ASSOCIATION FOR ROAD TRAFFIC SAFETY AND MANAGEMENT

GUIDANCE DOCUMENT

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PROVIDING GUIDANCE TO MANUFACTURERS AND USER COMMUNITIES

SELECTING THE CORRECT VARIABLE MESSAGE SIGNS (VMS) Update

Introduction

The aim of this Guidance Note is to provide organisations and individuals with information to enable them to select the correct VMS for each location and the points to be taken into account to make a good and lawful installation. This Guidance Note supersedes the earlier Note dated March 2019.

Selection of the VMS is probably the more important aspect because if the wrong VMS is selected it will not matter how good the installation, the investment will be worthless. Spending time at the outset of a project will reap a reward for all parties concerned. A VMS system comprising one sign, or many signs is a long term asset. A clear, concise objective for the system should be established and agreed by all stakeholders before selection begins.

The VMS display surface is just about the only interface that a national or local road authority has to broadcast messages to all drivers passing a VMS location. Individually, drivers may obtain information from their car radio, sat-nav or telephone but the quality and weighting of the messages is inconsistent. Local radio messages are notoriously poor for strangers to an area and telephone traffic message channels can be tedious. Messages displayed on VMS are available to all and can prepare drivers for planned and unplanned incidents and thereby influence their behaviour.

Standard for Variable Message Signs

The UK legislation for VMS is the Traffic Signs Regulations & General Directions 2016, specifically Chapter 16. The performance requirements of VMS are set out in BSI Standards publication "BS EN 12966:2014 incorporating corrigenda June 2018 and April 2021 Road vertical Signs – Variable message traffic signs" (hereafter called BS EN 12966:2014) and TOPAS 2516 – Procurement Specification for Discontinuous Variable Message Signs.

Reference to these publications is recommended reading. The annexes of BS EN 12966:2014 contain helpful information for anyone charged with selecting VMS and in particular the UK National Annex.

TSRGD sets out regulations and requirements for VMS in England, Scotland and Wales. Northern Ireland has additional requirements which are found in Traffic Signs Regulations (Northern Ireland) 1997.

Conformity Marking CE/CA labelling

You should also be aware of the requirements to CE/CA mark products. There are various conformity assessment markings to consider, both within and beyond the Construction Products Regulations CPR). For example, whilst there is no requirement for CA/CE for mobile VMS under CPR and therefore BS EN 12966, there is nevertheless a requirement in the UK for ALL VMS, fixed and mobile, to CE/CA to EMC, LVD and where appropriate RED – all of which Directives are beyond the requirements of the CPR, and all of which have been adopted by the UK (excepting rules on NI under the NI Protocol).

In addition, ALL VMS must prove compliance to BS EN 12966:2014 regardless of the ability to CE/CA mark under it. VMS that are registered with TOPAS all meet those criteria in full.

Criteria for selection

Regardless of the scale of the system whether it is a national network of VMS covering a wide area or, say, a hospital or shopping centre carpark the same four criteria apply:

- Conspicuity
- Legibility
- Comprehensibility
- Credibility

Conspicuity

This is also referred to as conspicuousness and relates to the environment in which the sign is to be installed and the visibility of the sign to the driver approaching it. The main consideration is **the location** of the sign that is relevant to the information to be displayed; it is not much good installing

a sign giving the number of spaces in a car park 10m before the car park entrance. The height of the sign above the road will determine how often it will be obscured by passing trucks and buses. On the strategic and major routes signs are usually mounted on cantilevers and gantries to avoid obscuration as much as possible. In urban areas signs are invariably mounted on the roadside.

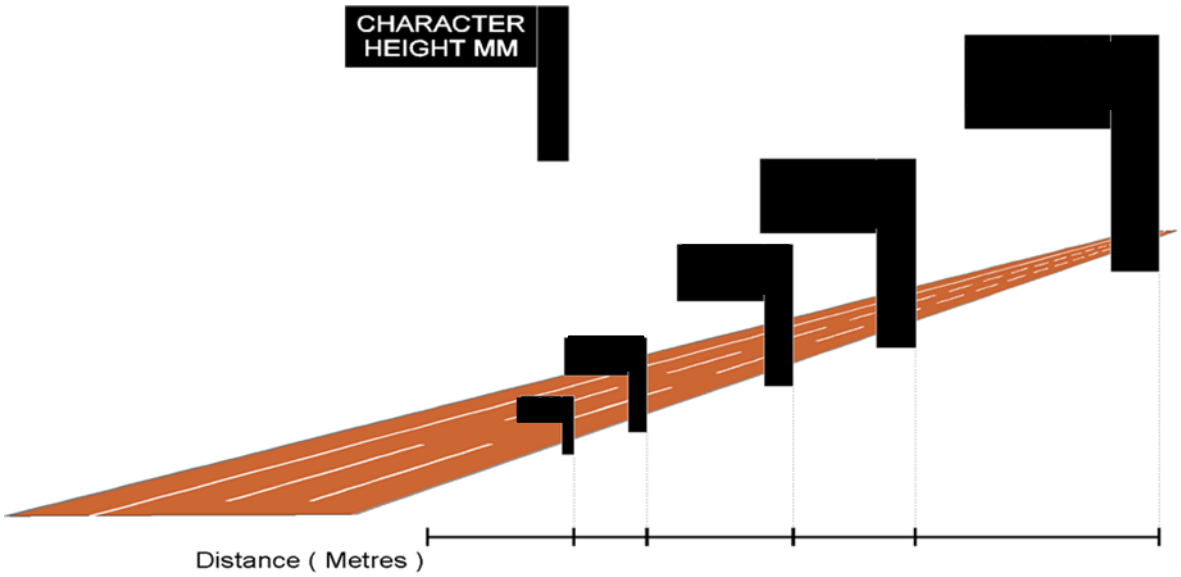
The road geometry, viewing angle and alignment must be considered to ensure the driver is able to see the sign and has enough time to read the message displayed. If the road is bendy it may be impossible to align the sign to a point where the driver has time to read the message.

Annex N of BS EN 12966:2014 provides guidance on dimensions, beam width, legibility and efficiency for VMS whilst the UK National Annex provides the specific requirements for Great Britain and Northern Ireland. This is repeated in TOPAS 2516.

Visibility takes account of factors affecting the driver's ability to see and read the VMS. The illustration above shows a cantilever mounted VMS well located and clear of distraction and clutter. The roadside mounted sign in the background does not have a clear field of vision, it is lost in the trees and shrubbery, the advertising sign creates a distraction and the message is confusing. Not a good installation.

Legibility

The legibility of the message displayed on the VMS determines the driver's ability to read or decipher the message, i.e. can the driver recognize the words and symbols. The illustration below provides an example of recognition distances when applying the recommended character sizes for the UK. The smaller the character height (and therefore the VMS sign) the shorter the distance of viewing. More detailed information may be found in the UK National Annex of BS EN 12966:2014.



Thus, getting the legibility right includes knowing the approach speed, character height, character font, character spacing, word spacing and line spacing, the luminance ratio often called contrast ratio and the dimensions of the sign border.

Comprehensibility

Human factors are more to the fore in this third criterion; the bullet points state the most important, but not necessarily all, considerations as they change from project to project.

- Comprehension skills of drivers, their age, background and experience; older drivers' visual acuity may not be so good, language of the driver may be a problem - and in this case getting the message across with pictograms may be a better option.
- Messages should be of a consistent format so that drivers become familiar with the way messages are displayed, build up a level of trust so that they are happy to act on the message because it is in their interest to do so.

- The amount of information displayed has to be relevant to the situation and conditions and give the driver time to read assimilate and act on the information. Nothing is more annoying than a message displayed after the incident has been cleared or conditions changed.

- The legibility distance and time must be right, and the character height correct for the approach speed. There is no point installing a VMS with 160mm character height on a road with an approach speed of 62mph/100km/h. It will be illegible. Similarly installing a VMS with over 30 words on any road approach will be pointless, since the speed of reading for anyone will be insufficient. The Department for Transport Traffic Advisory Leaflet TAL 01/15 advises

that "**Messages should be as short as possible while being fully comprehensible to drivers. They should not normally consist of more than eight words or six units of information**".

- The geographic details need to be appropriate for the local or strategic location.

- The ability of the driver to comprehend a message is affected by clutter around the sign and other distractions nearby.

Messages must always be displayed on a single face, no single message should appear as a scrolling or paging message. It is possible to display more than one separate message using changing screens, but each message must be clearly understood independently of any other message shown.

For example a sign stating "lane closed ahead" can appear on one page. A second face stating "between 01/01/21 and 06/01/21" is quite obviously not a second message, it is a continuance of the first message, and therefore must be displayed on the first page.

However, if the two messages were "lane closed between *date and *date" and the second message stated states "slow down, delays ahead" then this would be an entirely separate sign which could appear on a second face. You can also have blank pages.

All pages must meet the requirements for character heights and number of words or units permitted (as above)

Credibility

Credibility of the VMS installation links together the foregoing criteria and may be summarized as follows.

- Can the driver rely on the accuracy of the messages?
- Are the messages correct for the prevailing conditions?
- Are the messages legible and understandable to the driver?
- Is the visual and physical performance of the VMS up to the job?

This fourth point can be ensured by selecting VMS that meet the requirements of BS EN 12966:2014 and Schedule 16 of TSRGD 2016. More information regarding the definitions, requirements and standards pertaining to VMS can be found in the publications referred to in Table 1 below.

The information which is to be relied upon for the most appropriate use is found at BS EN 12966:2014 National Annex and is set out below:

National Annex BS EN 12966:2014 (incorporating corrigenda May 2021)
NA.4 Sign selection

Annex N of the standard provides the designer or purchaser with guidance on the selection of the appropriate character size of text on VMS depending on its intended application. The two basic factors to be considered are:

• the legibility distance, depending on the size and design of the message and its visual performance (luminance, luminance ratio, beam width and colour); and

• the recognition time (the duration of legibility), depending on approach speed. The calculated recognition time should not exceed the maximum recommended reading time for the purposes of this calculation, as detailed in Table NA.4. The process of calculating the recognition time is fully detailed in Annex N of the standard.

Table NA.4 — Maximum recommended reading time

Number of words in message	Maximum recommended reading time, s
1-3	3.0
4	3.3
5	3.6
6	4.0
7	4.3
8	4.6

Consideration should be given to the variable nature of sign displays. The maximum reading time should be taken for the highest number of words the sign is expected to display. Calculating the recognition time for the sign against the maximum recommended reading time, together with the speed of the road and beam width of the display, will confirm the character height.

Characters should be upper case with height based on a calculation of 7 × 5 (seven elements vertically and five elements horizontally) or a proportional alternative, for example 14 x 10. More information on character height, character width, character spacing, word spacing, line spacing and backing board dimensions can be found in Annex N of the standard

And finally, for the avoidance of doubt, the National Annex NA also states:

It is stated in the Scope of BS EN 12966:2014 that mobile, temporary and permanently installed VMS used on public and private land, including tunnels for the information, guidance, warning and/or direction
of traffic are covered.

Additionally the TSRGD requirements expressly apply to all forms of VMS – temporary, mobile and permanent. For the avoidance of doubt this means that mobile and temporary VMS should have the same visual and physical characteristics as a permanent VMS.

The way messages should be displayed on mobile and temporary VMS is prescribed in TSRGD 2016.

It is recommended by DfT, ADEPT representing the Traffic Signal Group for Local Authorities and industry experts, that procurement of VMS should be TOPAS registered products. TOPAS was created to ensure that standardisation and interoperatibility would remain following the removal of Secretary of State Type Approval. TOPAS is a tripartite body made up of government bodies, and user and industry representation – details of representation can be found on the TOPAS website as can the TOPAS specifications relating to VMS and other traffic control products. VMS products can be registered under TOPAS 2516 and VMS with vehicle activation under TOPAS 2541. Registration with TOPAS ensures the requirements of TSRGD and other legislation are adhered to. Procurers are advised by their frameworks to set requirements for TOPAS registered products.

Further publications

Definitions, requirements and standards	Information to be obtained
Display surface	BS EN 12966:2014+A1:2018 Incorporating Corrigenda 2018 and April 2021 Terms and definitions The words legend, aspect and display are often used to mean display aspect.
TOPAS 2516, latest edition	Refer to TOPAS website www.topasgroup.org.uk
TSRGD 2016	Traffic Signs Regulations and General Directions Statutory Instruments available from the Stationery Of
TAL 01/15	Traffic Advisory Leaflet 01/15 Variable Message Signs Department for Transport publication
BS EN 12966:2014+A1:2018 incorpor corrigenda June 2018 & April2021	Road vertical signs-Variable message traffic signs BSI standards publication
Highways England	"Policy for the use of Variable Signs and Signals (VSS)" version 3.2 May 2020

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