and pipes of a split air conditioning system, while maintaining blast protection and air tightness. One of the holes, typically a lower one, may be fitted with a water drain valve as explained above with reference to Fig. 7. The holes may be populated with plugs 64 if a central air conditioning system is used, thus enabling the option to select between installation of a
25 split or central air conditioning system in a single device.

In cases where a central air conditioning system is installed, the airtight door 140 is normally left open. It is closed by the occupants of the protected space in an event of emergency declaration. However in such situation, if the central air conditioning system is not turned off, as may happen by confusion and stress in an event of emergency, it may
30 force pressurized air towards the closed airtight door 140. The pressurized air is potentially contaminated, and although the airtight door is closed, this situation is

undesired. A faulty or leaking peripheral seal 148 of the airtight door 140 may let a small amount of contaminated air pass into the protected space.

In order to avoid such incident, the air conditioning adapter 12 may further comprise a separator sheet 170 partially perforated or provided with a cut out air passage 172 as illustrated in Fig. 17, and will be further explained. The separator sheet is attached to the cover plate 120 on the side mating the flange 32 of the wall sleeve 30, extending into the wall sleeve 30 perpendicularly to the cover-plate 120. The separator sheet 170 divides an internal volume of the wall sleeve 30 into a first typically upper volume 34 and a second typically lower volume 36. The first volume 34 serving as an entrance of air conditioned flow is preferably larger than the second volume 36 serving as a safety outlet of potentially contaminated air, as will be further explained below.

With reference to Figs. 16, 17 and 19, the air conditioning adapter 12 may further include a shutter 173 movable over the separator sheet 170, and a linkage 146 linking the shutter 173 and the airtight door 140. The linkage 146 associates the location of the shutter 173, to the position of the airtight door 140. When the airtight door 140 is fully opened the linkage 146 pulls the shutter 173 to fully cover the air passage 172 thus airflow separating the first volume 34 and the second volume 36.

While the airtight door 140 is in the open position, it permits air conditioning of the protected space by an air duct (not shown) which is connected at the outer side of the wall sleeve 30. The air duct is airflow coupled to the first volume 34 thus blowing air through the first volume 34, the open aperture 122 located in front of the first volume 34, and into the protected space. In case of emergency the airtight door 140 is manually closed and the linkage 146 pushes the shutter 173 backwards, exposing the air passage 172 thus permitting free airflow between the first volume 34 and the second volume 36.

Accordingly, even if the central air conditioning system is left operative when the airtight door 140 is closed, the airflow is turned back through the air passage 172 of the separator sheet 170, into the second volume 36 which is vented to the atmosphere, thus significantly reducing the risk of penetration of potentially contaminated air into the protected space. The pattern of airflow is demonstrated by dashed line with arrows marked 192 in Fig. 19.

The air conditioning adapter 12 may further include a duct connector 180 fitted to the wall sleeve 30 at the outer side of the wall, as shown in Figs. 18 and 19. The duct connector is airflow coupled to the first volume 34, while permitting free airflow from the second volume 36 to the atmosphere, such that when the airtight door 140 is closed, potentially contaminated air blown by a central air conditioning system is directed to the atmosphere through the separator sheet 170 and the second volume 36 as explained above. The construction of the duct connector 180 is substantially similar to the duct connector 80 described above with reference to Figs. 9 to 11.

With reference to Figs. 20 to 25, there is shown yet another embodiment of the invention demonstrating an air conditioning adapter generally referenced 14, to be fitted on a wall sleeve 30 of a protected space. The air conditioning adapter 14 is based on a cover-plate 220 having an aperture 222 or a plurality of apertures, the cover-plate 220 is permanently secured, typically by bolts 24 and nuts 26, to a flange 32 of the wall sleeve 30 at the inner side of the wall. A seal 228 is provided between the cover plate 220 and the flange 32.

The air conditioning adapter 14 further includes an airtight door 240 attached to the cover-plate 220 on the side mating the flange 32. The airtight door 240 covers and seals the aperture 222 or apertures when closed, as depicted in Figs. 20 and 25, and exposes the aperture 222 or apertures when open, as depicted in Figs. 21 to 23. A locking handle 250 is configured to affix the airtight door 240 in the closed position.

The airtight door 240 is selectively opened inwards the wall sleeve 30 during normal times, permitting airflow introduced into the protected space, by a central air conditioning system, and is selectively closed and locked in an event of emergency, thus providing blast protection and air tightness. The closing and locking mechanism may accept several constructions. One embodiment is explained with reference to Figs. 20 to 22 and 25. As shown in the figures, the airtight door 240 is shaped as a round disk provided with a mounting bolt 252 extending inwards the wall sleeve 30 at the center of the airtight door 240. The airtight door 240 is further provided with a locking handle 250 on the side facing the protected space. Rotation of the locking handle 250, rotates the airtight door 240 and mounting bolt 252 as well. An airflow-permitting circular mounting frame 270 provided with spokes 271 (Fig. 22), by a way of example, is carrying a central

nut 276. The mounting frame 270 is attached to the cover-plate 220 at a distance determined for instance by standoff spacers 278 extending inwards the wall sleeve 30. The mounting bolt 252 is assembled into the central nut 276 of the mounting frame 270 such that the mounting frame carries the airtight door 240 in a rotate-able and axially movable
5 manner about the central axis of the mounting bolt 252.

In operation, rotation of the locking handle 250 clockwise viewed from the protected space, rotates the entire assembly including the airtight door 240 and mounting bolt 252. As a result the mounting bolt 252 is screwed into the nut 276 carrying also the airtight door 240 inwards the wall sleeve 30, thus opening a circular gap between the
10 airtight door 240 and the cover plate 220. Rotation of the locking handle 250 counter clockwise viewed from the protected space reverses the process and narrows the circular gap to the point where the airtight door 240 is in contact with the seal 228 fitted to the cover plate 220, thus blocking the aperture 222. Further tightening the locking handle 250 counter clockwise presses the airtight door 240 onto seal 228 thus sealing and locking the
15 airtight door 240 in the closed position.

With reference to Figs. 20 and 21, the air conditioning adapter 14 may further include a plurality of holes, typically threaded holes, made to the cover plate 220. The holes are sized to accept cable glands for penetration of conduits, cables and pipes of a split air conditioning system, while maintaining blast protection and air tightness. One of
20 the holes, typically a lower one, may be fitted with a water drain valve as explained above with reference to Fig. 7. The holes may be populated with plugs 64 if a central air conditioning system is used, thus enabling the option to choose between split or central air conditioning system in a single device.

In cases where a central air conditioning system is installed, the airtight door 240 is
25 normally left open. It is closed by the occupants of the protected space in an event of emergency declaration. However in such situation, if the central air conditioning system is not turned off, as may happen by confusion and stress in an event of emergency, it may force pressurized air towards the closed airtight door 240. The pressurized air is potentially contaminated, and although the airtight door is closed this situation is
30 undesired. A faulty or leaking seal 228 of the airtight door 240 may let a small amount of contaminated air pass into the protected space.

In order to avoid such incident, the air conditioning adapter 14 may further include a funnel 274 having a wide side fitted on top of the mounting frame 270 and a narrow side extending inwards the wall sleeve 30, the function of which will be further explained below. A duct connector 280 is fitted to the outer side of the wall sleeve 30. The duct
5 connector is cylindrical in shape, having a peripheral portion extending beyond the wall sleeve to accommodate a flexible duct of a central air conditioning system. The duct connector 280 further includes an internal cylindrical hollow vessel 284 open at one end to fit by airflow coupling manner into the narrow side of the funnel 274. The hollow vessel 284 is attached to the outer portion of the duct connector 280 by at least one radial passage
10 282, also serving as a vent to the atmosphere. Optionally as shown in the figures three radial passages are provided in order to improve strength and airflow capacity. The funnel 274 and hollow vessel 284 divides an internal volume of the wall sleeve 30 into a first typically peripheral volume 234 and a second typically central volume 236. The first volume 234 serving as an entrance of air conditioned flow is larger than the second
15 volume 236 serving as a safety outlet of potentially contaminated air, as will be further explained below.

In addition to the above, the airtight door 240 may travel by rotation as explained above between the cover plate 220 and the mounting frame 270, such that when the airtight door 240 is fully open it is in contact with the mounting frame 270 and is
20 substantially blocking air passages 272 located between the spokes 271 (Fig. 22) of the mounting frame 270, thus airflow separating the first volume 234 and the second volume 236.

While the airtight door 240 is in the open position, it permits air conditioning of the protected space by an air duct (not shown) which is connected to the duct connector 280 at
25 the outer side of the wall sleeve 30. The air duct is airflow coupled to the first volume 234 thus blowing air through the first volume 234, the open aperture 222 located in front of the first volume 234, and into the protected space. In case of emergency the airtight door 240 is manually closed and the air passages 272 of the mounting frame 270 are exposed, enabling free air flow between the first volume 234 and the second volume 236.

30 Accordingly, even if the central air conditioning system is left operative when the airtight door is closed, the airflow is turned back through the funnel 274, into the second

volume 236 which is vented to the atmosphere through the at least one radial passage 282, thus significantly reducing the risk of penetration of potentially contaminated air into the protected space. The pattern of airflow is demonstrated by dashed line with arrows marked 292 in Fig. 25.

5 It will be appreciated that the specific embodiments of the present invention described above and illustrated in the accompanying drawings are set forth merely for purposes of example. Other variations, modifications, and applications of the present invention will readily occur to those skilled in the art. It is therefore clarified that all such variations are considered within the scope and spirit of the invention. Accordingly, the
10 protection sought herein is as set forth in the claims below.

CLAIMS:

1. An air conditioning adapter for a wall sleeve of a protected space, comprising:
 - a. a cover-plate having at least one aperture, said cover-plate is permanently secured to a flange of the wall sleeve at the inner side of the wall, said at least one aperture being smaller in area than a cross sectional area of the wall sleeve;
 - b. an airtight door fitted to said cover-plate on the side mating said flange, said airtight door covers and seals said at least one aperture when closed, and exposes said at least one aperture when open;
 - c. a lock configured to affix said airtight door in said closed position;wherein an internal volume of the wall sleeve is physically divided into a first volume and a second volume, the first volume serving as an entrance of air conditioned flow and the second volume serving as a safety outlet of potentially contaminated air; and wherein said airtight door is selectively opened inwards the wall sleeve during normal times, permitting free airflow of a central air conditioning system, while preserving neat appearance of the protected space, and is closed and locked in an event of emergency, thereby providing blast protection and air tightness.
2. The air conditioning adapter as claimed in claim 1, further comprising a plurality of holes made to said cover-plate adjacent said at least one aperture, said holes are sized to accept cable glands for penetration of conduits of a split air conditioning system, while maintaining blast protection and air tightness.
3. The air conditioning adapter as claimed in claim 2, wherein said airtight door is closed and locked when a split air conditioning system is installed.
4. The air conditioning adapter as claimed in claim 1, wherein said internal volume of the wall sleeve is physically divided by a separator sheet attached to said cover plate and extends into the wall sleeve, and, wherein said first volume is larger than said second volume.
5. The air conditioning adapter as claimed in claim 4, wherein said separator sheet is partially cut-out or perforated and is perpendicularly attached to said cover-plate.
6. The air conditioning adapter as claimed in claim 5, wherein said airtight door is attached to said cover plate by a hinge positioned adjacent said separator sheet, such that when said airtight door is open it is resting about said separator sheet and substantially

blocking the cut-out or perforations of said separator sheet, thereby airflow separating said first volume and said second volume.

7. The air conditioning adapter as claimed in claim 6, further comprising a duct connector fitted to the wall sleeve at the outer side of the wall, said duct connector is airflow coupled to said first volume, while permitting free airflow from said second volume to the atmosphere, such that when said airtight door is closed, potentially contaminated air blown by a central air conditioning system is directed to the atmosphere through the cut-out or perforations of said separator sheet and said second volume.

8. The air conditioning adapter as claimed in claim 6, wherein said first volume is positioned above said second volume such that when said airtight door is opened and rested about said separator sheet, said airtight door is left open by the own weight of said airtight door.

9. The air conditioning adapter as claimed in claim 4, wherein said separator sheet further comprises elastomer seals fitted between the edged of said separator sheet and the wall sleeve.

10. The air conditioning adapter as claimed in claim 1, wherein a shape of said at least one aperture is selected from the group consisting of: circular; rectangular; oval; and arch gate.

11. The air conditioning adapter as claimed in claim 10, wherein said lock further comprises: a bolt fitted through and extending in front of said airtight door; a rotatable crossbar fitted to said bolt; and a wing nut fitted over said crossbar, wherein loosening said wing nut enable rotation of said crossbar to a position permitting passage of said crossbar through said at least one aperture and opening of said airtight door inwards the wall sleeve.

12. The air conditioning adapter as claimed in claim 1, wherein said airtight door is shaped as a round disk provided with a mounting bolt extending inwards the wall sleeve at the center of said airtight door and a locking handle fitted on the side facing the protected space, rotation of said locking handle, rotates said airtight door and said mounting bolt as well.

13. The air conditioning adapter as claimed in claim 12, further comprising an airflow permitting mounting frame carrying a central nut, said mounting frame being attached to said cover-plate at a set distance inwards the wall sleeve, wherein said mounting bolt is assembled into said central nut of said mounting frame such that said mounting frame carries the airtight door in a rotate-able and axially movable manner about the central axis of said mounting bolt.

14. The air conditioning adapter as claimed in claim 13, wherein said internal volume of the wall sleeve is divided by a funnel having a wide side fitted on top of said mounting frame and a narrow side extending inwards said wall sleeve.

15. The air conditioning adapter as claimed in claim 14, further comprising a duct connector fitted to the outer side of the wall sleeve, said duct connector is cylindrical in shape, having a peripheral portion extending beyond the wall sleeve to accommodate a flexible duct of a central air conditioning system, said duct connector further comprises an internal cylindrical hollow vessel open at one end, said cylindrical hollow vessel is airflow coupled to the narrow side of said funnel, said hollow vessel is attached to said peripheral portion of the duct connector and vented to the atmosphere through at least one radial passage.

16. The air conditioning adapter as claimed in claim 15, wherein said funnel and said hollow vessel divides an internal volume of the wall sleeve into a first peripheral volume and a second central volume, said first peripheral volume serving as an entrance of air conditioned flow when said airtight door is open, and said second central volume, in conjunction with said at least one radial passage, is serving as a safety outlet of potentially contaminated air, when said airtight door is closed.

17. The air conditioning adapter as claimed in claim 2, further comprising a water valve fitted to one of said plurality of holes, said water valve being part of a water drain line of a split air conditioning system, enabling shut off of the drain line from within the protected space in event of emergency.

18. The air conditioning adapter as claimed in claim 2, provided with at least 4 holes, at least one of which is located below said at least one aperture, used for a water drain line, another 2 of which are located at one side of said at least one aperture, used for refrigerant

flow and return lines, and 1 of which is located at the opposite side of said at least one aperture used for an electric cable.

19. The air conditioning adapter as claimed in claim 1, wherein said wall sleeve is a standard tubular 8" wall sleeve and wherein said at least one aperture is shaped as an arch gate, width of said arch gate is selected between 130mm to 150mm and height of said arch gate is selected between 140mm to 160mm.

20. An air conditioning adapter for a wall sleeve of a protected space, comprising:

- a. a cover-plate having at least one aperture, said cover-plate is permanently secured to a flange of said wall sleeve at the inner side of the wall;
- b. an airtight door fitted to said cover-plate on the side facing the protected space, said airtight door covers and seals said at least one aperture when closed, and exposes said at least one aperture when open;
- c. a lock configured to affix said airtight door in said closed position;
- d. a separator sheet attached to said cover plate, extending into the wall sleeve, said separator sheet divides a volume of the wall sleeve into a first volume and a second volume, said separator sheet is further provided with an air passage;
- e. a shutter being movable over said separator sheet; and
- f. a linkage linking said shutter and said airtight door,

wherein said airtight door is selectively opened outwards the wall sleeve during normal times, permitting free airflow of a central air conditioning system, while preserving neat appearance of the protected space, and is closed and locked in an event of emergency, thus providing blast protection and air tightness, and wherein said linkage associates the location of said shutter to the position of said airtight door, such that when said airtight door is fully opened, said linkage pulls said shutter to fully cover said air passage thus airflow separating said first volume and said second volume.

21. The air conditioning adapter as claimed in claim 20, wherein in an event of emergency the airtight door is manually closed and said linkage pushes said shutter backwards, exposing said air passage thus permitting free airflow between said first volume and said second volume which is vented to the atmosphere.

22. The air conditioning adapter as claimed in claim 20, wherein said first volume is larger than said second volume.
23. The air conditioning adapter as claimed in claim 20, wherein said separator sheet is perpendicularly attached to said cover-plate.
24. The air conditioning adapter as claimed in claim 20, further comprising a plurality of holes made to said airtight door, said holes are sized to accept cable glands for penetration of conduits of a split air conditioning system, while maintaining blast protection and air tightness.
25. The air conditioning adapter as claimed in claim 24, wherein said airtight door is closed and locked when a split air conditioning system is installed.
26. The air conditioning adapter as claimed in claim 20, further comprising a duct connector fitted to the wall sleeve at the outer side of the wall, said duct connector is airflow coupled to said first volume, while permitting free airflow from said second volume to the atmosphere, such that when the airtight door is closed, potentially contaminated air blown by a central air conditioning system is directed to the atmosphere through said air passage of said separator sheet and through said second volume.
27. The air conditioning adapter as claimed in claim 20, wherein said airtight door is hinged to said cover plate.
28. The air conditioning adapter as claimed in claim 27, further comprising a swivel locking handle and a mating slot made to said airtight door near an edge distal from the hinge side, said locking handle is mounted in a rotatable manner over a fixed pin or bolt fitted to said cover plate, said locking handle is provided with a lock bar, narrow enough to pass through said slot when the lock bar is vertically positioned, said lock bar is longer than the slot width, such that when the lock bar is rotated to the horizontal position it rests over the edges of the slot and locks the airtight door in the closed position.