

## VEDLEGG 1.a-eng. (engelsk versjon)

### 1.1 Vurderte forhold i kompatibilitets- utredningen.

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| Top events (riskanalysis):<br>from risk analysis manual | Avs<br>STT<br>STO<br>Bra<br>PSP<br>PLO<br>PSS | (Derailment)<br>(Collision train - train)<br>(Collision train – other object)<br>(Fire)<br>(Persons injured on platform, in train (independent of speed and location) or during entering and leaving train)<br>(Persons injured at rail – road crossing)<br>(Person injured in or close to the open track (not in passenger platform areas)) |
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| Other harmful events: | HMS<br>MJØ<br>Sam<br>? | (Hazard for health. Harmful, risky conditions for staff)<br>(Pollution or noise to environment in ordinary or extraordinary operating conditions.)<br>(Lack of compatibility causes infrastructure installations to have hazardous function or reduced economy.)<br>(Only used on general topics where possible unwanted incidents cannot be established before more detailed information is available) |
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| K<br>1.1 | Description of use /general specification | <ul style="list-style-type: none"> <li>Type of rolling stock</li> <li>Main design features</li> </ul>   |
| K<br>1.2 |   | <ul style="list-style-type: none"> <li>Purpose / intended use</li> <li>Speed (signed speed or faster speed in curves?)</li> <li>Which railway lines</li> <li>Intended duration of use</li> <li>Seasons of the year</li> </ul> |
| K<br>1.3 |   | <ul style="list-style-type: none"> <li>Built according to which regulations / standards / TSI.</li> <li>Previous approval in Norway and abroad.</li> <li>Previous operation in Norway and abroad.</li> </ul>                  |

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| K<br>3.1.1<br>Ansv:<br>ITPB | Compatibility with track and profile (except pantograph) | Static strain on track too large: <ul style="list-style-type: none"> <li>Weight (max fuel and freight load)</li> <li>Distribution of axle load: <ul style="list-style-type: none"> <li>- between axles</li> <li>- between wheels on axle</li> </ul> </li> <li>Allowable axle load dependent of wheel size</li> <li><math>\Sigma P/L</math> (max weight per meter)</li> <li>P/a (axle load / min distance between wheels)</li> <li>P/b (axle load/distance from outer wheel to coupling end)</li> </ul> | Sam |
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| ID no. | Function prevent. t. event | Possible hazards / problems to be considered | Top event |
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| K 2.   |                            | Id 2 is not used in the compatibility study  |           |

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| K<br>3.1.2<br><br>Ansv:<br>- " - |  | Dynamic strain on track too large by: <ul style="list-style-type: none"> <li>• max speed on the section of line</li> <li>• max tractive and braking effort</li> <li>• min. radius of curves.</li> </ul> Evaluation based on: <ul style="list-style-type: none"> <li>• Track force (measurement?)</li> <li>• Nominal wheel profile and limits for wear.</li> <li>• Redistribution of load between wheels because of uneven track</li> <li>• Activation of magnetic rail friction brake only by emergency</li> <li>• Longitudinal displacement of track</li> <li>• Crosswise displacement of track</li> <li>• Free space for flange of wheel between guiding edges of the check rail and the running edge of the nose in turnouts (ledevidde sporveksler).</li> </ul> | Avs<br>Sam |
| K<br>3.2<br><br>Ansv:<br>- " -   |  | Allowable curve radius not sufficient for railway line. <ul style="list-style-type: none"> <li>- vehicle alone</li> <li>- coupled</li> <li>- S-curves</li> </ul> Vertical radius: $r$ and $\rho$  | Sam        |
| K<br>3.3.1<br><br>Ansv:<br>- " - |  | Free line profile exceeded static or dynamic by max speed and track failure on every line section. (Special tools in transport position.) <ul style="list-style-type: none"> <li>• Width (incl. protruding details like mirrors)</li> <li>• Height (incl. antennas)</li> <li>• Vert. og hor. curve profile enlargement in the middle and at the ends</li> <li>• By min. / max wheel size.</li> </ul>  | STO<br>Sam |

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| K<br>3.4<br><br>Ansv:<br>- " -   |   | Free profile around top of rail. <ul style="list-style-type: none"> <li>• Special tools on track maintenance machines when in transport mode.</li> <li>• Non-standard wheel-flange profile</li> </ul>   | Avs<br>Sam               |
| K<br>3.5<br><br>Ansv:<br>- " -   |   | Missing flange lubrications increases wearing of rail and wheels on other trains. <ul style="list-style-type: none"> <li>• Flange lubrication installed?</li> <li>• Amount of lubrication and spot for application of lubrication on wheel according to JBV requirement.</li> <li>• Lubrication of rail edge by another method?</li> </ul>  | Sam                      |
| K<br>3.6.1<br><br>Ansv:<br>- " - |   | Pressure surge in tunnels too large <ul style="list-style-type: none"> <li>• For other trains in opposite direction</li> <li>• For infrastructure installations in the tunnels</li> </ul>   | PSP<br>Sam               |
| K<br>4.1<br><br>Ansv:<br>- " -   | Compatibility with power supply system. | Capacity of safety grounding of parts of vehicle sufficient for short circuit current of power supply in order to ensure safe operation of line protection. <ul style="list-style-type: none"> <li>• grounding according to regulation.</li> <li>• doors / doorlocks</li> <li>• Moving parts. (for instance on excavators)</li> <li>• Rotating parts (for instance between top and bottom part of excavators).</li> </ul> | Bra<br>PLO<br>PSS<br>Sam |
| K<br>4.2<br><br>Ansv:<br>- " -   |   | Technical interlocking to prevent connection of power supplies: <ul style="list-style-type: none"> <li>• Catenary</li> <li>• 1000 V supply.</li> <li>• 400 V supply</li> <li>• 230 V supply</li> </ul> Other power supplies?  | PSP<br>Sam               |
| K<br>4.3<br><br>Ansv:<br>- " -   |   | Pantograph deviation from middle of track (in order to assure that it always hits the contact wire).<br>Request for verification by test-driving  | PSS<br>Sam               |

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| K<br>4.4<br>Ansv:<br>- " - |   | Free profile for pantograph (in order to prevent collision with infrastructure elements). Varies with class of railway line.   | PSS<br>Sam               |
| K<br>4.5<br>Ansv:<br>- " - |   | <ul style="list-style-type: none"> <li>Co-ordination of protective disconnection in vehicle and line-protection</li> <li>Request for test / documentation.</li> </ul>  | Bra<br>PSP<br>PSS<br>Sam |
| K<br>4.6<br>Ansv:<br>- " - |   | Too low pantograph upward force in not moving trains causes current to melt off catenary. <ul style="list-style-type: none"> <li>interlocking by falling air-pressure.</li> </ul>  | PSS<br>Sam               |
| K<br>4.7                   |   | Electrical compatibility between rolling stock and power supply. <ul style="list-style-type: none"> <li>Form (filled in) for check according to mechanical (pantograph) and electrical requirements.</li> <li>Form (filled in) for information for simulation of the power supply load-cases and stability (JD 590, app. 4a).</li> </ul>   | Sam                      |
| K<br>5.1<br>Ansv:<br>ITPS  | Compatibility with infrastructure signalling and communication installations. | Current in track cause negative influence on infrastructure installations. <ul style="list-style-type: none"> <li>exceeding limits for restricted frequencies</li> <li>limits applies to complete train (multiple operation)</li> <li>emergency operation in case of technical defect.</li> <li>weather dependent problem, especially ice-coating (isbelegg) on the contact wire.</li> <li>noise current dependent of drivers routine?</li> <li>automatic disconnection 95 /105 Hz not installed.</li> </ul> | STT<br>PLO<br>PSS<br>Sam |

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| K<br>5.2.1<br>Ansv:<br>- " - |   | Not reliable detection by track circuits <ul style="list-style-type: none"> <li>axle load too low</li> <li>electrical resistance between wheels</li> <li>max distance axle – axle and axle – vehicle outer end.</li> </ul>  | STT<br>PLO<br>PSS<br>Sam  |
| K<br>5.2.2<br>Ansv:<br>- " - |   | Not reliable detection by axle counter system <ul style="list-style-type: none"> <li>wheel profile wrong</li> <li>wheel material wrong</li> </ul>   | STT<br>PLO<br>PSS<br>Sam  |
| K<br>5.2.3<br>Ansv:<br>- " - |   | Rear end train integrity magnetic device not functioning properly (only line Hamar – Elverum - Støren) (halemagnet) <ul style="list-style-type: none"> <li>not possible to fasten the device</li> <li>snow-plough or other equipment: <ul style="list-style-type: none"> <li>mechanically occupying necessary space</li> <li>screens off or in other way cause bad function.</li> </ul> </li> </ul> | STT<br>PLO<br>PSS<br>Sam  |
| K<br>5.3<br>Ansv:<br>- " -   |   | ATC-installation in vehicle <ul style="list-style-type: none"> <li>Analysis of the modification of the class of rolling stock .</li> <li>Approval for every installation.</li> </ul>  | STT<br>Avs<br>Sam         |
| K<br>5.4<br>Ansv:<br>- " -   |   | Electromagnetic noise emission exceeds standard or cause malfunction of infrastructure installations. <ul style="list-style-type: none"> <li>EN 50121</li> <li>Earlier experiences of interference.</li> </ul>  | STT<br>PLO<br>PSS:<br>Sam |
| K<br>6.1<br>Ansv:<br>ITPS    | Compatibility with infrastructure tele communication installations. | GSM-R train radio. Installed telephone model and sot-ware in it must have type approval or preliminary approval from JBV.   | Sam                       |
| K<br>7.1<br>Ansv:<br>S.ko.   | Preparation for extraordinary handling /situations.                 | Parking <ul style="list-style-type: none"> <li>Parking brake capacity in gradients compared with line gradients</li> <li>Drag shoes (bremsesko)?</li> </ul>   | STT<br>STO<br>PLO<br>Sam  |

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| K<br>7.2<br>Ansv:<br>- " - |   | Marking of items important in rescue operation or otherwise available on location rescue is done.:<br><ul style="list-style-type: none"> <li>lifting points</li> <li>safety critical control mechanism</li> <li>safety critical indications</li> <li>connection for filling or draining</li> </ul>  | Sam<br>PSP<br>MJØ | K<br>8.2<br>Ansv:<br>- " - |   | Insufficient capacity in difficult operating conditions.<br><ul style="list-style-type: none"> <li>capacity for clearing snow in track</li> <li>slippery rails</li> <li>varies with railway line.</li> </ul>                              | Sam               |
| K<br>7.3<br>Ansv:<br>- " - |   | Connection to other rolling stock:<br><ul style="list-style-type: none"> <li>Connection to UIC-coupling possible?</li> <li>All necessary equipment for connection in one end available in train?</li> <li>Mechanical strength of coupling?</li> <li>Maximum 1 person in addition to train staff necessary to do coupling.</li> <li>Safety of staff when coupling. / Bernerspace by coupling.</li> <li>Compatible with UIC-brake?</li> </ul> | Sam<br>PSP        | K<br>8.3<br>Ansv:<br>- " - |   | Insufficient reliability.<br><ul style="list-style-type: none"> <li>Special precautions necessary to prevent risk of delay for other traffic?</li> </ul>  | Sam               |
| K<br>7.4<br>Ansv:<br>- " - |   | Does the vehicle have capacity for rescue hauling of other rolling stock if this is necessary in order to reopen normal traffic?  | Sam               | K<br>8.4<br>Ansv:<br>- " - |   | Communication with traffic management<br><ul style="list-style-type: none"> <li>train radio</li> <li>mobile telephone</li> </ul>  | Sam               |
| K<br>7.5<br>Ansv:<br>- " - |   | Portable equipment in order to ease reestablishment of traffic in case of disruption:<br><ul style="list-style-type: none"> <li>CTC-key (Centralized Train Control-key)</li> <li>drag shoes (bremsesko)</li> <li>device for connection to standard UIC-coupling of rescue train (if necessary)</li> </ul>   | STT<br>Sam        | K<br>8.5<br>Ansv:<br>- " - |   | Use of ATC not according to regulation.<br><ul style="list-style-type: none"> <li>ATC not installed in self-propelled vehicle.</li> <li>Distance between leading axle and ATC-antenna too long (pushing of railway carriages?)</li> </ul> | STT<br>Avs<br>Sam |
| K<br>8.1<br>Ansv:<br>S.ko. | Compatibility with traffic management and track capacity. | Insufficient speed for other traffic on line necessitate restriction:<br><ul style="list-style-type: none"> <li>slow speed in upward gradients (low power).</li> <li>downward gradients (thermal capacity of brakes limits speed),</li> <li>curves</li> <li>max speed</li> </ul>  | Sam               | K<br>8.6<br>Ansv:<br>- " - |   | Too slow passenger exchange:<br><ul style="list-style-type: none"> <li>door capacity</li> <li>disabled persons / wheelchairs</li> </ul>   | Sam               |
|                            |   |   |                   | K<br>8.7<br>Ansv:<br>- " - |   | Air pollution from vehicles (diesele engine or preheating / steam-locomotive?)<br><ul style="list-style-type: none"> <li>tunnels</li> <li>underground passenger stations</li> </ul>   | Sam               |
|                            |   |   |                   | K<br>8.8<br>Ansv:<br>- " - |   | Insufficient access for staff to infrastructure installations from rolling stock:<br><ul style="list-style-type: none"> <li>- entering and leaving rolling stock at and outside platform area.</li> </ul>                                 | Sam               |
|                            |   |   |                   | K<br>9.1<br>Ansv:<br>- " - | Compatibility with requirement for environmental protection | Line dependent restriction on use of toilet<br><ul style="list-style-type: none"> <li>Applies to stock with toilets without retention tank.</li> </ul>  | Sam               |