

GUIDANCE DOCUMENT WG3/04 MARCH 2019

# SELECTING VARIABLE MESSAGE SIGNS (VMS)

ANY SIGN WILL NOT DO!

# 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 installation. 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.

# Any Sign will do!

To understand the title of this paragraph imagine a busy Traffex exhibition and senior consultant employed by a renowned traffic engineering consultancy leading a party of customers from a Malaysian road constructor and operator.



The party stops at a stand for a long and detailed discussion about selection, performance and installation of VMS. The discussion was terminated by the consultant saying to the customer he was advising :

"You don't have to worry about that. Any sign will do."

So, if that is the case then the sign illustrated could be fit for installation. Clearly it is not!



The VMS display surface is just about the only interface that a national or local road authority 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 inconstant. 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 – BS EN 12966:2014

The performance of VMS is set out in BSI Standards publication "BS EN 12966:2014 incorporating corrigendum June 2018 Road vertical Signs – Variable message traffic signs". Reference to this publication together with TSRGD 2016 schedule 16 is recommended reading. The annexes of BS EN 12966:2014 contain helpful information for anyone charged with selecting VMS. TSRGD sets out regulations and requirements for VMS in the United Kingdom of Great Britain and Northern Ireland.

#### **Criteria for success**

Now let's imagine you have been asked to select and install a driver information system. Where do you begin? 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 for a success 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 considerations are 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.





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The road geometry, viewing angle and alignment all have to 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.

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 shows the approximate recognition distances of the most commonly used character sizes. More detailed information may be found in Annex N 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 last but no means least the dimensions of the sign border.

#### Comprehensibility

What a word just to cover the ability of the driver to understand the message! The human factors are more to the fore in this third criterion; the bullet points state the important but not necessarily every consideration 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.



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- 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. 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.

# 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.

There has been some confusion following the table reproduced in TAL 01/15. The information which is to be relied upon is found at BS EN 12966:2016 National Annex N Table N.1 and is set out below:

Size Range	Character height h	Character width a) W	Character spacing b) Sc	Word spacing c) Sw	Line spacing <sup>d)</sup> SI	Backing board border distance e)
А	100	71	28	71	57	100
В	160	114	46	114	91	160
С	240	171	68	171	137	240
D	320	228	91	228	182	320
E	400	285	114	285	228	400

#### Table N.1 — Minimum dimensions of text (mm)

a) If a fixed character dimension is used, the minimum character width is equal to 5/7 h. If a proportional character font is used, character width varies.

b) The minimum character spacing is equal to 2/7 h. If proportional character font is used, character spacing varies. c) The minimum word spacing is equal to 5/7 h.

d) The minimum line spacing is equal to 4/7 h. The line spacing is the clear area between spaces assigned to the characters; see also Figure P.2, Figure P.3 and Figure P.4. Recommendation for line spacing when using lower case

letters and descenders is given in Figure P.3 and Figure P.4. Recommendation for line spacing when using lower ca

e) The minimum backing board border distance is equal to h. This distance is measured from the border of text to the border of backing board

And also at BS EN 12966:2014 National Annex NA – UK Committee B/509/11 Guidance on the performance classes in the United Kingdom for Discontinuous Variable Message Signs as follows – Table NA.5:

#### Table NA.5 – Character size range and heights

Size Range Character height mm	
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Α	100
В	160
С	240
D	320
E	400

The character heights are upper case and based on 7 x 5 (7 elements vertically and 5 elements horizontally). More information on character height, character width, character spacing, word spacing, line spacing and backing board dimensions can be found in Annex N Table N.1.

TAL 01/15 tables 2 & 3 shows upper case character sizes of 100, 200, 250, 300, 350 and 400mm. Characters sizes range and heights do not correspond exactly with the Table NA.5, above, which takes precedence and is up-to-date as of June 2018.

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

It is stated in the Scope of this standard 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. 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.

Further publications

Definitions, requirements	Information to be obtained
and standards	
Display surface	BS EN 12966:2014 clause 3.8 Terms and definitions
	The words legend, aspect and display are often used
	to mean display aspect.
TOPAS 2516	Refer to TOPAS website www.topasgroup.org.uk
TOPAS	Traffic Open Products and Specifications
	Refer to <u>www.topasgroup.org.uk</u> for details.
TSRGD 2016	Traffic Signs Regulations and General Directions
	Statuary Instruments available from the Stationery Office.
TSRGD 2016 Schedule 16 Part 1	Requirements in relation to Variable Message Signs and leg
	for use on them.
TSRGD 2016 Schedule 16 Part 2	Signs automatically activated by vehicular traffic
TSRGD 2016 Schedule 16 Part 3	Legends giving warnings of adverse weather
	or other temporary hazards or incidents
TSRGD 2016 Schedule 16 Part 4	Legends indicating location of temporary hazard or

# Table 1



	incident
TSRGD 2016 Schedule 16 Part 5	Additional information
TSRGD 2016 Schedule 16 Part 6	Other legends
TAL 01/15	Traffic Advisory Leaflet 01/15 Variable Message Signs
	Department for Transport publication
BS EN 12966:2014 incorporating	Road vertical signs-Variable message traffic signs
corrigendum June 2018	BSI standards publication
BS EN 12966:2014 Annex N	Guidance on the dimensions, luminance, beam width,
	legibility and efficiency for discontinuous VMS
	Annex N provides information on;
	character heights
	legibility distances
	recognition times
	beam widths
	luminance
	luminance ratio
BS EN 12966:2014 Annex P	Guidance for the design of VMS messages
	Annex P provides information on:
	design of VMS messages
	specifying text dimensions
	inter word spacing
	inter character spacing
	inter line spacing
Highways England	"Policy for the use of Variable Signs and Signals (VSS)"
	version 3.0 June 2018
Clause 1.1	Adherence to policy
Clause 1.4	Key definitions
Clause 2.2	Portable VMS shall be set, monitored and used
	under the direction of the relevant control room.
Clause 2.7	Flashing and scrolling VMS legends
Clause 2.9	Units of information on portable VMS
TR0154, TR2136 and 2516A, B and C	Technical requirements for VMS now obsolete
TR2136	Technical requirements for VMS now obsolete
TR2516 A, B and C	Technical requirements for VMS now obsolete

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ARTSM, WG3

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