# Visibility of Ecoglo Hybrid Exit Signs with Pictogram Decals for a 24m Viewing Distance

## Observation Trial Test Report

### Aim

To determine if an Ecoglo Hybrid exit sign with a pictogram decal can meet the New Zealand Building Code (NZBC) Clause F8 performance requirements (F8.3.1 and F8.3.3) at a 24m viewing distance.

### Background

The Ecoglo HYU-1 Hybrid sign is normally supplied with pictogram decals that meet F8/AS1 with a 16m viewing distance. The sign dimensions are not large enough to meet F8/AS1 with a 24m viewing distance for a photoluminescent (PL) sign using a pictogram decal. However, Ecoglo Hybrid signs have greater luminance than F8/AS1 requires (see Appendix 2, Table 2), so it seems reasonable to consider that the extra luminance may make up for the reduced sign dimensions, and thus for the sign to be visible at 24m. If this is the case, a Hybrid sign with a 24m decal, while not meeting the requirements of the Acceptable Solution (F8/AS1) would meet the performance requirements of Clause F8, allowing it to be used in Alternative Solutions.

### Methodology

Ecoglo S20 standard PL exit signs at the dimensions specified in F8/AS1 have been independently tested using human observers (see Appendix 1) to show that they are suitably visible from a 24m viewing distance when their luminance is 21.4mcd/$m^2$. The testing was performed by Intertek in the USA, following the requirements of UL 924: 2009 Standard for Emergency Lighting and Power Equipment. Therefore, the Intertek tested signs can be used as a benchmark against which to assess other signs. By re-creating the luminance and observation conditions of the independent test in an in-house test, and comparing the visibility of a Hybrid sign with the S20 sign, we can determine whether the Hybrid sign could also be expected to have suitable visibility at 24m viewing distance.

For this trial, a special directional pictogram decal was manufactured without a PL border (a border is required by F8/AS1) in order to maximise the size of the pictogram elements for greatest possible visibility. In other jurisdictions (Japan, US, and Canada), PL exit signs do not require a PL border, so it seems reasonable to conclude that this is not a

necessary feature to ensure visibility in accordance with F8.3.1.
The pictogram height for this trial was therefore 175mm, compared with 144mm for the F8/AS1 Hybrid pictogram sign with a 16m viewing distance.

The trial Hybrid sign was charged for 60 minutes. Charging time of 60 minutes is sufficient to simulate a normal installation (24/7 continuous charging).
Benchmark Ecoglo S20 signs were charged with a 4000K fluorescent light source exposing them to 54 lux for 60 minutes, as per the independent testing mentioned above. The benchmark signs used were: the Ecoglo S20 sign with 24m visibility previously tested by Intertek, as well as an Ecoglo S20 24m visibility sign and an Ecoglo S20 16m visibility sign, taken from Ecoglo stock.

The observation test was timed so that, at the observation time, the three Ecoglo S20 signs had a luminance of 21.4mcd/$m^2$ (160 minutes after removal of the charging light), and the Hybrid sign was at 90 minutes discharge (the maximum time required by Clause F8, for Risk Group B and C buildings).

Refer to Appendix 2, Table 1 for the in-house test results used to determine the 160 minutes value.

## Trial parameters

The observation trial was based on UL 924: 2009 Standard for Emergency Lighting and Power Equipment, section 41.2, with the following modifications:

- Of the individuals making the observations, three were in the 18-30 age range and one was in the 51-70 age range
- The evaluations were
  1) To determine if the sign was Running Man Left or Running Man Right
  2) To rank the signs in order of ease of visibility
- The viewing distance was 24m
- There were four observers

The observation trial was carried out at the Ecoglo manufacturing facility in Christchurch, New Zealand at 6:30pm on 20 June 2018, the day before the shortest day of the year. The sun set that day at 4:59pm, and by 6:30pm it was dark outside. The illuminance of the background to the signs was measured at 7mcd/$m^2$. This provides less favorable viewing conditions than the UL 924 test conditions.

UL 924 requires the contrast ratio between the legend and background of the exit signs to be greater than 0.5. The contrast ratio of the Hybrid sign using the UL 924 method of determining contrast ratio was 0.8. The Hybrid signs exceed the contrast requirements of UL 924.

## Results

Evaluation 1: Running Man Left or Running Man Right?

| Tester | Age range | Hybrid sign with 175mm decal | S20 24m visibility sign | Intertek tested S20 24m visibility sign | S20 16m visibility sign |
|---|---|---|---|---|---|
| 1 | 18-30 | R | L | R | R |
| 2 | 18-30 | R | L | R | ? |
| 3 | 18-30 | R | L | R | R |
| 4 | 51-70 | R | L | R | L |
| Correct answer | | R | L | R | R |
| Number of correct responses | | 4 | 4 | 4 | 2 |

Evaluation 2: Ranking signs according to ease of visibility

| Tester | Age range | Most visible sign | Second most visible sign | Second least visible sign | Least visible sign |
|---|---|---|---|---|---|
| 1 | 18-30 | Hybrid sign | S20 24m sign | Intertek tested sign | S20 16m sign |
| 2 | 18-30 | Hybrid sign | S20 16m sign | S20 24m sign | Intertek tested sign |
| 3 | 18-30 | Hybrid sign | S20 24m sign equal with Intertek tested sign | | S20 16m sign |
| 4 | 51-70 | Hybrid sign | S20 16m sign | Intertek tested sign | S20 24m sign |

## Discussion

It can be seen from Evaluation 1 that the Hybrid sign was correctly identified as Running Man Right by each tester.
It can be seen from Evaluation 2 that the Hybrid sign was determined as the most visible sign by each tester.

It is worth noting that because the Hybrid sign has a translucent pictogram, there is noticeably less contrast in this sign than the S20 signs which have an opaque pictogram. It was obvious during the observation trial that an opaque pictogram in the Hybrid sign would further enhance its visibility. That said, the contrast ratio of the Hybrid sign as tested

exceeds that required by UL 924.

## Conclusion

The Hybrid sign with the 175mm high pictogram decal is more visible (as defined in F8.3.1 and F8.3.3) at a distance of 24m than the S20 24m visibility exit sign previously tested by Intertek (and shown to meet F8.3.1 and F8.3.3 at a 24m viewing distance).
This confirms that the Hybrid sign with the 175mm high pictogram decal meets the requirements of F8.3.1 and F8.3.3 for a viewing distance of 24m, and therefore can be used within the framework of an Alternative Solution for F8 when a viewing distance of 24m is required.