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| **TRANSITION ASSESSMENT CHECKLIST FOR VIRTUAL IMPACT TESTS**  **(FOR SIMULATION ASSESSED SYSTEMS)** | | | |
| Submission Date: | Click here to enter a date. | | Contact Details: |
| Manufacturer: |  | |
| Product Name: |  | |
|  | Barrier 1: |  | |
| Barrier 2: |  | |

| **Documents and Multimedia to be Provided for Each Virtual Test\*** | | | |
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| # | Item | Comment | Item Submitted (Y/N) |
| **1.** | **Format Technical Report\*\*** | **Report is to contain the following a) to e)** |  |
| **a)** | **Evidence of Vehicle Model Quality** | |  |
| *i)* | Vehicle model mesh | Images of vehicle mesh density local to contact areas |  |
| *ii)* | TR 16303 vehicle-in-idle test | Stability of model under gravity load (CofG disp vs time or energy balance) |  |
| *iii)* | TR 16303 vehicle suspension tests | Symmetric, asymmetric and single load tests to validate suspension kinematics |  |
| *iv)* | TR 16303 vehicle steering tests | Linear and circular track test to verify steering behaviour |  |
| *v)* | TR 16303 vehicle curb or step tests | Curb or step test to further demonstrate suspension and steering stability |  |
| *vi)* | TR 16303 vehicle full scale tests | Rigid wall and deformable barrier vehicle tests for confirmation of model stability |  |
| **b)** | **Evidence of Vehicle Model Accuracy** | |  |
| i) | Vehicle model mass, centre of gravity in X,Y,Z and wheel tracks | Comparison to EN1317 tolerance (and test vehicle if correlating to test data) |  |
| **c)** | **Evidence of Barrier AND Transition Model Accuracy** | |  |
| *i)* | Energy balance plot | Plot must show added mass and total, internal, kinetic, hourglass and sliding interface energies |  |
| *ii)* | Element Formulation | Element formulation (ELFORM) used for the shell and solid elements |  |
| *iii)* | Number of Integration Points | Number of integration points (NIPs) used for the shell elements |  |
| *iv)* | Boundary conditions | An overview of how the vehicle restraint system has been constrained |  |
| *v)* | Mesh density | Images of barrier/transition mesh density and the element edge length range. |  |
| *vi)* | Material Data | A summary of the material model and properties used for the deformable components. |  |
| *vii)* | Impact speed and angle | Confirmation of the impact speed and angle used for each virtual test (and correlated to test where available) |  |
| *viii)* | Software Version | Specify the version of the software used to simulate the virtual tests |  |
| **d)** | **Evidence of Barrier Model Accuracy** | |  |
| *i)* | EN1317 standard result data | Table of the key VRS metrics recorded in simulation and their equivalent physical test values where available (e.g. working width, dynamic deflection, intrusion, THIV, ASI). Exit box overlay. |  |
| *ii)* | Still image comparison | Side by side comparison of the virtual test stills versus the physical test (with accompanying time stamps, clearly showing point of separation between transition and vehicle). |  |
| **e)** | **Evidence of Transition Performance** | |  |
|  | Plastic strain plots | Plastic strain contour plot still images of areas of interest with reference to the specific failure strain for the respective material. |  |
|  | Bolt force data | Tensile and shear bolt force data with either bolt failure being modelled (and locations of failure being recorded with accompanying images) or calculated in post-processing e.g. effective stress.  The failure criteria used must be specified. |  |
| **2.** | **Videos showing global performance and local deformation characteristics** | **Various view angles such as Front, Side, Rear, Top and ISO for review.** |  |

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| **Simulations Submitted** | | | | | | | | | | | | | | | | | | |
| # | Simulation Date | | Supplier (if not Manufacturer) | | | | | | Unique ID | | | | | Comments | | | | |
| 1 | Click here to enter a date. | |  | | | | | |  | | | | |  | | | | |
| 2 | Click here to enter a date. | |  | | | | | |  | | | | |  | | | | |
| 3 | Click here to enter a date. | |  | | | | | |  | | | | |  | | | | |
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| Submitted By: | | | |  | | | | | | | | Signature: | | |  | | | |
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| \*The reader is referred to the simulation and modelling guidelines presented in TR 16303:2011 | | | | | | | | | | | | | | | | | | |
| \*\*All documents which are not English will have to be translated. | | | | | | | | | | | | | | | | | | |
| **BARRIER CORRELATION ASSESSMENT CHECKLIST  (FOR SIMULATION ASSESSED SYSTEMS)** | | | | | | | | | | | | | | | | | |
| Submission Date: | | Click here to enter a date. | | | | | | | | | | | Contact Details: | | | | |
| Manufacturer: | |  | | | | | | | | | | |
| Product Name: | |  | | | | | | | | | | |
|  | | Barrier 1: | | | |  | | | | | | | | | | | |
| Barrier 2: | | | |  | | | | | | | | | | | |
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| **Documents and Multimedia to be Provided for Each Simulation\*** | | | | | | | | | | | | | | | | | |
| # | Item | | | | | | | Comment | | | | | | | | | Item Submitted for both barriers (Y/N) |
| 1 | Formal technical report | | | | | | | Including model construction details, vehicle positioning and close-up views of the mesh details | | | | | | | | | Choose an item. |
| 2 | Videos showing global performance and local deformation characteristics | | | | | | | Various view angles such as Front, Side, Rear, Top and ISO | | | | | | | | | Choose an item. |
| 3 | Recorded bolt forces and comparison to installation data | | | | | | | Time history files and effective stress calculation | | | | | | | | | Choose an item. |
| 4 | Failure mechanism or localised buckling review and comparison | | | | | | | Photos from Test and Still Images from Simulation | | | | | | | | | Choose an item. |
| 5 | Energy balance | | | | | | | Total, Kinetic, Sliding Interface, Internal and Hourglass Energies | | | | | | | | | Choose an item. |
| 6 | Barrier material model data source and model implementation | | | | | | | Curves of stress-vs-strain and conversion to model input | | | | | | | | | Choose an item. |
| 7 | Element types and integration points | | | | | | | With reference to the software version | | | | | | | | | Choose an item. |
| 8 | Statement on the validation of the vehicles used for simulation | | | | | | | Data showing correlation achieved to vehicle only test, other barrier test or assumptions made on performance. | | | | | | | | | Choose an item. |
| 9 | Comparison measurements at key deformation points | | | | | | | Matching points on Test and Simulation using the same measurement method. | | | | | | | | | Choose an item. |
| 10 | ASI, THIV and Exit box overlay and proof of validity | | | | | | | Still Image comparison. | | | | | | | | | Choose an item. |
| 11 | Statement of rigid and deformable elements within the barrier and vehicle | | | | | | | Visual layout | | | | | | | | | Choose an item. |
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| **Simulations Submitted** | | | | | | | | | | | | | | | | | |
| # | Simulation Date | | Supplier (if not Manufacturer) | | | | | | | Unique ID | | | | Comments | | | |
| 1 | Click here to enter a date. | |  | | | | | | |  | | | |  | | | |
| 2 | Click here to enter a date. | |  | | | | | | |  | | | |  | | | |
| 3 | Click here to enter a date. | |  | | | | | | |  | | | |  | | | |
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| Submitted By: | | | |  | | | | | | | Signature: | | | | | |  |
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| \*All documents which are not English will have to be translated. | | | | | | | | | | | | | | | | | |