

PROTECTION DEVICE FOR VEHICLE

TECHNICAL FIELD

5 The invention relates to a protection device for a vehicle intended for military application according to the preamble of claim 1. The invention also relates to a vehicle.

BACKGROUND ART

10 The threat levels for personnel in vehicles intended for military purposes such as combat vehicles and terrain vehicles have increased continuously. Hereby more protection is required on the vehicle which results in increased weight of the vehicle.

DE102008052231 shows a military vehicle with a ballistic protection wall arranged in the vehicle to delimit a protection zone for personnel travelling in
15 the vehicle.

GB2341918 shows a military vehicle with ballistic protection wall arranged to delimit protection zones in the vehicle.

OBJECTS OF THE INVENTION

20 An object of the present invention is to provide a protection device for vehicle facilitating optimized protection without the vehicle becoming unnecessary heavy.

SUMMARY OF THE INVENTION

These and other objects, apparent from the following description, are achieved by a protection device for vehicle, and vehicle, which are of the type stated by way of introduction and which in addition exhibits the features
5 recited in the characterising clause of the appended independent claims 1 and 12. Preferred embodiments of the protection device are defined in appended dependent claims 2-11.

Specifically an object of the invention is achieved by a protection device for a vehicle intended for military application comprising a wall configuration with
10 ballistic protection properties arranged to constitute a delimitation of a protection zone of the vehicle, wherein said wall configuration is movably arranged in the vehicle for adaptation according to needs of the configuration of said protection zone. Hereby provision of flexible protection zones is facilitated such that the protection zone may be reduced e.g. when fewer
15 persons are travelling therein wherein the weight of the vehicle may be reduced which results in that the vehicle may be more efficiently manoeuvrable.

According to an embodiment of the protection device said protection zone is intended for objects particularly worth protecting, for example operator and/or
20 passenger.

According to an embodiment of the protection device said wall configuration comprises at least one movable wall element. Hereby easy adaptation of the protection zone is facilitated.

According to an embodiment of the protection device said wall element is
25 arranged to run essentially transverse to the longitudinal direction of the vehicle. Hereby easy adaptation of the protection zone is facilitated.

According to an embodiment of the protection device said wall configuration comprises protection material adapted to present protection level of said

protection zone. Hereby flexibility increases further wherein the protection zone may be adapted for present protection needs, wherein the weight of the vehicle may be optimized for the protection need.

5 According to an embodiment of the protection device said wall configuration comprises removable additional protection elements. Hereby adaptation of the protection zone is facilitated and protection level of the protection zone as the protection elements with different protection level may be utilized.

10 According to an embodiment of the protection device said additional protection elements comprise side, roof and/or bottom protection elements. Hereby optimized protection of the protection zone is facilitated such that protection against threat from both above, underneath and from the sides is obtained and may be adapted to the protection need.

15 According to an embodiment of the protection device said wall configuration comprises said wall elements as well as said additional protection elements for delimitation of a predetermined protection volume of the protection zone.

According to an embodiment of the protection device said wall configuration comprises a movably arranged front and a rear wall element. Hereby further optimization of protection zone/ protection zones is facilitated.

20 According to an embodiment of the protection device said wall configuration is modularly configured. Hereby adaptation of protection zones for different needs is facilitated.

According to an embodiment the protection device further comprises means for fixation of said wall configuration. Hereby protection zone with a stable structure is obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention will be had upon the reference to the following detailed description when read in conjunction with the accompanying drawings, wherein like reference characters refer to like parts throughout the several views, and in which:

Fig. 1 schematically illustrates a side view of a vehicle intended for military applications with a protection device according to an embodiment of the present invention;

Fig. 2a schematically illustrates a perspective view of a vehicle body with a protection device according to an embodiment of the present invention;

Fig. 2b schematically illustrates the vehicle body in fig. 2a;

Fig. 3a schematically illustrates a perspective view of a vehicle body with a protection device according to an embodiment of the present invention;

Fig. 3b schematically illustrates the vehicle body in fig. 3a;

Fig. 4 schematically illustrates a cross sectional view of a vehicle body according to an embodiment of the present invention; and

Fig. 5a-d schematically show different view of wall elements of a protection device according to an embodiment of the present invention.

DETAILED DESCRIPTION

Fig. 1 schematically illustrates a vehicle 1 according to embodiments according to the present invention. The exemplified vehicle 1 is constituted by a vehicle intended for military applications. The vehicle 1 comprises a vehicle body 10. The exemplified vehicle 1 is according to an embodiment constituted by a motor vehicle. The exemplified vehicle is according to an

embodiment constituted by a trailer. The exemplified vehicle 1 is according to an embodiment constituted by a heavy vehicle in the shape of a military vehicle. Said vehicle 1 is according to a variant a modularly built up vehicle. The vehicle 1 may be constituted by a tracked vehicle and/or a wheeled vehicle. The vehicle 1 comprises a protection device according to the present invention. The protection device comprises a wall configuration 2 with ballistic protection properties arranged to constitute a delimitation of a protection zone of the vehicle 1. Said wall configuration 2 is movably arranged in the vehicle 1 for adaptation to needs of the configuration of said protection zone.

10 Fig. 2a schematically illustrates a vehicle body 10 of a vehicle intended for military application with a protection device according to an embodiment of the present invention in an expanded position and fig. 2b schematically illustrates the vehicle body 10 in fig. 2a with the protection device in a compressed position.

15 The protection device comprises a wall configuration 20 movably arranged in the vehicle between said expanded and compressed positions. The wall configuration 20 is arranged to constitute a delimitation of a protection zone 30 of the vehicle.

20 According to an embodiment the vehicle body 10 has a protection zone 30 with ballistic protection properties, the protection zone 30 having side, roof and bottom protection elements 30a, 30b, 30c, 30d forming a protection volume. The protection zone 30 is expandable by means of said movably arranged wall configuration 20 to an increased protection zone 30' in which the wall configuration 20 is arranged in the expanded position. The protection zone 30, 30' is configured to constitute protection for personnel and/or other protection worthy components and subsystems.

The vehicle body 10 further has a body portion 12 forming a volume. Said body portion 12 according to a variant has a basic protection level, the body

portion 12 according to a variant being provided with armour constituting protection for basic armour level.

The wall configuration 20 comprises a movable wall element 40. Said wall element 40 is intended to be arranged in the vehicle body 10 and arranged to run essentially transversal to the longitudinal direction of the vehicle and run essentially from floor to roof in the vehicle so as to divide a space in the vehicle.

The wall element 40 is movable in the vehicle body 10 in the longitudinal direction for change of the configuration of said protection zone.

10 The wall element 40 has an inner side 40a with a surface intended to face the protected volume and an outer side 40b with a surface intended to be turned away from the protected volume. The wall element 40 has a roof side 40c arranged to run in connection to an upper area of the vehicle body 10 essentially transversal to the longitudinal direction of the vehicle, a bottom
15 side 40d arranged to run in connection to a lower area of the vehicle body 10 essentially transversal to the longitudinal direction of the vehicle and sides 40e, 40f running along the respective vehicle side between said underside and upper side.

Said wall element 40 is intended to be arranged in the vehicle body 10,
20 wherein the wall element 40 is movable between an expanded position shown in fig. 2a in which said extended protection zone 30' is obtained, and a compressed position shown in fig. 2b in which the wall element 40 is moved from the expanded position in the direction of the arrow a such that a compressed protection zone 30 is obtained.

25 Said wall configuration 20 further comprises removable additional protection elements 22, 24, 26, 28. Said additional protection elements comprise side protection elements 22, 24, roof protection elements 26 and/or bottom protection elements 28.

Said wall configuration 20 comprises said wall element 40 as well as said additional protection elements 22, 24, 26, 28 for delimitation of a predetermined protection volume of the protection zone 30'.

5 Said additional protection elements 22, 24, 26, 28 are intended to be placed in connection to the wall element 40 in the expanded position so as to thus improve the protection of that protection zone 30' of the increased protection volume. Said additional protection elements 22, 24, 26, 28 are intended to be arranged externally on the vehicle. Said additional protection elements according to a variant also comprise internal protection portions.

10 Said side protection elements 22, 24 comprise a first side protection element 22 and a second side protection element 24, wherein the first side protection element 22 is intended in the expanded position to be placed along one of the side walls and the second side protection element 24 along the opposite one of the side walls of the vehicle body 10 in connection to the wall element
15 40 arranged in the expanded position.

Further said roof protection element 26 is in the expanded position intended to be applied along the roof of the vehicle body 10 in connection to the wall element 40 arranged in the expanded position.

Further said bottom protection element 28 is intended in the expanded
20 position to be applied along the bottom of the vehicle body 10 in connection to the wall element 40 arranged in the expanded position.

Said additional protection elements 22, 24, 26, 28 are intended to be arranged on the vehicle body 10 of the vehicle in dependence of present protection needs. Hereby said side protection elements 22, 24 and/or said
25 roof protection element 26 and/or said bottom protection element 28 by applied in the expanded position of the wall configuration 20. Hereby the weight of the vehicle may be optimized to required protection level. For example bottom protection elements 28 are not required when no risk for mine/ mine explosions exist, which reduces the vehicle weight.

- Said additional protection elements 22, 24, 26, 28 have according to an embodiment different lengths for provision of protection zones 30 with different size of volume, i.e. different size of additional protection elements are used for providing of different size of protection volume. Hereby
5 adaptation of the protected volume is facilitated, wherein the wall configuration 20 may be arranged on one or several intermediate positions between said compressed and expanded position, where additional protection elements adapted for the respective position is used.
- Said wall configuration 20 comprises protection material adapted to present
10 protection level of said protection zone 30. Hereby said wall element 40 comprises protection material adapted to present protection level, e.g. adapted for ballistic protection such as adapted thickness of armour. Further said additional protection elements 22, 24, 26, 28 comprise protection material adapted to present protection level.
- 15 Said protection material according to an embodiment comprises material with secondary splinter reducing properties, wherein according to a variant the material of the structure of the wall element 40 has secondary splinter reducing properties and/or the wall element 40 comprises a so called spall liner.
- 20 According to a variant where the additional protection 22, 24, 26, 28 apart from external protection portions also comprise internal protection portions, the internal protection portions of said side protection elements 22, 24 and/or roof protection element 26 and/or bottom protection element 28 of said additional protection elements 22, 24, 26, 28 comprise material with
25 secondary splinter reducing properties, wherein according to a variant the structure of the material of said side protection elements and/or roof protection elements and/or bottom protection elements has secondary splinter reducing properties and /or said side protection elements and/or roof protection element and/or bottom protection element comprise a so called
30 spall liner.

According to a variant said wall element 40 is constituted by a sandwich structure with a corresponding weight and protection function as a so called spall liner. According to a variant where the additional protection 22, 24, 26, 28 apart from external protection portions also comprises internal protection portions the internal protection portions of said side protection element 22, 24 and/or roof protection element 26 and/or bottom protection element 28 of said additional protection element 22, 24, 26, 28 of a so called sandwich structure with corresponding weight and protection function as a so called spall liner.

Said wall configuration 20 is exchangeably arranged in the vehicle body 10 of the vehicle. Consequently said wall element 40, side protection elements 22, 24, roof protection element 26 and bottom protection element 28 are exchangeable. Hereby is according to an embodiment wall configuration 20 with protection material adapted for present protection level arranged in connection to vehicle body 10 of the vehicle and is exchangeable to wall configuration 20 with protection material adapted to other protection level when protection needs are changed.

Consequently the wall configuration 20 may comprise wall element 40 and additional wall elements 22, 24, 26, 28 with protection material with energy absorbing ability adapted to different protection levels depending on present protection need, where e.g. the bottom protection element 28 may have a higher or lower protection level than the wall element 40 and/or roof protection element 26 and/or side protection elements 22, 24.

Fig. 3a schematically illustrates a vehicle body 110 according to an embodiment of the present invention illustrating a vehicle body 110 of a vehicle intended for military application with a protection device according to an embodiment of the present invention in an expanded position and fig. 3b schematically illustrates the vehicle body in fig. 3a with the protection device in a compressed position.

The protection device in fig. 3a-b differs from the protection device in fig. 2a-b mainly in that the wall configuration 120 comprises a front and a rear movable wall element 40, 140.

5 The wall configuration 120 is arranged to constitute a delimitation of a protection zone 130 of the vehicle wherein the front wall element 40 and the rear wall element 140 constitute opposing delimitations of said protection zone.

Said front and rear wall elements 40, 140 are intended to be arranged at a distance from each other in the vehicle body 10 and arranged to run
10 essentially transversal to the longitudinal direction of the vehicle and run essentially from roof to floor in the vehicle for dividing a space in the vehicle.

Said front and rear wall elements 40, 140 are movably arranged in the vehicle body 10 in the longitudinal direction of the vehicle for change of the configuration of said protection zone.

15 The front wall element 40 is movably arranged between an expanded position shown in fig. 3a in which an expanded protection zone 130' is obtained, and a compressed position shown in fig. 3b in which the wall element is moved from the expanded position in the direction of the arrow B such that a compressed protection zone 130 is obtained. In the expanded
20 position the front wall element 40 is connected to additional protection elements 22, 24, 26, 28 in the shape of said protection elements 22, 24 and/or roof protection elements 26 and/or bottom protection elements 28 in accordance with the embodiment described in fig. 2a-b.

Further the rear wall element 140 is movably arranged between an expanded
25 position shown in fig. 3a in which an expanded protection zone 130' is obtained, and a compressed position shown in fig. 3b in which the wall element is moved in the direction of the arrow C from the expanded position such that a compressed protection zone 130 is obtained. In the expanded position the rear wall element 140 is connected to additional protection

elements 122, 124, 126, 128 in the shape of side protection elements 122, 124 and/or roof protection elements 126 and/or bottom protection elements 128 in accordance with the embodiment described in fig. 2a-b.

5 Said wall configuration 120 comprises said wall element 40 as well as said additional protection elements 22, 24, 26, 28, 122, 124, 126, 128 for delimitation of a predetermined protection volume of the protection zone 130, 130'.

10 By having a front and a rear wall element 40, 140 movably arranged in the vehicle body 10 the protection possibility and flexibility of the protection is improved further. Hereby the front wall element 40 may be arranged in the expanded position or the compressed position or positions there between, and at the same time the rear wall element 140 may be arranged in the expanded position or the compressed position or positions there between, additional protection elements 22, 24, 26, 28, 122, 124, 126, 128 being
15 applied in expanded position in dependence of protection needs.

Fig. 4 schematically illustrates a cross sectional view of a vehicle body 10 according to an embodiment of the present invention.

The vehicle body 10 comprises portions 50 for movable cooperation with portions of the wall configuration 2 for facilitating of move of the wall
20 configuration 2 in said vehicle body 10. Said portions 50 according to an embodiment comprise grooves arranged in connection to roof and/or bottom of the vehicle body 10, which groove portions are arranged to receive portions such as wheel portions of the wall configuration arranged to run in said groove portion for provision of said movement of the wall configuration.

25 Said movable cooperation with portions of the wall configuration may be provided by means of any suitable portions, groove portions according to a variant being arranged at the wall configuration to receive portions of the vehicle body 10.

Portions of the vehicle body such as groove portions for movable cooperation with portions of the wall configuration may be arranged on side walls of the vehicle body. 10.

Fig. 5a-d schematically illustrate different views of a wall element 240 of the protection device according to an embodiment of the present invention. 5

The wall element 240 has a protection portion with an inner side 240a with a surface intended to face the protected volume and outer side 240b with a surface intended to be turned away from the protected volume. The wall element 240 has a roof side 240c arranged to run in connection to an upper area of the vehicle body essentially transversal to the longitudinal direction of the vehicle, a bottom side 240d arranged to run in connection to a lower area of the vehicle body essentially transversal to the longitudinal direction of the vehicle, and sides 240e, 240f running along the respective vehicle side between said roof side and bottom side. 10

The wall element 240 comprises portions 244 for movable cooperation with portions 50 of the vehicle body for facilitating moving of the wall element 240 in said vehicle body. 15

The wall element 240 further comprises an opening 248 closed with an openable shutter 246 for facilitating of stowing and access of systems and/or equipment in the vehicle. The shutter 246 is slidably arranged or turnably arranged. The shutter 246 is according to a variant removably arranged. 20

The protection device according to the present invention further comprises means 60 for fixation of said wall configuration, schematically illustrated in fig. 4. According to an embodiment said means 60 for fixation of the wall configuration comprises locking means for lockably arranging the wall configuration in the compressed position or expanded position or positions there between. 25

Said locking means according to this embodiment comprises portions for provision of fastening and locking cooperation between wall elements of the wall configuration and vehicle body 10. Said locking portions according to an embodiment comprises screw joints, clamp tie joints, snap joints or the
5 corresponding.

Said ballistic protection zone according to the present invention according to a variant forms a protection volume being protected according to different levels of STANAG 4569 depending on protection needs.

The wall element according to embodiments of the present invention is
10 according to a variant dividable for facilitating applying the same.

Above different embodiments of a protection device comprising a wall configuration being movably arranged in a vehicle between an expanded and compressed position for adaptation of needs of the configuration of a protection zone, the protection zone in the compressed position having an
15 extension in the longitudinal direction of the vehicle with side, roof and bottom protection elements with ballistic protection properties forming a protection volume.

According to a variant the wall configuration in the compressed position only forms a delimitation of one wall element, wherein a protection volume is
20 formed in the expanded position.

Above a protection device with a wall configuration comprising two movable wall elements arranged at a distance from each other, these delimiting a protection zone forming a protection volume. According to an alternative variant said wall elements, arranged at a distance from each other, form two
25 protection volumes.

According to an additional variant the protection device comprises a wall configuration with more than two movable wall elements arranged at a distance from each other for forming of protection zones.

Above a protection device comprising wall configuration with wall elements movably arranged in the longitudinal direction of the vehicle. According to an alternative variant the protection device comprises one or more wall elements being turnably arranged for adaptation of needs of the configuration of a protection zone, said wall elements being pivotable about one or more axes such that the wall element may be turned between different positions for reinforcing protection level on sides, roof and/or bottom of the vehicle.

The foregoing description of the preferred embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated.

CLAIMS

1. A protection device for a vehicle (1) intended for military application comprising a wall configuration with ballistic protection properties arranged to constitute a delimitation of a protection zone (30, 30'; 130, 130') of the
5 vehicle, wherein said protection zone (30, 30'; 130, 130') has ballistic protection properties, wherein said wall configuration (2; 40, 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) comprises at least one movable wall element (40; 40, 140; 240) arranged to run essentially transverse to the longitudinal direction of the vehicle, **characterized in that** said wall configuration (2; 40,
10 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) is movably arranged in the vehicle for adaptation according to needs of the configuration of said protection zone (30, 30'; 130, 130'), wherein said at least one wall element (40; 40, 140; 240) is movably arranged in the longitudinal direction of the vehicle between an expanded position for an extended protection zone, and
15 a compressed position.
2. A protection device according to claim 1, wherein said protection zone (30, 30'; 130, 130') is intended for objects particularly worth protecting, for example operator and/or passenger.
3. A protection device according to claim 1 or 2, wherein said wall
20 configuration (2; 40, 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) comprises protection material adapted to present protection level of said protection zone.
4. A protection device according to any of claims 1-3, wherein said wall configuration (2; 40, 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) comprises
25 removable additional protection elements (22, 24, 26, 28; 122, 124, 126, 128).

5. A protection device according to claim 4, wherein said additional protection elements (22, 24, 26, 28; 122, 124, 126, 128) comprise side, roof and/or bottom protection elements.
6. A protection device according to any of claims 1-5, wherein said wall configuration (2; 40, 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) comprises said wall elements (40; 40, 140; 240) as well as said additional protection elements (22, 24, 26, 28; 122, 124, 126, 128) for delimitation of a predetermined protection volume of the protection zone.
7. A protection device according to any of claims 1-6, wherein said wall configuration (40, 140, 122, 124, 126, 128) comprises a movably arranged front and a rear wall element (40, 140).
8. A protection device according to any of claims 1-7, wherein said wall configuration (2; 40, 22, 24, 26, 28; 140, 122, 124, 126, 128; 240) is modularly configured.
9. A protection device according to any of claims 1-8, wherein further comprising means (60) for fixation of said wall configuration.
10. A vehicle intended for military application comprising a protection device according to any of claims 1-9.