

## Railway Challenge Scrutineer's Check Sheet

**Team:**

### Purpose:

This document comprises a list of vehicle characteristics that will be physically inspected prior to the Railway Challenge Performance Demonstration. The described inspections are in addition to the review of supplied design documents

Collectively, design review and inspection seek to ensure safety, compliance and a fair comparison of vehicles

With respect to inspection, the following should be noted:

Symbol Used

- For items marked with a red star: In the event that a Scrutineer deems the locomotive non-compliant, the issue must be resolved before the locomotive is moved away from the inspection area
- For items marked with a blue star: In the event that a Scrutineer deems the locomotive non-compliant then, if the issue is not resolved, the locomotive may continue with the Railway Challenge, but the stated penalty will be applied by the judges<sup>1</sup>



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Pale grey text indicates scrutineering check applies only if a relevant Challenge Option is being undertaken

<sup>1</sup> Note that rectification of the non-compliance may incur an availability penalty, should the locomotive not be able to undertake dynamic scrutineering as scheduled

### Documentation:

The following documents must have been submitted and approved by the Railway Challenge engineering committee before any locomotive is permitted to take part in any Performance Demonstration:

#### Operation:

- Safety related operating instructions (Technical Specification Section 11.2.7 refers<sup>2</sup>)

#### Document Seen



### Inspection / Demonstration:

The Scrutineer will make a physical inspection of the locomotive for evidence of compliance with the Technical Specification, hazards and Challenge rules, as follows:

#### Static Inspection:

#### Apparent Compliance

- Hazard warning markings (Technical Specification Clause 4.8 refers)
- Jacking point indication
- Tow bar supplied (Technical Specification Clause 6.2.1 refers), preferably stowed within locomotive
- Sharp edges, corners, protrusions, potential catch risks (inc. cable loops)
- Operator within locomotive suitably constrained without inhibiting emergency escape. No potential contact injuries (sharp edges, hot surfaces, electric shock) (Technical Specification Section 6.3.3 refers)
- Guarding. All entrapment risk assets enclosed by secure rigid guards<sup>3</sup>
- Locomotive mounted emergency brake location markings
- Suitable protection and containment of primary fuel



<sup>2</sup> Must be printed or available on dedicated tablet, available to be carried by train operator

<sup>3</sup> Must be in place at time of scrutinising so as to allow inclusion in loading gauge inspection

- Mass of replaceable energy storage asset(s) (if incorporated) (Technical Specification Section 4.1 refers) compliant and labelled
- Earth bond (axlebox to each axle)
- All wires, cables and pipework labelled or otherwise uniquely identifiable (Technical Specification Section 3.3 refers)
- Accelerometer mounting point, including cable route (Technical Specification Section 9.2 refers)
- Provision of two or three dimensional replica human form (Technical Specification 6.3.4 refers) and ergonomics as per accepted concept design (Rules Section 9.6 refers)
- Loading gauge (inc. clearance between vehicle underside and track) <sup>4</sup>

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#### Demonstration <sup>5</sup> (Static):

- Emergency brake operation from locomotive mounted buttons
- Emergency brake operation in the event of loss of communication with remote control
- Emergency brake operation in the event of loss of control system power
- Emergency brake no-release (if full service brake not selected; Technical Specification 5.4 refer)

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<sup>4</sup> Measurement will be undertaken on straight and level track. Gauge profiles used will be to Drawing RCO2 (Technical Specification Clause 4.3 refers). Scrutineers will expect to see notable clearance between the gauge and locomotive (to allow for vehicle dynamics and end / centre throw). If in doubt, they will exercise the right to inspect applicable calculations

<sup>5</sup> Unless otherwise stated, demonstration will be witness of system function and not of system existence

- Service brake operation
- Indication – remote panel shows status of auto-coupling system (Technical Specification Section 6.2.2 refers)
- Indication – remote panel indicators functional if locomotive in on-board control mode (Technical Specification Section 6.3.2 refers)
- Indication – braking system fault (method to be agreed by Scrutineer)
- Demonstration – remote panel controls not functional if locomotive in on-board control mode (Technical Specification Section 6.3.2 refers)
- Demonstration – Operator able to drive locomotive without rotation about vertical axis or asymmetry with respect to any part the body (Technical Specification Section 6.3.4 refers)
- Demonstration – Operation from locomotive functional as specified (Technical Specification multiple sections refer) (Rules Section C9.9 refers). Note max. speed 5 km/h
- Demonstration – refuelling from zero to 100% capacity within 120 seconds (or otherwise satisfying the Scrutineer that this is achievable) (Technical Specification Section 4.1 refers)
- Demonstration - Precipitation resistance – operation after one full watering can emptied via a diffuser from 1m above (with no temporary water ingress prevention measures)
- Demonstration – traverse movement jacking wheels – fitment and operation (Technical Specification Section 6.3.1 refers)
- Demonstration – horn (Technical Specification 5.8 refers)<sup>6</sup>

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<sup>6</sup> The Organisers reserve the right to employ sound level meters in the event of doubt with respect to compliance with the Technical Specification

### Demonstration <sup>7</sup> (Dynamic ):

- Indication – locomotive operating via recovered energy only
- Indication – status of recovered energy storage
- Indication – speed compliant with Technical Specification Clause 5.7.1)
- Indication – Automatic braking mode selected (Technical Specification 5.7 refers)
- Demonstration – 15 km/h speed limiter (method to be agreed by Scrutineer)<sup>8</sup>
- Emergency brake rate measurement, based on braking distance measurement <sup>9 10</sup>

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<sup>7</sup> Demonstration will be undertaken on the Railway Challenge track system

<sup>8</sup> At the Scrutiniser's discretion, it may be required to demonstrate operation at 10 km/h before higher speed running is undertaken if locomotive on-board operation is available and intended for use (Rules Section C9.10 refers)

<sup>9</sup> Distance will be calculated by the Head Scrutineer based on the specified tare braking rate (Technical Specification Clause 5.2 refers) and the ratio of locomotive and trailing load masses

<sup>10</sup> If locomotive on-board operation is available and intended for use during practice and Challenge operation, this test must be undertaken with locomotive on-board operation (Rules Section C9.11 refers)

## License Key

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|------------------------------------|
| <b>Documentation – User Guide</b>  |
| <b>Inspection - Markings</b>       |
| <b>Inspection - Physical</b>       |
| <b>Demonstration - Performance</b> |
| <b>Demonstration - Indications</b> |

In the event of query please contact Tim Poole (Head Scrutineer) or Stephen Head (Deputy Head Scrutineer)