



## Improvements to safety signage on passenger trains (T052a)

### Background?

This work was carried out jointly by Interfleet Technology and human factors specialists, Davis Associates, on behalf of the Rail Safety and Standards Board in response to the Ladbroke Grove Rail Inquiry Part 1 (LGRI/1) Recommendations 71, 72 and 73, regarding passenger emergency signage and labels, that:

- All safety signs shall use luminous material.
- All safety signs shall be capable of being understood without the need to read text (so far as feasible).
- There shall be a system of signage that is common to all trains in Great Britain.

### Aims

The aim of the research was to develop guidelines that would support a standardised system of luminous safety signage for use on all passenger trains.

The objectives of the guidelines were to enable the design and testing of new symbols that are legible and comprehensible to passengers with a consistent visual style that distinguishes them from other signage.

The project also went on to develop an initial set of new symbols. A new set of signs for UK passenger vehicles using the new guidelines was subsequently produced under a follow on project, T246 'Development of common passenger safety signs'.

### Method?

The research was completed in seven stages:

#### Stage one: Defining best practice

The research began with a literature review covering aspects relating to graphical legibility and comprehension, including a search of standards and best practice.



#### Stage two: Information needs analysis

The primary aim of this stage was to define the list of referents for which graphical symbols were required (a referent is the item or action to be depicted by the symbol). This was done through a fleet signage survey, a review of the current signage catalogue and a stakeholder workshop.

#### Stage three: Benchmark legibility tests

Before any symbols or signs could be developed it was first necessary to define graphical guidelines that would ensure their legibility when printed on luminous material and when viewed under low-light and smoke-filled conditions.

A custom-designed viewing chamber was constructed to allow controlled introduction of smoke and various lighting conditions. Test graphics were inserted into the chamber (Snellen charts and Landolt Rings) and a series of legibility tests were performed using thirty-three people to represent a range of visual acuity levels.





*Stage four: Symbol development and comprehension testing*

Graphical symbol concepts were conceived during a brainstorm session. The symbol concepts were then drawn-up using the graphical guidelines defined in stage three. Up to ten of the most promising graphical symbols for each referent were taken forward to comprehensibility judgment testing and comprehension testing. Both these stages of testing involved members of the public completing procedures based on standard ISO 9186:2001.



Comprehension testing was also carried out with members of the public on-board trains. The three highest scoring symbols for each referent (that had attained the comprehensibility pass mark from the earlier stage) were shown to passengers who were informed about the context of use, but given no indication of the meaning. Participants were asked to give the meaning of the symbol. A panel of three independent judges assessed their responses using a weighted scoring system to calculate overall level of comprehension.



**“What does this symbol mean?”**

Comprehensibility judgment testing involved members of the public who were approached on-board trains and asked to complete test booklets containing symbol variants. The participant was informed of the symbol’s intended meaning and then asked for their estimation of the percentage of the general population that would correctly understand the meaning of the symbol. Analysis of the data enabled the short-listing of graphical symbol variants for comprehension testing.

The final part of stage four involved a mutual confusion test. The aim of this test was to identify any possible confusion between the meanings of the developed symbols.



**“What percentage of the general population do you think would understand these symbols?”**





### Stage five: Instruction comprehension tests in context

In order to verify the comprehensibility of the graphical symbols tests were conducted with members of the public using safety equipment on-board a rail vehicle.

### Stage six: Legibility and discriminability verification testing

In order that the legibility of text and graphical symbols could be verified, the earlier tests in the viewing chamber were repeated with the full set of symbols and a selection of signs.



Further testing was also carried out on rail vehicles. Members of the public were given emergency scenarios on board trains with either old or new styles of signage fitted, and asked to demonstrate how they would react in each situation.



### Stage seven: Standardisation

In this final stage of the research programme, an initial set of symbols

was developed. In addition to this, two guideline documents were produced with the aim of facilitating a new common system of standardised passenger safety signs.

### Findings

This study has developed a set of graphical symbols and sample signs, and two guideline documents for passenger safety signage design. These guidelines define the processes for the design and testing of new graphical symbols, and for the design of safety signs that will be legible and comprehensible on luminous material, and which have a consistent visual style that distinguishes them from other signage.

ITL/GN0001 Graphics guidelines for safety signs

ITL/GN0002 Guidelines for symbol design and testing



Through a parallel project, Interfleet has produced a new ATOC Extranet facility and this contains all of the above deliverables in a dedicated section. Authorised individuals and organisations are able to download all the necessary resources for the design of signs that are fully compliant with this

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new common system of passenger safety signs.

### Next steps

RSSB is managing the development of a supplementary set of graphical symbols for those additional referents identified as being needed for less common and newer devices (Research Project T422, 'Completing passenger train safety signage to improve legibility and comprehension'). This will enable suitable signs to be designed with symbols appropriate to their operation.

### Contact

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