True Vehicle Inspection by Preventing Manipulations and Tricks by Examiners

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True Vehicle Inspection by Preventing Manipulations and Tricks by Examiners

Van Leeuwen Test Systems B.V.
The Netherlands
Anti-Manipulation Measures

Integrated and automated test station
Anti-Manipulation Measures

Car test lane and universal test lane
Anti-Manipulation Measures

Car test lane and universal test lane
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Motorcycle test lane and car test lane
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Test lane overhead monitor

- type of test
- driver instructions
- real-time measuring values
- tests to perform
- licence number
- axle nr.
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Network connections test lane
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Network connections test station
Anti-Manipulation Measures

Network connections test organisation
Anti-Manipulation Measures

All test station computers in locked air conditioned room
## Anti-Manipulation Measures

Controlled access to IT system

### Permissions

<table>
<thead>
<tr>
<th>Permission</th>
<th>Station overview</th>
<th>End of day summary</th>
<th>Inspector reporting</th>
<th>Statistics and graphics</th>
<th>Information equipment/calibration</th>
<th>Add equipment event</th>
<th>User access</th>
<th>Vehicle info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Manager</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>X</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Station Manager</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>X</td>
<td>X</td>
<td>V</td>
</tr>
<tr>
<td>Maintenance</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>V</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Anti-Manipulation Measures

Bribery sensitive situation

Prevent by strict regulation and smart inspection system

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Tracking system links the tests to the correct vehicle (axle)

T = tracking
F = front axle
R = rear axle
I = in
O = out
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Licence number check
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Stage 1
Anti-Manipulation Measures

Inspector identification with RFID tag at each test stage
Anti-Manipulation Measures

Inspector id stored with each test

<table>
<thead>
<tr>
<th>Test Result</th>
<th>Start Time</th>
<th>End Time</th>
<th>Lane</th>
<th>Performed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passed</td>
<td>17:41:12</td>
<td>17:42:36</td>
<td>406050</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Axle</th>
<th>Weight</th>
<th>Drag</th>
<th>Brake type</th>
<th>Left force</th>
<th>Right force</th>
<th>Efficiency</th>
<th>Diff - Prog</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>781</td>
<td>22,6%</td>
<td>Service</td>
<td>271</td>
<td>252</td>
<td>67%</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>781</td>
<td>22,6%</td>
<td>Serv Imbal.</td>
<td>265</td>
<td>242</td>
<td>-</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>781</td>
<td>22,6%</td>
<td>Parking</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>766</td>
<td>45,8%</td>
<td>Service</td>
<td>214</td>
<td>208</td>
<td>55,1%</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>766</td>
<td>45,8%</td>
<td>Serv Imbal.</td>
<td>214</td>
<td>208</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>766</td>
<td>45,8%</td>
<td>Parking</td>
<td>219</td>
<td>198</td>
<td>54,4%</td>
<td>10%</td>
</tr>
</tbody>
</table>
Anti-Manipulation Measures

Irregularity alerts

Vehicle reported stolen

Vehicle inspection report:

Vehicle Type: Car
Manufacturer:
Model:
Engine Type: Four Stroke
Fuel Type: Petrol

Head Beam Information
Headlight Configuration: 2 High

Axle Information
Number of Axles: 2

Traction | P. Brake | Lifted | Steered | Speed Sensor | Type | Distance to Next (mm)
--- | --- | --- | --- | --- | --- | ---
Axle 1 | | | | | | 0
Axle 2 | Released | | | | NORMAL | 0

Attention

Vehicle stolen! (be safe)
Anti-Manipulation Measures

Fixed preselected tests for each compulsory inspection.
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Robotised headlight beam tester with laser scanner to prevent incorrect vehicle alignment

Movie clip
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Comprehensive PTI standards
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Stage 2, side slip tester
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Side slip tester
Anti-Manipulation Measures

Side slip tester
Anti-Manipulation Measures

Side slip tester

short switch bars
Anti-Manipulation Measures

Side slip tester

speed measurement
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Stage 2, suspension tester
Anti-Manipulation Measures

Tracking system controlled cover plates
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Misalignment
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Axle position indication
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Wheel position check

allowed wheel position area

weight load cell
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Weight and position change check during suspension test
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Judgement against absolute values, so not only left/right comparison

### Suspension

<table>
<thead>
<tr>
<th></th>
<th>5-VPT-02</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anti-Manipulation Measures

Stage 2, roller brake tester
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‘Safety’ barriers around brake tester
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Automatic triggering of retest
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Progressivity check to prevent slamming on the brakes
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Automatic re-test

In this example: requirement = 50%
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Use of emergency stop detection
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Use of emergency stop detection
Anti-Manipulation Measures

Use of emergency stop detection
Anti-Manipulation Measures

Stage 3
Anti-Manipulation Measures

Stage 3, diesel smoke test under full load with CDST
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Controlled test cycle on CDST

Engine Power (kW)

- Rated engine power
- Measured wheel power
- Full throttle part
- Gear changes

80% 90% 100% wheel power

Engine RPM

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Checks on engine rpm and power

![Image of engine rpm and power checks]
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Speedometer test on CDST

No actual speed indication at speedometer test
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Aircon-test: both temperature and air flow measurement
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Stage 4
Anti-Manipulation Measures

Inspector identification with RFID tag at each test stage
# Anti-Manipulation Measures

Comparison of test results between inspectors

<table>
<thead>
<tr>
<th>Inspector</th>
<th>Performed Test</th>
<th>Total passed</th>
<th>Total failed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Above Carriage Inspection</td>
<td>106</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Above Carriage Inspection</td>
<td>2793</td>
<td>309</td>
</tr>
<tr>
<td></td>
<td>Above Carriage Inspection</td>
<td>1318</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>Above Carriage Inspection</td>
<td>1216</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total Above Carriage Inspection</td>
<td>5433</td>
<td>393</td>
</tr>
<tr>
<td></td>
<td>Under Carriage Inspection</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Under Carriage Inspection</td>
<td>1143</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Under Carriage Inspection</td>
<td>549</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Under Carriage Inspection</td>
<td>568</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total Under Carriage Inspection</td>
<td>2266</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Diesel Smoke Test</td>
<td>73</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Diesel Smoke Test</td>
<td>2213</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>Diesel Smoke Test</td>
<td>965</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Diesel Smoke Test</td>
<td>1103</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total Diesel Smoke Test</td>
<td>4359</td>
<td>168</td>
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<tr>
<td></td>
<td>Emission Test</td>
<td>26</td>
<td>0</td>
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<td></td>
<td>Emission Test</td>
<td>562</td>
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<tr>
<td></td>
<td>Emission Test</td>
<td>21</td>
<td>0</td>
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<tr>
<td></td>
<td>Emission Test</td>
<td>17</td>
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</tr>
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<td></td>
<td>Total Emission Test</td>
<td>626</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Roller Brake Test</td>
<td>571</td>
<td>966</td>
</tr>
</tbody>
</table>

From: 27-12-2012  To: 27-01-2014
Anti-Manipulation Measures

Test lane output
fraud sensitive documents
Anti-Manipulation Measures

Lockable printer cabinet

test certificates

test reports
Anti-Manipulation Measures

End of inspection
Anti-Manipulation Measures

Station overview screen for station manager

<table>
<thead>
<tr>
<th>VEHICLE STATION OVERVIEW</th>
<th>Traffic on vehicle test lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lane 1</td>
<td></td>
</tr>
<tr>
<td>Waiting 02</td>
<td></td>
</tr>
<tr>
<td>KGS-883 MWE-927</td>
<td>SZ-23-45</td>
</tr>
<tr>
<td></td>
<td>HR-PJ-33</td>
</tr>
<tr>
<td></td>
<td>BDR-284</td>
</tr>
<tr>
<td></td>
<td>FC-35-HS</td>
</tr>
<tr>
<td>Lane 2</td>
<td></td>
</tr>
<tr>
<td>Waiting 00</td>
<td></td>
</tr>
<tr>
<td>GT-43-KD</td>
<td>FS-HK-58</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane 3</td>
<td></td>
</tr>
<tr>
<td>Waiting 02</td>
<td></td>
</tr>
<tr>
<td>HD-29-LK JSJ-836</td>
<td>LP-LK-74</td>
</tr>
<tr>
<td></td>
<td>VR-OM-73</td>
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<tr>
<td></td>
<td>HS-JJ-54</td>
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<tr>
<td></td>
<td>NWS-320</td>
</tr>
<tr>
<td>Lane 4</td>
<td></td>
</tr>
<tr>
<td>Waiting 01</td>
<td></td>
</tr>
<tr>
<td>HDS-937</td>
<td>ND-93-NS</td>
</tr>
<tr>
<td></td>
<td>LKS-824</td>
</tr>
<tr>
<td></td>
<td>TS-38-JS</td>
</tr>
<tr>
<td>Lane 5</td>
<td></td>
</tr>
<tr>
<td>Waiting 00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Inspection type**
- Car lane
- Universal lane
- Motorcycle lane

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Anti-Manipulation Measures

Station overview screen with real-time test lane overview screen
Thank you for your attention.

Please feel free to contact us for detailed information.

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