

**Ministry of Defence**

**Integrated Test, Evaluation and Acceptance Plan**

**(ITEAP)**

**VIRTUS Pulse 2**

**(SAKER and OSPREY 2 Ballistic Protection)**

**Issue 0.4**

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# TEST TABLES

## Contents of Test Tables

1. Test tables have been split into groupings relevant to the assessment phase. Where determination of tests is required, these are detailed in Annex A.
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      3. User Assessment Panel
      4. ILS/SCM/Safety
   2. Phase 2
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      3. ITDU
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| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| 1.1.1 | SAKER plate provides essential  medical coverage to the Torso | Annex A  Paragraph 1 | **PASS/FAIL:**  Due to project constraints only the Threshold Measure of Performance (TMoP) will be assessed.  SAKER shall be provided ''''' ''' ''''''''''''' giving a protected area in the dimensions specified in Annex A Paragraph 1.  PASS – The TMoP has been achieved.  FAIL – The plate submitted has not met the TMoP.  **Scored: Coverage Assessment**  The coverage of the SAKER plate system will be assessed and scored by Dstl using the Weapon Target Interaction (WTI) Tool as detailed in Annex A, Paragraph 1.  All Tenders will be given two assessment opportunities with the WTI Tool (provided by Dstl) to assure the coverage can be optimised.  Full details of the coverage scoring regime are detailed in Appendix 1 of Annex A | SME Validation – System Inspection/  Test | 4 (K)  20 (K) | There will be two assessment opportunities for coverage scoring before final submission of plate design, with two systems allowed in each submission. The final system submitted will form the coverage score. |
| 1.1.2 | OSPREY 2 plate provides essential  medical coverage to the Torso | Annex A  Paragraph 1 | **PASS/FAIL:**  Due to project constraints only the Threshold Measure of Performance (TMoP) will be assessed.  OSPREY 2 shall be provided ''''' ''' ''''''''''''' giving a protected area in the dimensions specified in Annex A Paragraph 1.  PASS – The TMoP has been achieved.  FAIL – The plate submitted has not met the TMoP.  **Scored: Coverage Assessment**  The coverage of the OSPREY 2 plate system will be assessed and scored by Dstl using the Weapon Target Interaction (WTI) Tool as detailed in Annex A, Paragraph 1.  All Tenders will be given two assessment opportunities with the WTI Tool (provided by Dstl) to assure the coverage can be optimised.  Full details of the coverage scoring regime are detailed in Appendix 1 of Annex A | SME Validation – System Inspection/  Test | 4 (K)  20 (K) | There will be two assessment opportunities for coverage scoring before final submission of plate design, with two systems allowed in each submission. The final system submitted will form the coverage score. |
| 1.1.3 | The areal density (AD) of the SAKER system |  | **PASS/FAIL:**  PASS – The OMoP has been achieved. AD of the hard armour plate is to be ''''''''' '''''''''''''''''  PASS – The TMoP has been achieved. AD of the hard armour plate is to be ''''''''' ''''''''''''''''  FAIL – The AD is ''' '''''' '''''''''''''''' | SME Validation – System Inspection/Test  Tender documentation | 10 (K) |  |
| 1.1.4 | The AD of the OSPREY 2 System |  | **PASS/FAIL:**  PASS – The OMoP has been achieved. AD of the hard armour plate is to be '''''''''' ''''''''''''''''  PASS – The TMoP has been achieved. AD of the hard armour plate is to be ''''''''' '''''''''''''''.  FAIL – AD ''' ''''''' '''''''''''''''' | SME Validation – System Inspection/Test  Tender documentation | 11(K) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| 1.2.1 | Fitting and Removal of System Components to desired position   Desired position is defined against specified anthropometric landmarks in  [DSTL/TR098554 v1.0.] |  | **PASS/FAIL:**   This SAT consists of two parts.   **Positioning**  A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment will follow manufacturer's instructions for fitting and removal of the system to check for correct positioning.   Pass =TMoP system fits within the desired position. The plates must be able to be placed in intimate contact with the top centre of the plate pouch  Fail = System does not fit in desired position  **Use of Tools**  Inspection as to whether any tools are required to insert or remove the plate.   Pass = TMoP. No tool required to insert/remove system.  Fail = Tool required to insert/remove system. | SME Validation – System Inspection | 6 (K); 15 (1) | User Trials and CBTF will assess impact on user of position. |
| 1.2.2 | System Components and Mass |  | **PASS/FAIL**:  This SAT consists of a single part.  **System Components and Mass**   A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment will be conducted against the manufacturer supplied evidence of the individual and combined mass of the system components.  PASS = OMoP – In addition to the hard armour plate there is a maximum of a single additional components provided to hold the plate in the desired position, with a mass not to exceed 5% of the total mass of the ballistic plates.  PASS = TMoP - In addition to the hard armour plate there is more than one additional components provided to hold the plate in the desired position, with a mass not to exceed 15% of the total mass of the ballistic plates.  FAIL = Mass of additional component(s) exceeds 15% of the total mass of the ballistic plates.  Note: Manufacturer is to provide system and component mass breakdown. | SME Validation - Documentation Review | 8 (1) | The User Assessment Panel will consider the usefulness, complexity and operational impact of the number of components. |
| 1.2.3 | Identification of Operational and Training systems | Annex A  Paragraph 2 | **PASS/FAIL:**  The Operational and Training Systems must be easily identified as follows:  PASS – The TMoP has been achieved.  Operational – the exterior be a matt finish and not one that could be considered orange in normal daylight conditions.  Training – the exterior to be a bright orange and to include the following wording in large capitals, in a bold font of a contrasting colour to that of the plate, positioned on the front and rear faces of all training plates.  **ONLY FOR USE IN TRAINING –**  **THIS PLATE DOES NOT PROVIDE BALLISTIC PROTECTION**  The training plates meet requirements of the impact and water absorption testing as defined in Annex A, Paragraph 2.  FAIL – The plate submitted has not met the TMoP. | SME Validation – System Inspection | 8(1)  9 (K) |  |
| 1.2.4 | Physical Bulk |  | **PASS/FAIL:**  This SAT consists of a single part.  **SAKER and OSPREY 2 Physical Bulk**  A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment will inspect manufacturer supplied evidence.  PASS = OMoP. There is to be no increase required in the volume in the STV main plates pouches compared to using the OSPREY plate system (including additional item(s) required to hold the plate in the correct position). The system is ''''''''''''''''''' in thickness at all points measured perpendicular to its front surface.  PASS = TMoP. There is to be no increase required in the volume in the STV main plate pouches compared to using the OSPREY plate system (including additional item(s) required to hold the plate in the correct position). The system is no thicker at all points measured perpendicular to its front surface compared to the OSPREY plate system.  Fail = The SAKER or OSPREY 2 system is thicker than Project VIRTUS Pulse 1 OSPREY system plate. | SME Validation – System Inspection/Test | 12 (1) | The ballistic protection aspects of SR12 will be assessed through ballistic trials. This SAT will only assess the physical bulk aspects of SR12. |
| 1.2.5 | Physical Integrity in Climatic and Storage Conditions |  | **PASS/FAIL:**   This SAT consists of two parts.   **Physical Integrity in Climatic Conditions**   A desk level technical evaluation of the Tender submission to ensure technical compliance. The Authority will assess the manufacturers’ supplied evidence.  PASS = Manufacturers’ Certificate of Conformity of system components against TMoP climatic conditions.   FAIL = No satisfactory evidence or Certificate of Conformity provided.  **Physical Integrity in Storage Conditions** A desk level technical evaluation of the Tender submission to ensure technical compliance. The Authority will assess the manufacturers’ supplied evidence.  PASS = OMoP – Manufacturers’ guarantee of no reduction in ballistic performance for any component for 10 years Shelf Life.  PASS = TMoP – Manufacturers’ guarantee of no reduction in ballistic performance for any component for 5 years Shelf Life.  FAIL = TMoP not achieved. | SME Validation - Documentation Review | 13 (1), 33 (1) |  |
| 1.2.6 | Indication of damage to protection functionality |  | **PASS/FAIL:**   **Correct Functioning User Inspection**  A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment of provided instructions and/or ''''''''''''''''''''' ''''' ''''''''''''''''''''''''''''''''''' ''''''''' '''''''''''''''' to assist the User in identifying damage that would be detrimental to system performance.  PASS = OMoP – In addition to the TMoP the Manufacturer provides instructions '''' '''' ''''''''''''''''''''''''''''''''''''''' ''''''''''''''''''''''''''''''' and evidence demonstrating the operating parameters (e.g. battery life in high/low temperatures, reliability, minimal support).  PASS = TMoP - Manufacturer provided instructions for User check procedure that does not incorporate a ''''''''''''''''''''''''''''''''''''''' '''''''''''''''''''''''''''''  FAIL = Instructions not provided, or not suitable to support user identifying correct functioning ''''' '''''''' '''''''''''''''''''''''''' '''''''''''''''''.  *Note*: Manufacturer to provide damage indication that initiates an inspection procedure to assist the User in identifying damage that could be detrimental to ballistic performance. | SME Verification - Documentation Review | 27 (1) | There will be no ballistic testing element to this requirement.   User Trial will assess use of procedure in the field.  ILS assessment will consider the sustainability elements of ''''''''' ''''''''''''''''''''''''''''' solutions.  If an '''''''''''''''''''''''' '''''''''''''''''''''''''' '''' ''''''''''''''''''''''' '''''' ''''''''''''' '''''''''' ''''''''''' assessment will be required as described in the Annex B of the SRD. |
| 1.2.7 | Labelling for SAKER and OSPREY 2 | Annex A  Paragraph 11 | **PASS/FAIL:**  This will be tested against the Tender submission and labelling information contained in manufacturers’ supporting documentation.  Pass = TMoP - Both the SAKER and OSPREY 2 Operational and Training plates are to be labelled in accordance with the requirements of Annex A, Paragraph 11.  Fail = Failed to meet TMoP. | SME Validation – System Inspection/  Test | 28 (1) |  |
| 1.2.8 | Use and Maintenance Documentation |  | **PASS/FAIL:**  **Documentation**   A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment of Manufacturers’ provided instructions and documentation.   PASS = TMoP - Listed documentation provided (Sizing, Fitting, General usage, Maintenance, Inspection); and commitment to through life update support.   FAIL = Listed documentation is not provided or it is not of an acceptable standard. | SME Validation - Documentation Review | 29 (1) | User Assessment Panel will assess the value/usability of the provided documentation.  ILS assessment will include review of use and maintenance documentation. |
| 1.2.9 | Cleanability |  | **PASS/FAIL:**   **Cleanability** A desk level technical evaluation of the Tender submission to ensure technical compliance. Assessment of Manufacturers’ evidence against the effect of the recommended cleaning regime on ballistic performance.  PASS = TMoP. Manufacturers’ evidence demonstrates no degradation of system performance as a result of the manufacturers’ recommended cleaning routine.   FAIL = No acceptable evidence provided. | SME Verification - Documentation Review | 35 (1) | Care and maintenance instructions assessed under 'Documentation' test |

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| --- | --- | --- | --- | --- | --- | --- |
| 1.3.1 | Remain Correctly and Securely Positioned - User Assessment Panel |  | **Scored: Subjective Feedback**  This SAT consists of a single part.   **Remain Securely and Correctly Positioned**   The User Assessment Panel consists of generalist and specialist Users who will conduct first look assessments drawing on military experience as to the suitability of the system set against the SRs.  Assessment will consider whether the system remains correctly and securely positioned during use.  This part will be scored with a subjective based judgement rating using a numerical scale.   Assessment may be supported by additional evidence gained in the DCCT to assess the impact of the position of the plates on use through a range of recognised firing positions including transition between positions. | SME judgement and subjective feedback | 6 (K) |  |
| 1.3.2 | Intuitive Use – User Assessment Panel |  | **Scored: Subjective Feedback**  This SAT consists of a single part.  **Intuitive Use – User Assessment Panel**   The User Assessment Panel consists of generalist and specialist Users who will conduct first look assessments drawing on military experience as to the suitability of the system set against the SRs.  Assessment will consider whether the system is intuitive to use, following a single 45 minute lesson.  This part will be scored with a subjective based judgement rating using a numerical scale.   Note: associated training aides are to be provided by the Manufacture as required. | SME judgement and subjective feedback | 7 (1) |  |
| 1.3.3 | Impact of the Number of Components on Use |  | **Scored: Subjective Feedback**  This SAT consists of a single part.  **Number of Components**  The User Assessment Panel consists of generalist and specialist Users who will conduct first look assessments drawing on military experience as to the suitability of the system set against the SRs.  The user will consider the usefulness, complexity and operational impact of the number of components.  This part will be scored with a subjective based judgement rating using a numerical scale. | SME judgement and subjective feedback | 8 (1) |  |
| 1.3.4 | Insertion, Positioning and Removal |  | **Pass/Fail**   **Inserting and Removing the system**  The User Assessment Panel consists of generalist and specialist Users who will conduct first look assessments drawing on military experience as to the suitability of the system set against the SRs.  The User will fit and remove the system as per the manufacturer’s instructions:   Pass = a single User is able to correctly fit, insert, position and remove the system without assistance  Fail = a single User is unable to correctly fit, insert, position and remove the system without assistance | Measured Performance | 23 (1) | Complexity of use is assessed in a separate User Assessment Panel test. This test only looks at whether a single user can fit the plates. |
| 1.3.5 | Suitability of Documentation |  | **Scored: Subjective Feedback**  This SAT consists of a single part.  **Documentation**  The User Assessment Panel consists of generalist and specialist Users who will conduct first look assessments drawing on military experience as to the suitability of the system set against the SRs.  The user will consider the usefulness, complexity and value of documentation.   This part will be scored with a subjective based judgement rating using a numerical scale. | SME judgement and subjective feedback | 29 (1) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
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| 1.4.1 | ILS/SCM | Integrated Logistic Support, Statement of Requirement | **Scored: Statement of Work**  Integrated Logistic Support (ILS) and Supply Chain Management (SCM) SMEs will assess the manufacturer’s supplied documentation and evidence. Assessment will mark compliance against the ILS Statement of Requirement. | SME Validation - Documentation Review | 27 (1), 29 (1), 31 (1), 32 (2), 36 (1), 37 (1) |  |
| 1.4.2 | Legislation and Regulations |  | **PASS/FAIL**  **Legislation and Regulations**  Assessment will be an SME review of the Manufacturer’s documentation, ensuring that it demonstrates the appropriate level of information to demonstrate the plates are safe by design (test information, hazard assessment and identification of residual risk)  PASS = TMoP/OMoP. Compliant with mandatory requirement of SR-24, SR-25 and SR-26.  FAIL = Below TMoP. Information to demonstrate compliance was not provided. | Pass/Fail | 24 (M), 25 (M), 26 (M) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| 2.1.1 | The SAKER system shall perform as intended in both wet and dry conditions  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 3 | **PASS/FAIL:**  The system shall perform as intended in both wet and dry environments as defined in Annex A, Paragraph 3.  The system is to be tested wet at room temp following submersion in potable tap water.  PASS – The OMoP has been achieved. **NO** increase in mass of the hard armour plate subsequent to immersion test  PASS – The lowest TMoP has been achieved Exposure results in **'''''''' ''''''' '''''''''** increase in mass of the hard armour plate subsequent to immersion test  PASS – The mid-level TMoP has been achieved. Exposure to results in **''''''''' '''''''' ''''''''''''** increase in mass of the hard armour plate subsequent to immersion test  PASS – The highest TMoP been achieved. Exposure results in **'''''''''' ''''''' '''''''''''** increase in mass of the hard armour plate subsequent to immersion test  FAIL – The system has failed to meet TMoP. Exposure results in **''''''''''** increase in mass of the hard armour plate subsequent to immersion. | SME Validation – System Inspection/Test | 14 (1) | Body Armour performance is generally impaired when wet compared to when dry |
| 2.1.2 | The SAKER system shall provide protection against SAA threats  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 4 | **PASS/FAIL:**  The system shall provide protection to the User from the defined threat, as detailed in '''''''''''''''' '''' ''''' '''''''''''''' ''''''''''' '''''''' '''''''''''''''''''''' ''''''''''''''''''' ''''' '''''''' '''''''''''''  To be tested in accordance ''''''''' '''''''''''' ''''''''''' ''''''''' ''''''' '''''''''''''''''''''''''''''' ''''''''''''''''' ''''' '''''''''''''''' ''''' ''''''''''''''''''''''' ''' | SME Validation – System Inspection/Test | 1 (K)  5 (1) | It has been deduced that if ''''''''''''''''' ''''''''' ''''''''''''' '''''''' '''''''''''''''''''' '''''''''''' ''''''''''''' ''''''''''' ''' '''''''''''' '''''''''' '''''' ''''''''''' ''''' ''''''''''''''' ''''''''' ''''''''''''''''' ''''''''''''''''''''' '''''''''''''' ''''''' ''''''''''''''''''' ''''''''''' ''''''''''''''''''' '''''''' '''''''''''''''''''' '''''''' ''''''' '''''''''''''' ''''''''''''''''' ''' ''''''''''''''''''' ''''''''''''''. |
| 2.1.3 | The SAKER system shall be reliable  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 5 | **PASS/FAIL:**  The system will undergo ballistic testing in accordance with AEP 2920 except where variations in the acceptance criteria are stated in this ITEAP.  PASS – The OMoP has been achieved. ''''''' ''''''''''''''' '''''''''''''''' ''''''''''' ''' '''''''''''''''''' ''''' '''''' ''''''''''''''''  PASS – The highest TMoP has been achieved. '''' '''''''''''''''''''' ''''' '''''''''''''''''''''''' '''' ''''''''''''''' '''' ''''''''''''''''''''''''''' '''' '''''''''' ''''''''''''' ''' ''''''''''''''''''''' '''''''''''''''''''''''''''' ''''' ''''''''''''''''''''' ''''''''''' ''''''''''' '''''''''''''''''''''''''''''' '''''''''' ''' ''''''''''''''''' ''''' '''''' ''''''''''''''  PASS – The lowest TMoP has been achieved. '''' '''''''''''''''''''' '''''' ''''''''''''''''''''' ''''' '''''''''''''' '''' ''''''''''''''''''''''''' ''' ''''''''' '''''''''''''' '''' '''''''''''''''''''' ''''''''''''''''''''''''' '''''' '''''''''''''''''''''''' ''''''''''''' '''''''''''' '''''''''''''''''''''''''' ''''''''''' ''' ''''''''''''''''' ''''' '''''' ''''''''''''''  FAIL – The system has failed to meet the lowest TMoP. More than ''' ''''''''''''''''''' '''''' ''''''''''''''''''''''' '''' '''''''''''''''' ''''' ''''''''''''''''''''''''''' ''' ''''''''' '''''''''''''' ''' '''''''''''''''''''''' '''''''''''''''''''''''''' ''''' ''''''''''''''''''''''''' ''''''''''''' '''''''''''' '''''''''''''''''''''''''''' '''''''''' ''' ''''''''''''''''' '''''' '''''''''''''' | SME Validation – System Inspection/Test | 3 (K)  30 (1)  34 (1) |  |
| 2.1.4 | The OSPREY 2 system shall perform as intended in both wet and dry conditions  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 7 | **PASS/FAIL:**  The system shall perform as intended in both we and dry environments as defined in Annex A, Paragraph 7.  The system is to be tested wet at room temp with wetting liquid to be potable tap water.  PASS – The OMoP has been achieved. **NO** increase in mass of the hard armour plate subsequent to immersion test  PASS – The lowest TMoP has been achieved Exposure results in **'''''''''' '''''' '''''''''** increase in mass of the hard armour plate subsequent to immersion test  PASS – The mid-level TMoP has been achieved. Exposure to results in **''''''''' ''''''' ''''''''''''** increase in mass of the hard armour plate subsequent to immersion test  PASS – The highest TMoP been achieved. Exposure results in **'''''''''' ''''''' '''''''''''** increase in mass of the hard armour plate subsequent to immersion test  FAIL – The system has failed to meet TMoP. Exposure results in **''''''''''** increase in mass of the hard armour plate subsequent to immersion. | SME Validation – System Inspection/Test | 14 (1) | Body Armour performance is generally impaired when wet compared to when dry. |
| 2.1.5 | The OSPREY 2 system shall provide protection against SAA threats  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 8 | **PASS/FAIL:**  The system shall provide protection to the wearer from the defined threat, as detailed in '''''''''''''''' ''' ''''' '''''''''''''' '''''''''' ''''''' ''''''''''''''''''''''' ''''''''''''''''''  To be tested in accordance with '''''''''' ''''''''''' ''''''''' '''''''' ''''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''' ''''''''''''''' ''''' ''''''''''''''''''''''''''' ''''' | SME Validation – System Inspection  /Test | 2 (K)  5 (1) | It has been verified ''''''''' ''' ''''''''''''''''''''''' ''' '''''''' ''''''''''''''' '''''''' '''''''''''''''''' '''''''''''''' ''''''''''''' ''''''''''' ''' ''''''''''' ''''''''''' '''''' ''''''''''' ''''' '''''''''''''''' '''''''' '''''''''''''''''' '''''''''''''''''''''' '''''''''''''' '''''' '''''''''''''''''' ''''''''''' ''''''''''''''''''''' '''' ''''''' ''''''''''''''''''''''' '''''''' ''''''' '''''''''''''' '''''''''''''''' ''' ''''''''''''''''''''' threat. |
| 2.1.6 | The OSPREY 2 system shall be reliable  [NATO Allied Engineering Publication (AEP) 2920] | Annex A  Paragraph 9 | **PASS/FAIL:**  The system will undergo ballistic testing in accordance with AEP 2920 except where variations in the acceptance criteria are stated in this ITEAP  PASS – The OMoP has been achieved. ''''''' ''''''''''''' ''''''''''''' ''''''''' '''' ''''''''''''''''' ''''' '''''' ''''''''''''''  PASS – The highest TMoP has been achieved. ''' '''''''''''''''''' ''''' '''''''''''''''''''''''' ''''' '''''''''''''' '''' ''''''''''''''''''''''' ''' '''''''''' '''''''''''''' '''' ''''''''''''''''''''' ''''''''''''''''''''''''' ''''' '''''''''''''''''''''' ''''''''''''' '''''''''''' '''''''''''''''''''''''''''''''' ''''''''''' ''' ''''''''''''''''''' ''''' ''''''''''''''  PASS – The lowest TMoP has been achieved. '''' '''''''''''''''''''''' '''''' '''''''''''''''''''''''' ''''' '''''''''''''''' '''' '''''''''''''''''''''''' '''' ''''''''''' '''''''''''' '''' ''''''''''''''''''''''' ''''''''''''''''''''''''''''' ''''' ''''''''''''''''''''''' ''''''''''' '''''''''''' ''''''''''''''''''''''''''''''' '''''''''' ''' ''''''''''''''''''' '''''' '''''''''''''  FAIL – The system has failed to meet the lowest TMoP. ''''''''''''' ''''''''''' ''' '''''''''''''''''''''''' '''''' '''''''''''''''''''''' '''' '''''''''''''' '''' ''''''''''''''''''''''' '''' ''''''''' ''''''''''''' ''' '''''''''''''''''''''' ''''''''''''''''''''''''''''' ''''' ''''''''''''''''''''''''' ''''''''''' ''''''''''' ''''''''''''''''''''''''''''''' ''''''''''' '''' '''''''''''''''' '''''' ''''''''''''''''' | SME Validation – System Inspection/  Test | 3 (K)  30 (1)  34 (1) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| 2.2.1 | Remain Correctly and Securely Positioned During CBTF |  | **PASS/FAIL**  This SAT consists of a single part.   **CBTF - Remain Correctly and Securely positioned** The position of the plate will be objectively measured at the start and the end of the CBTF activity. It will be assessed against the desired position as defined against specified anthropometric landmarks in [DSTL/TR098554 v1.0].  Pass = Plate position satisfactorily covers the desired coverage areas at the end of the CBTF activity.   Fail = Plate position does not satisfactorily cover the desired coverage areas at the end of the CBTF activity. | Measured Performance | 6 (K) | Trial participants will be instructed not to re-position the plates during any part of the test |
| 2.2.2 | Time to Insert/Position/Remove system |  | **PASS/FAIL**  This SAT consists of a two parts.   **Time to Insert/Position/Remove system** The time taken will be recorded for the User to complete removal of the system (and any item(s) required to hold it in position) from the VIRTUS plate pouch, followed by repositioning of it in another STV, with and without the use of the in-service warm weather glove. Timing will be recorded and marked by Dstl as a Pass/Fail against the Threshold MoP. Scoring will be against the OMoP/TMoP scale.   PASS = OMoP. Removal/insertion completed in '''''' '''''''''''''''''.  PASS = TMoP. Removal/insertion completed in ''''''' ''''''''''' '''''' '''''''''''''''''''   FAIL= Removal/insertion completed in ''''''' '''''''''''''''''''  **Inserting and removing the system without assistance**   The User will fit and remove the system as per the manufacturer’s instructions:  Pass: a single User is able to fit and remove the system without assistance.  Fail: a single User is unable to fit and remove the system without assistance. | Timed Performance and Pass/Fail | 17 (2), 23 (1) |  |
| 2.2.3 | CBTF Integration |  | **Scored: Subjective Feedback**  The CBTF will be the primary source of HFI assessment. A set of scenarios covering typical movement and manoeuvre in the Dismounted Close Combat environment will be assessed utilising the CBTF. SSET Users will assess each Tender response, and a base line control of VIRTUS Pulse 1 with the OSPREY plate.  **CBTF - Integration** Users will provide a subjective response to a questionnaire to assess whether User movement is not adversely affected during a range of military tasks with a range of DCC equipment types that are currently used by VIRTUS Pulse 1 DCC Users.  This part will be scored with a subjective based judgement rating using a numerical scale. The score with the OSPREY plate will be used as a baseline to assess acceptability. | Subjective Feedback | 19 (1) |  |
| 2.2.4 | Discomfort |  | **Scored: Subjective Feedback**  The CBTF will be the primary source of HFI assessment. A set of scenarios covering typical mobility in the Dismounted Close Combat environment will be assessed utilising the CBTF. SSET Users will assess each Tender response, and a base line control of VIRTUS Pulse 1 with the OSPREY plate.   **CBTF - Discomfort** Users will provide a subjective response to a questionnaire to assess areas of discomfort during the CBTF. Assessment will include an image of the torso/vest so that Users can mark areas of discomfort on the body.   This test will be scored with subjective based judgement using numerical scale.  Note: CBTF will trial systems for less than 24hrs duration. | Subjective Feedback | 21 (1) |  |
| 2.2.5 | CBTF Manoeuvre and movement |  | **Scored: Subjective Feedback**  The CBTF will be the primary source of HFI assessment. A set of scenarios covering typical mobility in the Dismounted Close Combat environment will be assessed utilising the CBTF. SSET Users will assess each Tender response, and a base line control of VIRTUS Pulse 1 with the OSPREY plate.   **CBTF - Manoeuvre and movement** Users will provide a subjective response to a questionnaire to assess whether mobility is not adversely affected during a range of military tasks with a range of DCC equipment types that are currently used by VIRTUS Pulse 1 DCC Users.  This part will be scored with a subjective based judgement rating using a numerical scale. The score with the OSPREY plate will be used as a baseline to assess acceptability. | Subjective Feedback | 22 (1) |  |
| 2.2.6 | Rough Handling |  | **PASS/FAIL**   This test consists of multiple parts.   SSET troops will assess each system and a baseline through a series of scenarios for conducting general military tasks.  **CBTF** Routine visual inspection of the plate will be carried out against manufacturer’s instructions by a Military Advisor as part of the CBTF trial to assess for any damage (e.g. cracks, dents, corrosion or any other damage that would constitute either an actual or potential reduction in protective performance) that does not have an ordinary/explainable reportable cause. Any reportable events will be recorded.   Pass = No non-ordinary damage observed  Fail = Damage observed without an incident occurring for a reportable replacement. | Observation | 18 (1) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- |
| 2.3.1 | Remain Correctly and Securely Positioned During Typical Use |  | **Scored: Subjective Feedback**  This SAT consists of multiple parts.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the analogue scale. All collected data will feed into an overarching ITDU report, which will provide recommendations on the suitability of the Tender.  **Mechanical Moving Target Track Range (MMTTR)** Assessment will be supported by evidence gained during MMTTR firing to assess the impact of the position of the plates on use through a range of firing positions in accordance with Operational Shooting Policy (OSP), Volume 1 – Personal Weapons, Chapter 3 – The Rifle, Section 5 – Transition to Live Fire Tactical Training (TLFTT)  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability.  **ITDU Battlefield Missions (BFMs)** Assessment will be supported by evidence gained during BFMs to assess the impact on plate position through a range of tasks and standing, kneeling and prone firing positions.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability.   **Specialist Trials Developments Units (Armoured TDU (ATDU), Communication and Information Systems TDU (CISTDU), Combat Service Support TDU (CSSTDU), Royal Artillery TDU (RATDU) and Royal Engineer TDU (RETDU)).** Assessment will be supported by evidence gained in assessing the impact of the position of the plates on use through a range of tasks and typical Specialist Unit tasks.   This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 6 (K) |  |
| 2.3.2 | Simple to Operate and Requires Minimal Training |  | **Scored: Subjective Feedback** This SAT consists of multiple parts.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the analogue scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.   **ITDU Battlefield Missions (BFMs)** The user needs to be able to read, understand and pick up training information quickly. The assessment will be based on the relative intuitiveness of using the systems, and the ease of training.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability.   **Specialist Trials Developments Units (ATDU, CISTDU, CSSTDU, RATDU and RETDU).**  The user is required to be able to read, understand and pick up training information quickly. The assessment will be based on the relative intuitiveness of using the system, and the ease of training.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 7 (1) |  |
| 2.3.3 | Low Light Conditions |  | **Scored: Subjective Feedback**  This SAT consists of a single part.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the numerical scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs** The User will assess the ease of fitting and removing plates in low light conditions. Weather conditions and light millilux levels will be recorded for the trial.   This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 16 (2) |  |
| 2.3.4 | Rough Handling |  | **PASS/FAIL**   This SAT consists of multiple parts.   SSET troops will assess each system and a baseline through a series of scenarios for conducting general military tasks.   **ITDU Battlefield Missions (BFMs)** Routine visual inspection of the plate will be carried out by the User against manufacturer’s instructions as part of various phases of the trial to assess for any damage (e.g. cracks, dents, corrosion or any other damage that would constitute either an actual or perceived loss in ballistic performance) that does not have an ordinary reportable cause. Any reportable events will be recorded.   Pass: No ordinary/explainable damage observed  Fail: Damage observed without an incident occurring for a reportable replacement. | Observation | 18 (1) |  |
| 2.3.5 | TDU Physical Integration |  | **Scored: Subjective Feedback**  This SAT consists of multiple parts.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting specified military tasks in the Land environment.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the numerical scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs** User movement is not adversely affected during a range of military tasks with a range of DCC equipment type that is currently used by VIRTUS Pulse 1 DCC Users as detailed in SRD Annex B Integration List.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability.   **Specialist TDUs** The User will assess whether access/egress of a Specialist TDU set of representative vehicle military vehicles (as detailed in SRD Annex B Integration List) is better, worst or no different than the OSPREY baseline.   This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 19 (1) |  |
| 2.3.6 | Discomfort |  | **Scored: Subjective Feedback**  This SAT consists of a single part.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the analogue scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs** As part of the overall assessment of BFM with use over 24 hours, the User will assess the relative discomfort through subjective scoring on a pain map. The pain map will represent the VIRTUS Pulse 1 vest so as only to assess those areas affected by the plate.  This part will be scored with subjective based judgement using numerical scale.   Note: Dstl will assess pain/discomfort during CBTF and will note any occurrence, which may be used to provide additional evidence when marking this SR. | Subjective Feedback | 21 (1) |  |
| 2.3.7 | ITDU Manoeuvre and Movement |  | **Scored: Subjective Feedback**  This SAT consists of a single part.   SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the analogue scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs** As part of the overall assessment of BFM, the User will assess the impact of the system on the ability to manoeuvre and conduct general military tasks.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 22 (1) |  |
| 2.3.8 | User application of functionality inspection |  | **Scored: Subjective Feedback**  SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores using a numerical scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs**  The User will apply the manufacturer’s inspection instructions as part of the daily use initial inspection stage, and assess the ease of use of the methodology. Any deviation required from the specified inspection regime will be recorded.  This part will be scored with a subjective based judgement rating using a numerical scale. The OSPREY plate score will be used as a baseline to assess acceptability. | Subjective Feedback | 27 (1) |  |
| 2.3.9 | Cleanability |  | **Scored: Subjective Feedback**  SSET troops will subjectively assess each system and a baseline through a series of scenarios for conducting general military tasks.   Note: Qualitative comments may be captured and reviewed to aid understanding of the scores of the analogue scale. All collected data will feed into an overarching ITDU report, which will give recommendations on the suitability of the Tender.  **ITDU BFMs**  At the end of each BFM phase, where applicable, cleaning will take place. The User will assess the ease of cleaning based on the provided documentation and instructions.   This part will be scored with a subjective based judgement rating using a numerical scale. The baseline OSPREY plate score will be used as a baseline to assess acceptability. | Subjective feedback | 35 (1) |  |

| **ID** | **SAT** | **Determination Details** | **SAT Scoring Method** | **Test Category** | | **SR link**  **(Priority)** | **Comments** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 3.1.1 | Codification and Labelling |  | **PASS/FAIL:**   Post contract award, the manufacturer will ensure the system includes labelling on each discrete component that provides NATO codification, as well as descriptive and sizing information in a standardised format [DEFSTAN 81-41].  Each item must have a 2D Barcode that complies with the following:   * DEFSTAN 05-132 – Marking of Service Material Items Using a Unique Item Identifier (UII) * DEFSTAN 81-41 Pt6 – Packaging of Defence Materials * 2017DIN04-101 – Assets Subject to Special Controls – United States Export Control Regulations (as appropriate) | | SME Validation – System Inspection | 28 (1) |  |
| 3.1.2 | All production batches of the SAKER system shall be manufactured to the initially accepted performance | Annex A  Paragraph 6 | **PASS/FAIL:**  Each production batch – defined as ''''''''''''' '''''''''''''''''' Plates is to be subjected to a minimum of '''''' ''''''''' ''''''''''''''''''''' conducted in the same manner as SAT 2.1.3 with the exceptions as described in ''''''''''''''' ''' '''''''''''''''''''''' '''''  Batch testing is predicated on what MoP the system achieved for SR 3 during Test 2.1.3  PASS – If '''''' ''''''''' iterations are conducted with no failure of CP or BFD greater than '''''''''''''', then the batch can then be accepted for use.  FAIL – If ''' test iterations results in failure, testing is halted and the entire batch is to be rejected.  See flow diagram in '''''''''''''' ''''' '''''''''''''''''''''' '''''''''' | | SME Validation – System Inspection/  Test | 30 (1), 33(1) |  |
| 3.1.3 | All production batches of the OSPREY 2 system shall be manufactured to the initially accepted performance | Annex A  Paragraph 10 | **Pass/Fail:**  Each production batch – defined as ''''''''''''' ''''''''''''''''''''''' ''' Plates - is to be subjected to a minimum of '''''' ''''''''' iterations conducted in the same manner as SAT 2.1.6 with the exceptions as described in '''''''''''''' '''' '''''''''''''''''''''''' ''''''''  Batch testing is predicated on what MoP the system achieved for SR 3 during Test 2.1.6  PASS – If '''''' ''''''''' iterations are conducted with no failure of CP or BFD greater than ''''''''''''''', then the batch can then be accepted for use.  FAIL – If ''' test iterations results in failure, testing is halted and the entire batch is to be rejected.  See flow diagram in ''''''''''''''''' ''''' ''''''''''''''''''''''''' ''''''''''''''' | | SME Validation – System Inspection/  Test | 30 (1). 33(1) |  |

# Annex A DETERMINATION FOR Tender evaluation SAT matrix

DETERMINATION FOR TENDER EVALUATION TEST MATRIX

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| --- |
| 1. **SAT-1.1.1 Essential Medical Coverage To The Torso** |
| * 1. **Essential Medical Coverage To The Torso**   The anatomical structures defined as Essential Coverage are:          The anthropometric landmarks for the essential anatomical coverage of the torso from the front are defined in Table 1.   |  |  | | --- | --- | | **Internal anatomical structure (Essential Coverage)** | **Corresponding External anthropometric landmark** | | ''''''''''''''''''''' ''''''''''''' ''''' ''''''' '''''''''' ''''' ''''''''' '''''''''''' | ''''''''''''''''''''''''''''''' '''''''''''''' | | ''''''''''''''' '''''''''''' '''' ''''''''' '''''''''' | '''''''''''''''' ''''''''''''''' '''' ''''''' '''''' ''''''''''' '''''''''''' ''''''''' | | ''''''''''''''''''''''' ''''' ''''''' ''''''''''''''''''''''''' ''''''''''''' | '''''''''' ''''''''''' |   Table 1: Anthropometric landmarks  From the posterior; the location of the anatomical structures are identical to those identified from the anterior; and the corresponding anthropometric landmarks for the posterior are recommended as being horizontal with the corresponding landmarks for the anterior (See Figure 1 and Figure 2).    '''''''''''''''''''''''''''' ''''''''''' ''''''''''''''''''''''''' '''' '''''' ''''''''''''''''' '''''''''' ''''' '''''' ''''''''' '''' ''''''' ''''''''''  ''''''''''''''' '''''''''''' '''' '''''' '''''' '''''''' ''''''''' '''''' ''''''''''''''''''''''''''' '''' '''''' ''''''''''''' '''''''''' '''' ''''''' '''''''''  '''''''''''' '''''''''' '''''''''''''''''''''''''''' '''' ''''''' ''''''''''''''''''''' '''' '''''' '''''''''''''''''''''' ''''''''''  Figure 1: Relation of external landmarks to the internal anatomical structures, corresponding to essential coverage of the torso – Anterior.    ''''''''''''''''''''''''' '''''''''''' '''''''''''''''''''''''''' '''' '''''' ''''''''''''''''' ''''''''' '''' ''''''' ''''''' '''' '''''' ''''''''''  '''''''''''''' ''''''''''''' '''' '''''' '''''' '''''''' '''''''''' ''''''' ''''''''''''''''''''''''' '''' '''''' ''''''''''''''' ''''''''' '''' ''''''' ''''''''  '''''''''' ''''''''' ''''''''''''''''''''''''''''' '''' ''''''' '''''''''''''''''''''' '''' '''''' '''''''''''''''''''' ''''''''''''  Figure 2: Relation of external landmarks to the internal anatomical structures, corresponding to essential coverage of the torso – Posterior.   * 1. **Threshold and Objective Plate Dimensions**   Threshold and objective lengths:  The Threshold and Objective lengths are defined for the five plate sizes Table 2 below.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  | Plate Size | | | | | |  |  | '''''''''''' ''''''''''''' | '''''''''''''' | '''''''''''''''''''' | '''''''''''''' | '''''''''''' ''''''''''''''' | | Threshold Length (mm) | | ''''''''' | '''''''''' | ''''''''' | ''''''''' | '''''''''' | | Objective Length (mm) | | ''''''''' | '''''''''' | '''''''' | '''''''''' | ''''''''' |   Table 2: Threshold and objective lengths of plate  For example, the medium plate has a Threshold length of ''''''''''''''''''' and an Objective length of ''''''''''''''''''''  Threshold and objective widths:  Fixed widths are suggested as the threshold widths for all sizes of plates;   * '''''''''''''''''' '''' ''''''''''''''''''' as the Threshold bottom width. * ''''''''''''''''' '''' ''''''''''''''''' as the Threshold top width. * A single continuous width of '''''''''''''''''''' ''''' '''''''' Objective width – i.e. a rectangular plate.   See Figure for a diagram defining top and bottom widths.  **Threshold top lengths:**  The top length of each plate depends on the defined threshold length of the plate size. This is defined to ensure sufficient protection to the heart and aorta, but allow for a reduction in plate width in that area.   * The Threshold top length of the plate is defined to be '''''''''''' ''''' the Threshold length for the size of plate. This is defined in Table below. * There is no restriction on the bottom length of plate.  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  | Plate Size | | | | | |  |  | ''''''''''''' ''''''''''''' | ''''''''''''' | '''''''''''''''''' | '''''''''''''' | '''''''''''''' ''''''''''''' | | Threshold top lengths (mm) | | '''''''''' | '''''''''' | ''''''''' | ''''''''' | '''''''''' |   Table 3: Threshold top length of plate  **Plate shape:**  Figure 3 visualises the defined lengths and widths that the 2-dimensional projection of the plate must meet.    Figure 3: Plate dimensions  **Rounding of corners:**  At each of the six right angled corners, rounding will be permitted to enable the production of an ergonomic plate. The 2-dimensional projection of the plate will not have to cover the triangle made by joining a hypotenuse between 20mm distances along the 2 edges joining at the corner. This is visualised in Figure 4.    Figure 4: Allowance of rounding of corners of 20mm.   * 1. **Weapon Target Interaction (WTI) Tool**   The plate coverage will be assessed using the WTI tool to quantify the coverage of plates that meet the Threshold dimensions. Only coverage of the torso/abdomen region will be assessed. Full details of the Coverage Scoring Regime and WTI Model assessments are detailed in Appendix 1 of this Annex  The WTI assessments consist of:       * Grids ''''' '''''''''''' resolution that cover the torso are arranged from each of these angles. * At each point of these grids a shot line is used to simulate the impact of a bullet through the torso. * Expected injures from projectile impacts are simulated for each of the shot-lines, * This is repeated for every shot line in the grid; * The total number of shot-lines that result in unsurvivable, critical and severe injuries are calculated, minimising these injuries results in better coverage. * More detailed explanation of WTI, the “VIRTUS Pulse 2 Coverage Definition and Assessment Method”, and how the different levels of injuries are determined can be provided as part of the Pre-Tender Phase (Section 4) Briefing Workshop.   ''''''''' ''''''' '''''''''''''''''''' ''' ''''''''''''''''''''' ''''''''''''''''''''''''' '''''''''''''' '''''''''''''''' '''''''''''''''''''''' ''''' '''''''''''''''''''''''''''' '''''''''' ''''''''''''''' ''''''' ''''''''' '''''''''''''''' '''''''' '''''''''''''''''''' '''''''''''''''''''''''''''  '''''''''' '''''''''''' '''' ''''''''''''''''''' '''''''  '''''''''''' '''' ''''' ''' ''''' '''' '''''' ''' '''''''''' ''' ''''' ''' ''''''''''  This WCS is then compared to the WCS of the Threshold Coverage (TC) and Objective Coverage (OC) of the Threshold and Objective size plates '''''''''''''''''''''' ''''' ''''''''' ''''''''' '''''''' '''''''''''''''''''''''''''' '''''''''' '''' '''''''''''''' '''' '''''''''''' '''''''' ''''' '''''''' ''''''''''''''''' '''''''''  '''''''''''''''''''' ''''''''''''''''''''''''' ''''''''''''''' '''''''''''''' ''' '' ''''''''''''' ''' ''''''''' '' '''''''''' ''' ''''''''' '' ''' ''''''  The projected area (PA) of the plate ''''' ''''''''''''' ''''' '''''''''' ''''''''''' '''' determine the Overall Coverage Score (OCS). This is compared to the Threshold Area (TA) and Objective Area (OA) and is given a score out of 10 defined as:  '''''''''''''''''' ''''''''''' ''''''''''''''' '''''''''''''''' ''' '' ''''''''' '' ''''''''' '' '''''''''' '''' ''''''''' '' ''' '''''''  The Overall Coverage Score (OCS) is then defined as:  ''''''''''''' ''' ''''''''''' ''' ''''' '''' '''''''''''''  Hence the highest '''''''''''' '''' '''''''''''''''''''''' ''''' '''''''''''''''''''''''' ''''''' '''''''''''''''''''''' '''''''''' '''''''''''''''''''''''''' ''''''''' ''''''''''''''''''''''' '''''''''''' with more reward given for minimising the projected area.  **Assumptions**   * The assessments will be undertaken on the Zygote geometry in the standing position, which is representative of ''' ''''''''''' ''''''''''''''''''''' male in the UK Military. * Plates are vertically positioned by aligning the top of the plate level with the suprasternal notch, for both front and rear plates.   + If a plate is asymmetric then the centre of the plate must be defined. * The centre of the top and bottom of each plate will be stood ''''''' '''''''''''''''' '''''''''''''''''''' from the skin to represent SAF beneath the plate. * The CAD of the plates is to be submitted to Dstl in .stl file format   + To allow the assessments to be undertaken, dates and point of contact for submissions will be confirmed by the authority. * Plate lengths must scale linearly from the medium size plate as defined by the difference in Threshold length. Widths should stay constant between all of the plates. Ratios are defined in Table .  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  | Ratio of plate length to medium plate length | | | | | |  |  | ''''''''''''' '''''''''''' | '''''''''''''' | '''''''''''''''''''' | ''''''''''''''' | ''''''''''''' '''''''''''''' | | Ratio | | '''''''''' | '''''''''' | ''' | ''''''''''' | '''''''''' |   Table 4: Ratio of plate heights compared to medium plate height.  Output  After each assessment a report will be produced that contains the following information:  The weighted coverage scores for plate designs  Unweighted scores for plate designs from each aspect  Vulnerability plots from all angles assessed  Screen grabs of plates positioned on Zygote geometry. |

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| 1. **SAT-1.2.3 Training Plates** |
| 2.1 The front and rear training plates do not provide ballistic protection. They will be used in the training environment, but must be robust and replicate the operational plates in size, shape, weight and thickness.  2.2 The training plates, both front and rear must:   * Be bright or florescent orange in colour * Be of a rigid construction * Have the edges of the plates protected to avoid any chipping or de-lamination. * Not absorb water or retain moisture when tested in accordance with the test method detailed below (2.4). * The training plates shall maintain physical integrity in the climatic conditions as prescribed in SR13 * The acceptable in-service of the training plates, shall be a minimum of 10 years   2.3 Test Method – Drop test   * The training plate will be positioned horizontally on a hard even surface, strike face uppermost. * Up to six random positions, including strikes to the edges will be marked on the training plate * A steel sphere grade '''''''''' '''''''''' ''''''''''''' as defined in HOSDB standard publication '''''''''''''''''''' ''''''''''''''''' '''''''' will be dropped through a tube from a height ''''' ''''''' ''' ''''''''''' '''n each marked position. * The training plate will be visually examined to establish its condition after the drop test is completed. * The training plate will be deemed to have passed to test if no visible signs of cracking or de-lamination have occurred and the integrity of the plate remains intact.   2.4 Test Method – Water Absorption   * Each sample training plate shall be weighed and marked prior to testing. * The samples shall be submerged in distilled water at a temperature of ''''''''''''''''' for a period of 15 minutes * The samples shall then be removed and hand dried until there are no visible signs of water on the exterior surface. * The samples shall then be weighed after 15 minutes drying in an upright orientation. * For the samples to pass the test procedure, the following criteria must be met:   + There must not be a weight differential of more '''' ''''''''' of the dry weight between the original weight and the post submerged weight   + There must be no visible signs of water ingress   + There must be no visible change in the size, shape or form of the training plate resulting from the test procedure |

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| 1. **SAT-2.1.1 SAKER Performance in both wet and dry conditions** |
| 3.1 **Pre-conditioning**. Pre-conditioning of any and all samples shall be in exact accordance with NATO AEP 2920, less the following changes:  a. NATO AEP 2920 Para 5.2.3 – Immersion  • Potable tap water shall be used as the wetting liquid.  • Prior to ballistic testing each plate shall be weighed prior to being soaked and after the specified drying time (15 mins) in an upright orientation after being removed from the liquid. The weights are to be recorded and submitted with the ballistic report. |

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| 1. **SAT- 2.1.2 SAKER Protection against Small Arms Ammunition (SAA) threats** |
| * 1. Tested in accordance with AEP 2920, except where variations in the acceptance criteria are detailed in this ITEAP/Annex/Appendix 2   2. The acceptable degree of yaw '''' ''''''''''   3. Testing as an “in conjunction with” system. Any system (SAKER) that is composed of both a soft and hard armour part is to be tested as an “in conjunction with” system and any penetration is to be determined in accordance with AEP 2920, Para 5.14.3.   4.4 A single test iteration is defined as:   * **'''''''''' ''''''''''''''** '''' ''''''''''''' '''''''''''''''''''''' ''''''''' ''''''''''''''''' ''''''' ''''''''''''' '''''''''''' ''''''''''' '''' '''''''''''''''''' ''''''' ''' '''''''''''''' ''''''''''' ''''''' '''''''''''' ''''' ''''''''' '''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''''''''''''''''''''''' ''''''''''''' ''''' ''''''''' '''''''''''''''''''''' ''''' ''' '''''''''''''''''''''''''''''''' '''''''''''''''''' '''''''''''''''''''''' ''''''''''' ''''''' ''''''''''' ''''''''''' ''''''' ''''''' '''''''''''''' '''' '''''' '''''''' '''''''''''''''''' ''''''''''' '''' '''''''' '''''''''''''''''''''''''' ''''''''''''' ''''' ''''''''''''''''''''''' '''''''''''''''''''' * **''''''''''' ''''''''' ''''''''''''''''** '''' ''''''''''''''''''' ''''''' ''''''' ''''''''''''''' ''''' ''''''' ''''''''''' '''' ''''''' ''''''''''' '''''''''''''' ''''''''' '''''''''''''' ''''' ''''''' ''''''''' '''''''''''''' '''' '''' '''''' ''' '''''''''''''' '''''''''' ''' ''''''''''''''' '''''''''''' ''''''' ''''''''''' ''''' ''''''' '''''''''''''''''''''''''''''''' '''''''''''''''''' '''''''''''''''''''''''' ''''''''''''''''''''''''' '''''''''' ''''''''' '''' '''''''''' ''''''''''''' '''''''''' ''' ''''''''''''''''' '''' '''''''' '''''''''''''''''''''' ''''' '''' ''''''''''''''''''''''''''''''''' '''''''''''''''' ''''''''''''''''''''' ''''''''''''' ''''''' ''''''''''' ''''''''''' '''''''' ''''''' ''''''''''''' '''' ''''''' '''''''' '''''''''''''''''' ''''''''''''' ''''' '''''''' ''''''''''''''''''''''''' '''''''''''' ''''' ''''''''''''''''''''' '''''''''''''''''''''' * **'''''''''''''' ''''''''''''** '''' ''''''''''''' '''''''''''''''''''' ''''''' '''''''''''''' ''''''' '''''''''''''' ''''' '''''''''''''' '''''''''' ''''''''''''''''''''' ''''''''' '' '''''''''''''''' ''''' ''''''' '''''''' '''''''''''''' '''''''''' '''''' ''''''''''''' ''''''''''' ''' '''''''''''''' ''''''''' '' '''''''''''' '''''''''' '''''''' ''''''''''' ''''' '''''''' '''''''''''''''''''''''''''''''''''''' ''''''''''''''''' '''''''''''''''''''''' '''''''''''' '''''''''' ''''' '''''''''''' '''''''''''''''' ''''''''''' ''' ''''''''''''''''''   4.5 Taken together these will count as the both the Threshold and Objective requirement components of SR 1 and 5. |
| 5. **SAT-2.1.3 SAKER System Reliability** |
| 5.1 Tested in accordance with AEP-2920, except where variations in the acceptance criteria are detailed in this ITEAP/annex/Appendix 2.  5.2 The Roma Plastilina® No1 should be conditioned before testing. This should be in accordance with Annex N.2 of AEP 2920 (for the calibration – sphere drop) Temperature condition is to be carried out in accordance with Paragraph 6.3 of HOSDB Body Armour Standards for UK Police (2007) Part 2: Ballistic Resistance Publication No. 39/07/B)  ''''''''' '''' '''''''''' ''''' '''''' ''''''''''''''''''''' ''''' '''''''''''''''''''' ''''''''''''''''''' '''''''''''''''' '''''''''' '''''''''''''''' ''''''' ''''''''''''''' ''''' ''''''''' ''''''''''' ''''''''''''''''''' '''''' ''''''' ''''''''''''''''''''''''''''''''' '''''''''''' ''''''' '''''''''''''''''' '''''' '''''''''''''''''' '''' ''''''''''''' ''''''''''''''''''' ''''' '''''''' ''''''''''' '''''' ''''''''''''''''''''''' ''''' '''''''''''''''''' ''''''''''' ''''''''''''''' ''''''' '''''' '''''''''''''''''''''''''' '''''' ''''''''''' '''''''''''''''''  5.4 Instances of any of the delivered strikes that result in either a complete penetration (CP) (as defined in Para 5.12.2 of NATO AEP 2920), or that produce a back face deformation (BFD) (as defined in Para 5.15 of AEP 2920) of greater '''''''''''' '''''''''''''' ''''''' be recorded.  5.5 If '''''' test iterations are conducted with no instances of CP or BFD greater '''''''''''' '''''''''''''''' then the Objective MoP for reliability is satisfied. No further test iterations are required if '''''' ''''''''''''''''''''''''''''''' ''''''''' iterations occur.  5.6 If any test iteration in the first '''''' ''''''''''''' ''''''''''''''' in CP or BFD greater than '''''''''''''' on either the ''''''''' ''''' ''''''''''''''''''' '''''''''''', testing will continue up to ''''''' test iterations. If no more than two test iterations have resulted in CP and/or BFD greater than ''''''''''''' then the Threshold MoP for reliability is satisfied.   |  |  | | --- | --- | | Total iterations with CP or excessive BFD | Score | | ''' | ''''''' | | '''' | '''' | | ''' | ''' | | '''' ''''' ''''''''''''' | ''' |   5.7 A score ''''' '''' ''''' '''''''' '''''''''''' will result in a fail and the submitted system will be removed from the competition. |

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| 6. **SAT-3.1.2 SAKER Production Batch Testing** |
| 6.1 Tested in accordance with AEP 2920 except where variations in the acceptance criteria are detailed in this ITEAP/Annex/Appendix 2.  6.2 The Roma Plastilina® No1 should be conditioned before testing. This should be in accordance with Annex N.2 of AEP 2920 (for the calibration – sphere drop) Temperature condition is to be carried out in accordance with Paragraph 6.3 of HOSDB Body Armour Standards for UK Police (2007) Part 2: Ballistic Resistance Publication No. 39/07/B)  6.3 Testing as an “in conjunction with” system. Any system (SAKER) that is composed of both a soft and hard armour part is to be tested as an “in conjunction with” system and any penetration is to be determined in accordance with AEP 2920, Para 5.14.3.  6.4 Each batch of ''''''''''''' '''''''''''''''''''' '''''''''''''' will be subject to a minimum ''''' '''''' '''''''''' iterations, selected equally across the sizes if there is more than one size in the batch, conducted in the same manner as SAT 2.1.3, with the exceptions described below.  6.5 Batch testing is predicated on what MoP the system achieved for SR 3 during TEST 2.1.3.  6.6 The plates are to be tested wet at room temperature with wetting liquid to be potable tap water.   |  |  | | --- | --- | | **% mass increase of protective components** | **Score** | | Mean % mass increase across all samples greater than ''''''''''' ''''''''''' than that found in initial acceptance testing. | Fail | | Mean % increase in mass across all samples comparable to that found in acceptance testing (2.1.1), but not greater than '''''''''''' ''''''''''' that mean % mass increase | Pass |  * If the mean % mass increase across all samples tested from each batch when wet conditioning has been conducted results in a Fail result, the entire batch can be deemed to have failed, and will be rejected. * If the mean % mass increase across all samples tested from each batch when wet conditioning has been conducted results in a Pass result, the conditioned samples will continue to ballistic testing.   6.7 **A single test iteration is defined as:**   * **'''''''''' ''''''''''''**'' ''' ''''''''''''' '''''''''''''''''''' ''''''' '''''''''''''''' ''''''' ''''''''''''' '''''''''''' '''''''''''' '''' ''''''''''''''''' ''''''' '' ''''''''''''''''' '''''''''''' ''''''' ''''''''''''' ''''' '''''''' ''''''''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''''''''''''''''''''''' ''''''''''''' '''' '''''''' ''''''''''''''''''' ''''' ''' '''''''''''''''''''''''''''''''' '''''''''''''''''' ''''''''''''''''''''' ''''''''''' ''''''' ''''''''''' '''''''''''' '''''''' '''''' '''''''''''''' ''''' '''''' ''''''' ''''''''''''''''' ''''''''''' '''' ''''''' ''''''''''''''''''''''''''' ''''''''''''' ''''' '''''''''''''''''''' ''''''''''''''''''' * **''''''''''' '''''''''' '''''''''''''''**'' '''' ''''''''''''''''''' '''''''' '''''' ''''''''''''' ''''' ''''''' '''''''''' '''' ''''''' '''''''''''' '''''''''''''' ''''''''' '''''''''''''' ''''' '''''''' ''''''''' '''''''''''''''' '''' ''''' ''''''' ''' ''''''''''''''' ''''''''' '' ''''''''''''''' '''''''''' ''''''' ''''''''''' ''''' ''''''' ''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''''''''''''''''''''' '''''''''' ''''''''' ''''' ''''''''''' ''''''''''''' '''''''''' ''' '''''''''''''''' '''' ''''''' ''''''''''''''''''' ''''' '''' ''''''''''''''''''''''''''''''' ''''''''''''''''' ''''''''''''''''''''''' ''''''''''' ''''''' '''''''''''' '''''''''''' ''''''' '''''' '''''''''''''' ''''' '''''' '''''''' '''''''''''''''''' ''''''''''' ''''' ''''''' ''''''''''''''''''''''' '''''''''''' '''' ''''''''''''''''''' ''''''''''''''''''' * **''''''''''''''' ''''''''''''**'' '''' ''''''''''''' '''''''''''''''''''''' '''''''' '''''''''''''''' ''''' ''''''' '''''''''''''' ''''''' ''''''''''''' ''''''''''' ''''''''''''''''''' '''''''''' '' '''''''''''''''' '''' '''''''' ''''''''' ''''''''''''' ''''''''' '''''' ''''''''''''''' '''''''''' ''' '''''''''''''''''' '''''''''' '''''''' ''''''''''''' ''''' ''''''' '''''''''''''''''''''''''''''''''''' '''''''''''''''''' '''''''''''''''''''''''' '''''''''''' '''''''''' ''''' ''''''''''' '''''''''''''' ''''''''''' ''' ''''''''''''''''   6.8 Up to a total ''''' '''''' ''''''''''''''''''' of SAKER, selected from across the range of '''''''''' ''''''''''''' provided by the manufacturer, shall be chosen for testing. A single iteration of the test, as described above, will be carried out on each sample.  6.9 Instances of any of the delivered strikes that results in either a complete penetration (CP) (as defined in Para 5.14.2 of AEP 2920), or that produce a back face deformation (BFD) (as defined in Para 5.15 of AEP 2920) of greater '''''''''' ''''''''''''''' '''''''' be recorded, and this test iteration will be deemed to have failed.  6.10 If '''''' ''''''''' iterations are conducted with no failure of CP or BFD greater '''''''''''' '''''''''''''', then the batch can then be accepted for use.  6.11 If 1 test iteration results in failure, testing is halted and the entire batch is to be rejected.  6.12 See flow diagram at 6.13 |

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| 6.13 Batch Testing Flow Diagram |

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| 7 **SAT 2.1.4 OSPREY 2 Performance in both wet and dry conditions** |
| 7.1 **Pre-conditioning**. Pre-conditioning of any and all samples shall be in exact accordance with AEP 2920, less the following change:  a. AEP 2920 Para 5.2.3 – Immersion   * Potable tap water shall be used as the wetting liquid. * Prior to ballistic testing each plate shall be weighed prior to being soaked and after the specified drying time (15 mins) in an upright orientation after being removed from the liquid. The weights are to be recorded and submitted with the ballistic report. . |

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| 8 **SAT-2.1.5 OSPREY 2 Protection against SAA threats** |
| 8.1 Tested in accordance with AEP 2920 except where variations in the acceptance criteria are detailed in this ITEAP/Annex/Appendix 2.  8.2 The acceptable degree of ''''''''''' '''' '''''''''  8.3 Testing as an “in conjunction with” system. Any system (OSPREY 2) that is composed of both a soft and hard armour part is to be tested as an “in conjunction with” system and any penetration is to be determined in accordance with NATO AEP 2920, Para 5.14.3  8.4A single test iteration is defined as:   * **'''''''''' '''''''''''''** ''' ''''''''''''''' '''''''''''''''''''''' ''''''' '''''''''''''''''' ''''''' '''''''''''''' ''''''''''''' ''''''''''' '''' '''''''''''''''''' ''''''''' '' '''''''''''''''' ''''''''''' '''''''' ''''''''''''' ''''' '''''''' ''''''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''''''''''''''''''''' ''''''''''''' ''''' '''''''' ''''''''''''''''''' ''''' ''' '''''''''''''''''''''''''''''''' ''''''''''''''''' ''''''''''''''''''''' ''''''''''''' ''''''''' ''''''''''''' '''''''''''' ''''''' '''''' '''''''''''''' ''''' '''''' ''''''' ''''''''''''''''''''' '''''''''''' ''''' ''''''' '''''''''''''''''''''''''''' ''''''''''''' '''' '''''''''''''''''''' '''''''''''''''''''' * **''''''''''' ''''''''''' ''''''''''''''''** ''' ''''''''''''''''''' '''''''' ''''''' '''''''''''''' ''''' ''''''' '''''''''' ''''' '''''''' '''''''''''' '''''''''''''' ''''''''' '''''''''''''' ''''' ''''''' '''''''''' '''''''''''''''' ''''' '''' '''''' '''' '''''''''''''''' ''''''''' ''' '''''''''''''' '''''''''''' ''''''' '''''''''''' ''''' ''''''' '''''''''''''''''''''''''''''' ''''''''''''''''' '''''''''''''''''''''' ''''''''''''''''''''''' ''''''''''' ''''''''' ''''' '''''''''''' ''''''''''''' ''''''''''' ''''''''' ''''''''''''' ''''' ''''''' ''''''''''''''''''' ''''' ''' ''''''''''''''''''''''''''''''' '''''''''''''''''' '''''''''''''''''''''''' ''''''''''''' ''''''''' '''''''''''' ''''''''''' '''''''' ''''''' ''''''''''''' '''' ''''''' ''''''''' ''''''''''''''''''''' ''''''''''' ''''' '''''''' '''''''''''''''''''''''''''' '''''''''''' ''''' ''''''''''''''''''''' ''''''''''''''''''' * **'''''''''''''' ''''''''''''** ''''' ''''''''''''' ''''''''''''''''''' ''''''' '''''''''''''''' ''''''' '''''''''''''' ''''''' ''''''''''''''' '''''''''' ''''''''''''''''' ''''''' '' ''''''''''''''' ''''' ''''''''' ''''''''' '''''''''''' '''''''''' '''''' ''''''''''''' ''''''''''' '''' '''''''''''''''' '''''''''' '' '''''''''''''''' ''''''''''' ''''''' '''''''''''' ''''' ''''''' ''''''''''''''''''''''''''''''''''''' ''''''''''''''''''' ''''''''''''''''''''' '''''''''''' '''''''''' ''''' ''''''''''' '''''''''''''''' '''''''''' '''''''''' ''''''''''''''   8.5 Taken together these will count as the both the Threshold and Objective requirement components of SR 2 and 5. |

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| 9**. SAT-2.1.6 OSPREY 2 System Reliability** |
| 9.1 Tested in accordance with AEP 2920 except where variations in the acceptance criteria are detailed in this ITEAP/Annex/Appendix 2.  9.2 The Roma Plastilina® No1 should be conditioned before testing. This should be in accordance with Annex N.2 of AEP 2920 (for the calibration – sphere drop) Temperature condition is to be carried out in accordance with Paragraph 6.3 of HOSDB Body Armour Standards for UK Police (2007) Part 2: Ballistic Resistance Publication No. 39/07/B)  9.3 A total of ''''''' ''''''''''''''''''' ''''' '''''''''''''''''''''''' 2, selected equally from across the ''''''''''''''' ''''' ''''''''' ''''''''''''' provided by the manufacturer shall be chosen for testing.. '''' '''''''''''''' ''''''''''''''''''' of the test, as described above, will be carried out on each sample.  9.4 Instances of any of the delivered strikes that results in either a complete penetration (CP) (as defined in Para 5.14 of NATO AEP 2920), or that produce a back face deformation (BFD) (as defined in Para 5.15 of NATO AEP 2920) of greater than '''''''''''''''' will be recorded.  9.5 If ''''' ''est iterations are conducted with no instances of CP or BFD ''''''''''''''' '''''''''' '''''''''''''''''' then the Objective MoP for reliability is satisfied. No further test iterations are required if '''''' consecutive test iterations occur.  9.6 If any test iteration in the first '''''' tests results in CP or BFD greater than ''''''''''''''' on '''''''''''''' '''''''' '''''''' ''''' '''''''''''''''''' ''''''''''''', testing will continue up ''''' ''''' '''''''''' iterations. If no more than two test iterations have resulted in CP and/or BFD greater '''''''''' ''''''''''''''' then the Threshold MoP for reliability is satisfied.   |  |  | | --- | --- | | Total iterations with CP or excessive BFD | Score | | ''' | ''''''' | | '''' | ''' | | '''' | '''' | | '''' ''''' ''''''''''' | ''' |   9.8 A '''''' '''''''''''''' will result in a fail and the submitted system will be removed from the competition. |

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| 10 **SAT-3.1.4 OSPREY 2 Production Batch Testing** |
| 10.1 Tested in accordance with AEP 2920 except where variations in the acceptance criteria are detailed in this ITEAP/Annex/Appendix 2.  10.2 The Roma Plastilina® No1 should be conditioned before testing. This should be in accordance with Annex N.2 of AEP 2920 (for the calibration – sphere drop) Temperature condition is to be carried out in accordance with Paragraph 6.3 of HOSDB Body Armour Standards for UK Police (2007) Part 2: Ballistic Resistance Publication No. 39/07/B)  10.3 Testing as an “in conjunction with” system. Any system (OSPREY 2) that is composed of both a soft and hard armour part is to be tested as an “in conjunction with” system and any penetration is to be determined in accordance with NATO AEP 2920, Para 5.14.3.  10.4 Each batch '''' '''''''''''' '''''''''''''''''''' plates will be subject to a minimum '''' '''''' '''''''''' iterations selected equally across the sizes if there is more than one size in the batch, conducted in the same manner as SAT 2.1.6, with the exceptions described below.  10.5 The conduct of batch testing is predicated on what MoP the system achieved for SR 3 during SAT 2.1.6.  10.6 The plates are to be tested wet at room temperature with wetting liquid to be potable tap water.   |  |  | | --- | --- | | % mass increase of protective components | Score | | Mean % mass increase across all samples greater than ''''''''''' more than that found in initial acceptance testing | Fail | | Mean % increase in mass across all samples comparable to that found in acceptance testing (SAT 2.1.4), but not greater '''''''''' '''''''''' than that mean % mass increase | Pass |  * If the mean % mass increase across all samples tested from each batch when wet conditioning has been conducted results in a Fail result, the entire batch can be deemed to have failed, and will be rejected. * If the mean % mass increase across all samples tested from each batch when wet conditioning has been conducted results in a Pass result, the conditioned samples will continue to ballistic testing.   10.7 **A single test iteration is defined as:**   * **'''''''''' ''''''''''''''** ''' '''''''''''' '''''''''''''''''''' ''''''' ''''''''''''''' ''''''' ''''''''''''''' ''''''''''''' ''''''''''' ''''' '''''''''''''''' ''''''''' ''' ''''''''''''''''' '''''''''' ''''''' ''''''''''''' ''''' ''''''''' ''''''''''''''''''''''''''''''''' '''''''''''''''' ''''''''''''''''''''' '''''''''''' ''''' ''''''' '''''''''''''''''''''' '''' ''' '''''''''''''''''''''''''''''''' '''''''''''''''''' ''''''''''''''''''''''''' '''''''''''' ''''''' ''''''''''''' '''''''''''' '''''''' '''''' '''''''''''' ''''' '''''' '''''''' ''''''''''''''''''' ''''''''''''' ''''' ''''''' '''''''''''''''''''''''''''' ''''''''''' '''' '''''''''''''''''''''' ''''''''''''''''''''' * **''''''''''' ''''''''' '''''''''''''''** '''' '''''''''''''''''''' '''''''' '''''' ''''''''''''''' ''''' ''''''' '''''''''' ''''' ''''''' ''''''''''''' '''''''''''' '''''''''' ''''''''''''' ''''' ''''''' ''''''''' '''''''''''''' '''' ''''' ''''''' '''' ''''''''''''''''' '''''''' '' ''''''''''''''' ''''''''''' ''''''' '''''''''''' '''' ''''''' '''''''''''''''''''''''''''''''' '''''''''''''''''' ''''''''''''''''''''' ''''''''''''''''''''''''' ''''''''''' ''''''''' ''''' ''''''''''' ''''''''''''' ''''''''''' '''''''''' '''''''''''' ''''' ''''''' ''''''''''''''''''''' ''''' '''' '''''''''''''''''''''''''''''''''' ''''''''''''''''''' '''''''''''''''''''''' '''''''''''''' ''''''' '''''''''''' '''''''''''' '''''''' '''''' ''''''''''''' ''''' '''''' ''''''' ''''''''''''''''''''' ''''''''''' ''''' ''''''' '''''''''''''''''''''''' '''''''''''' ''''' ''''''''''''''''''' ''''''''''''''''''' * **'''''''''''''''' ''''''''''''** '''' ''''''''''''' '''''''''''''''''''' '''''''' '''''''''''''' '''''''' '''''''''''''' '''''' '''''''''''''' ''''''''''' '''''''''''''''''''' '''''''''' ''' ''''''''''''''''''' ''''' ''''''' '''''''''' '''''''''''' '''''''''' '''''' '''''''''''''' '''''''''''' ''' '''''''''''''' '''''''''' '' ''''''''''''' '''''''''''' ''''''' ''''''''''''' ''''' ''''''' '''''''''''''''''''''''''''''''''''''' '''''''''''''''' '''''''''''''''''''''''' '''''''''' ''''''''' ''''' ''''''''''' ''''''''''''' '''''''''' '''''''' ''''''''''''   10.8 Up to a total of ''''''' samples '''' '''''''''''''''''''''''' ''''' selected from across the range of five sizes provided by the manufacturer, shall be chosen for testing. A single iteration of the test, as described above, will be carried out on each sample.  10.9 Instances of any of the delivered strikes that results in either a complete penetration (CP) (as defined in Para 5.14.2 of NATO AEP 2920), or that produce a back face deformation (BFD) (as defined in Para 5.15 of NATO AEP 2920) of greater ''''''''''' '''''''''''''' ''''''' be recorded, and this test iteration will be deemed to have failed.  10.'''''' ''' '''''' '''''''''' ''''''''''''''''''''' ''''''' '''''''''''''''''''''''' with '''''' ''''''''''''' of CP or BFD greater than '''''''''''''''''' then the batch can then be accepted for use.  10.11 If ''' ''''''''' '''''''''''''''''''' results in failure, testing is halted and the entire batch is to be rejected.  10.12 See flow diagram at 10.13 |

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| 10.13 Batch Testing Flow Diagram |

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| 11 **SAT-1.2.7 Labelling Requirements** |
| 11.1 The SAKER and OSPREY 2 OPERATIONAL Plates are to be labelled with the following information:   * Item name * SIZE * NATO stock number * Month and year of manufacture * Batch number * Unique Protective Plate Identification Number * Contract number * Clear identification of correct side to be worn next to body * The wording: ‘**HANDLE WITH CARE’**. * Relevant care instructions   11.2 The information is to remain legible throughout the life of the items  11.3 The size of the lettering shall be 6mm in height  11.4 The SAKER TRAINING plates and OSPREY 2 TRAINING plates are to be labelled with the information as detailed below:   * Item name * Size * NATO stock number * Month and year of manufacture * Contract number * Clear identification of correct side to be worn next to body * The wording: ‘**ONLY FOR USE IN DRY TRAINING – THIS PLATE DOES NOT PROVIDE BALLISTIC PROTECTION** * Relevant care instructions   11.5 Each item must have a 2D Barcode that complies with the following requirements:   * DEFSTAN 05-132 – Marking of Service Material Items Using a Unique Item Identifier (UII) * DEFSTAN 81-41 Pt6 – Packaging of Defence Materials * 2017DIN04-101 – Assets Subject to Special Controls – United States Export Control Regulations (as appropriate) |

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| APPENDIX 11. Coverage Scoring This Appendix details the scoring regime used to assess VIRTUS Pulse 2 Tenderers body armour coverage against essential medical coverage and allows technical objective discrimination between the coverage to be made.  The scoring method must be able to represent the additional coverage afforded over the Threshold coverage, and coverage provided from non-perpendicular angles/elevations (which are the only ones considered in the definition of Threshold dimensions). In addition, the scoring method will include the injurious effects of projectiles. 1.1 WTI model assessments A scoring regime using Dstl’s Weapon Target Interaction (WTI) tool will be used. The WTI assessments consist of:   * Grids ''''' ''''''''''''''' resolution that cover the torso are arranged from each of the impact angles selected. * At each point in the grid a shot line is used to simulate the impact of a bullet through the torso[[1]](#footnote-1). * Expected injures from projectile impacts are simulated for each of the shot-lines. * This is repeated for every shot line in the grid;   + This is repeated for each grid at each trajectory/angle and a visualisation is provided. * WTI calculates the total number of shot-lines that result in unsurvivable (U), critical (C) and severe (S) injuries. Minimising these injuries results in better coverage. * The metric used for scoring candidate plates is:   + The number of shot-lines of each predicted injury (U, C and S) that are stopped by the plates.   An example of the Threshold requirements for a ''''''''''' ''''''''''''''''''''''' male wearing protective plates, compared to a male with no protective plates, is illustrated from two different angles in Figure 1 and Figure 2. Table 1 summarises how the colours represent injury in the Figures.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Injury** | Un-survivable | Critical | Severe | Serious | Moderate | Minor | Armour | | **Colour** |  |  |  |  |  |  |  |   Table 1: Key for vulnerability grids |
| |  |  | | --- | --- | |  |  |  Figure 1: Example of WTI output for no protection (left) and for Threshold plate dimensions (right) for 0° azimuth and 0° elevation   Figure 2: Example of WTI output for no protection (left) and Threshold dimensions (right) for 20° azimuth and 20° elevation  To provide an indication of expected scores, results are provided in Table for an example Threshold dimension plate, Objective dimension plate, OSPREY, ECBA and medium-sized SAPI plates. 1.2 Summary of example plate coverage scores Table 2 summarises the results for the 5 example plates assessed in WTI.   |  |  |  |  | | --- | --- | --- | --- | | **''''''''''' '''''''''''''' '''' ''''''''''''''''''''' '''' ''''''''' '''''''''''' '''''''' ''''''' ''''''''''''''' '''''' ''''''''''''''' '''''''''''''''''''' ''''''' ''''''''''''''''''''' ''''''''''''''''''** | | | | | **''''''''' ''''''''''''** | **'''''''''''''''''''''''''''''**  **'''''''''''' ''''** | **''''''''''''''''**  **'''''''''''' ''''** | **'''''''''''''''**  **''''''''''''' ''''** | | **''''''''''''''''''' ''''''''''''''''''''''''** | ''''''''''''''''''''' | ''''''''''''''''''''' | ''''''''''''''''' | | **''''''''''''''''''' ''''''''''''''''''''''''** | ''''''''''''''''''' | '''''''''''''''''' | ''''''''''''''''''' | | **''''''''''''''''' ''''''''''** | ''''''''''''''''''' | ''''''''''''''''''' | ''''''''''''''''''' | | **''''''''''''''''** | '''''''''''''''''' | ''''''''''''''''''''' | ''''''''''''''''''''' | | **''''''''''''** | '''''''''''''''' | '''''''''''''''' | '''''''''''''''' |   Table 2: Comparison of the total number of shot-lines of each injury for different plates  Maximising the number of shot-lines covered in Table 2 results in increased coverage and a reduction in likely injury. A weighting is applied to these scores in order to prioritise coverage of the shot-lines that are likely to results in high rates of mortality. Historical analysis of combat injuries suggests a likely mortality of ''''''''''''' ''''''''''' '''''''''' '''''''''' respectively for unsurvivable, critical and severe injuries.  Based on this data, the following weighting is used:  • ''' ''''''' ''''''''''''''''''''''''''''''''' '''''''''  '''''''''' '''''' '''''''''''''''' ''''''''  ''''''''' '''''' ''''''''''''''''' '''''''  We then calculate the total number of U, C and S shot-lines, and weight them against the known mortality rates to suggest a Weighted Coverage Score (WCS):  • '''''' ''' ''''' ''' '''''' ''' ''''''''' ''' ''''' ''' '''''''''' = Weighted Coverage Score  Furthermore, the scoring system should reflect Threshold dimensions being the minimum likely score and Objective dimensions being the upper likely score achievable on this 50th percentile assessment. Therefore the Threshold Coverage (TC) score is:  • ''''''''''''''''''''' ''' ''''' '''' '''''''''''''''''''' '''' ''''''''' ''' ''''''''''''''' '''' ''''''''' ''' ''''''''''''''''''''''' = TC  The Objective Coverage (OC) score is:  • '''''''''''''''''''' ''' ''''' ''' '''''''''''''''''' ''' ''''''''' '''' '''''''''''''''''''' ''' ''''''''' '''' ''''''''''''''''''''''' = OC  The WCS of the candidate coverage score is subtracted from the objective coverage scores, and divided by the difference between OC and TC.  This ensures that the candidate plate will achieve a Relative Coverage Score (RCS) out of 10 based on where it’s score sits on a linear scale between the lower and upper scores.  **1.2.1 RCS Example**  The Medium SAPI plates cover ''''''''''''''''''''''''' ''''''''''''''''''''''''''' '''''''''' '''''''''''''''''''''''' '''''''''''''''''''''''' This equates to a WCS of:  '''''''''''''' ''' ''''''''''''''''''' ''' ''''' ''' '''''''''''''''''''' ''' '''''''''' '''' '''''''''''''''''''''' ''' '''''''''' '''' '''''''''''''''''''''''  Therefore, the final coverage score out of 10 for the Medium SAPI plate is:  ''''''''''''' ''' '''''''''''''''''''''''' ''' '''''''''''''''''''''''''' '' ''''''''''''''''''''''''' ''' '''''' ''' ''''''''  **1.3 Area scores**  So that an optimal coverage solution is obtained, a metric is also used that rewards minimising the projected area of the plate.  The projected area (PA) of the candidate plate (in mm2) is compared to the Threshold Area (TA) and Objective Area (OA) of the threshold and objective dimension pates, respectively. This calculates the Relative Area Score ''''''''''''' ''''''' '''' ''''''' ''''''''''''''''''' ''''''''  '''''''''''''''''' ''''''''''' ''''''''''''''' '''''''''''''''' ''' '' ''''''''' '' ''''''''' '' ''''''''' ''' '''''''' '' ''' ''''''  **1.3.1 RAS Example**  The PA of the Threshold, Objective and Medium SAPI dimensions are shown in Table 3.  Plate type Projected Area (mm2)  Threshold Dimension ''''''''''''''''  Objective Dimension'''''''''''''  Medium SAPI ''''''''''''''''  Table 3: Projected Areas of different plates.  The Medium SAPI plate RAS is given by:  '''''''''''' ''' '''''''''''''''' ''' ''''''''''''''' '' ''''''''''''''' ''' '''''' ''' '''''''''  **1.4 Overall Coverage Score**  The two scores RCS and RAS (for coverage and projected area) are then combined into an Overall Coverage Score (OCS), defined as:  ''''''''''''' ''' ''''''''''' ''' ''''' ''' ''''''''''''  Hence the highest OCS is obtained by maximising the coverage and minimising the projected area, with more reward given for minimising the projected area.  **1.4.1 OCS Examples**  For the Threshold dimensions RCS ''' '''' ''''''''' '''''''''''' ''' ''''''' '''''''''''''''  Threshold Dimensions OCS = '''''''' ''' ''''' ''' '''''''''''' '''' '''''''''''  For the Objective dimensions RCS = ''''''' ''''''''' '''''''''' '''' '''' '''''''''''''''''  Threshold Dimensions OCS '''' '''''''''''' ''' ''''' ''' ''''''''' ''' '''''''''''  For the Medium SAPI plate RCS '''' ''''''''' ''''''''' ''''''''''' ''' ''''''' '''''''''''''''''  Medium SAPI ''''''''''''' '''' ''''''' ''' ''''' ''' '''''''''' ''' ''''''''''' |

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| **APPENDIX 2**  **Ballistic Test Regime:**  Ballistic testing will be undertaken in accordance with (iaw) the following:  **2.1 Velocity Measurement**   * A single light gate apparatus will be used to measure each test, following calibration.   **2.2 Impact and Yaw Angle**   * All impacts will occur at ''''' obliquity to the plate. * High speed video will be required for all shots to determine yaw angles (still images of each round will be recorded). Yaw angle must not exceed ''''', else an unfair hit will be recorded. * Maximum distance from yaw measurement to impact to be ''''''''. * Impact location will be measured from the centre of the visible penetration.   **2.3 Ballistic Test Reporting**   * Test reports will contain: '''''''''''' ''''''''''' ''''' ''''''''''' '''''''''''' ''''''''''''' '''''' '''''''''''' ''''''''''''''''''''' ''''''''''' ''''''' ''''''' '''''''''''''''''''''''''''''''''''''''''''''' ''''''''''''''''''''' ''''''''''''''''''''' ''''''''''''''' '''''''''' ''''''''''''''' '''''''''''''''''''''''''''''''''''''''''''''''''''''' '''''''''''''''''''''''''''''' '''''''''''''''''''''' '''''''''''''' '''''''''''''' '''''''''''''''' ''''''''''''''' ''''''''' '''''''''''''''''' '''''''''''''''''.   **2.4 Range / Target Set-up**   * The targets will be located at least '''''''''''' ''''' ''''''' '''''''''''''''''' of the proof barrel. * Ballistic testing will be undertaken with the target configuration a “'''''''''''''''''''''''”. The Vproof must be achieved through '''''''''''''''''''''''' '''''''''''''''''''''''''''' ''''' ''''''' ''''''''''''', and within the Back Face Deformation (BFD) ''''''''''''''''''''' ''''' ''''''' ''''''''''' * The range will be conditioned to '''''''''''' '''''''''''' ''''''''''''''''''' relative humidity. * Targets will be submerged in tap water '''''''''''''' '''''''''''' ''''''' '''' '''''''''''''''''''''''' '''' ''''''' hours, and allowed to drip vertically for '''''' ''''''''''''''''' prior to subsequent ballistic testing. * Ballistic testing will take place within ''''''' '''''inutes after removal from the water. * The shot will be iaw SATs 2.1.2, 3.1.2, 2.15 and 3.1.4.   **2.5 Back Face Deformation**   * The targets will be secured to conditioned and validated Roma Plastilina® No.1 using two retention straps, iaw AEP 2920 5.3.1 and 5.3.2. * For curved targets, Plastilina will be built up onto the rear surface of the plate to ensure uniform contact with the Plastilina block. BFD will be measured using callipers to ''''''''''''''''''''' * BFD must '''''' ''''''''' ''''''''''.   1. **Projectile Velocity** * Proof testing will be performed against the velocities and tolerance provided in the classified Annex. * Increase/decrease in projectile velocity will be achieved through up/down-loading propellant.   **2.7 Drop Testing (Target)**   * Drop testing of the targets will NOT be undertaken.   **2.8 Performance Criteria**   * Partial penetration (PP) and Complete Penetration (PP) will be measured iaw AEP 2920 5.14.2. |

1. Representative of a 7.62x39 ball round. [↑](#footnote-ref-1)