



# Technical Specifications for Variable Message Signs in Israel

Updated Version based on the European Standard  
EN12966:2014+A1:2018

Edition 3.1

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### Note:

**This English Edition is a partial translation of the formal Hebrew Edition. It is provided as an assistance for the Recognized Laboratory for carrying out the testing. If any contradiction is found between the Hebrew formal Edition and this English Edition, the formal Hebrew formal Edition shall apply.**

## 1. European Foreword

See EN 12966:2014+A1:2018, section named **European Foreword**.  
This section is not included in this English Edition of these Specifications.

## 2. Introduction

See EN 12966:2014+A1:2018, section named **Introduction**.  
This section is not included in this English Edition of the Specifications.

## 3. Introduction to Israeli Specifications – Edition 3.1

This Document, titled “Technical Specifications for Variable Message Signs in Israel”, Edition 3.1, includes the specific requirements in Israel for VMS.

The Edition 3.1 is based on the European Standard EN12966:2014+A1:2018. This standard is sometimes referred to in this document as “the European Standard”.

This edition of these Specifications replaces the Second Edition of these Specifications from year 2015, that was based on older versions of EN 12966.

**Edition 3.1 was revised compared to Edition 3, and the reference to IS 12899-1 was canceled, in all aspects, except for the Retro-Reflective material. Additionally, a few language corrections have been incorporated.**

In contrary to previous editions of these Specifications, this Edition 3.1 does not include a full translation of the European Standard to Hebrew.

Sometimes, the specific requirements in Israel are different, or more detailed, than the requirements of EN 12966. Therefore, this document includes:

- Reference to the Introductory Sections of EN 12966:2014+A1:2018
- Appendix A – Applicability of EN 12966:2014+A1:2018 Standard to the Israeli VMS. This Appendix includes a detailed reference to the European Standard, clause by clause, and specify the applicability of each EN requirement to VMS in Israel, see detailed table in Appendix A.
- Additions and Amendments to the European Standard requirements, relevant for VMS to be used in and imported to Israel. These Additions and Amendments and detailed in Sections 6 and on.

## 4. Scope

See EN 12966:2014+A1:2018, Section named **Scope**.

This section is not included in this English Edition of these Specifications.

## 5. Term and Definitions

See EN 12966:2014+A1:2018, Section 3 named **Terms and Definitions**.

This section is not included in this English Edition of these Specifications.

## 6. General Requirements for VMS of all Types

These requirements are applicable to both types of signs in Israel, as mentioned above:

- Continuous (prismatic)
- Discontinuous (light-emitting using luminous elements).

The Variable Message Signs (VMS) that are imported to Israel have to meet any law, standard, rule or regulation that are valid in Israel. As much as there are no relevant requirements and instructions in the Israeli legal and standardization system, the standards that are referred to in EN 12966:2014+A1:2018 and Appendix A are applicable.

Section 2 of EN 12966:2014+A1:2018 provides a list of relevant European and International Standards that are applicable. Meeting these standards is a requirement for meeting EN 12966:2014+A1:2018.

Following a coordination with the Standards Institution of Israel, the bullets below define a list of Israeli Standards that replace a few European and International Standards that are referred to in EN 12966:2014+A1:2018, Section 2:

- Israeli Standard IS 60529 replaces European Standard EN 60529.
- Israeli Standard IS 62368-1 replaces European Standard EN 60950-1.
- Israeli Standard series IS 61008 replaces European Standard series EN 61008.
- Israeli Standard series IS 61009 replaces European Standard series EN 61009.
- Israeli Standard IS 9001 replaces European Standard EN ISO 9001:2008.
- Israeli Standard IS 12899-1 replaces European Standard EN 12899-1, with regards to Retro-Reflective material requirements.

The requirements defined in these specifications are applicable only for newly approved signs. Signs that were approved based on previous edition of these Specifications will not have to meet the requirements of this edition, during Validity Extension by the Inter-Ministrial Committee.

The European Standard EN 12966:2014+E1:2018 and these Specifications apply to two different types of Variable message signs:

- **Continuous VMS** – Prismatic Signs that show sign faces of the type of fixed signs defined in IS / EN 12899-1
- **Discontinuous VMS** – Light-Emitting Signs that use luminous elements to show different messages and symbols on a single sign face.

**It is emphasized that the requirements of the European Standard and these Specifications are applicable for all VMS signs in Israel (both Prismatic and Light-Emitting).**

This document should be read in conjunction with:

- A. The Israeli Ministry of Transport Guidelines for Variable Message Signs, 2009,
- B. The Israeli Ministry of Transport Guidelines for Lane Control Systems, 2013.

All 3 documents supplement one another.

However, the definitions in these Specifications supersede the definitions in document A, as follows:

- Clause 10.4 (including Table 4), page 66
- Clause 10.5, page 66
- Clause 11.2, page 67.

## 7. Colors of Light-Emitting VMS

In the European Standard EN 12966:2014+A1:2018 the use of White-Yellow color is canceled, and the permitted colors are: Red, Orange, Yellow, White, Green, Blue.

The chromaticity coordinates for these colors are defined in the European Standard.

For VMS with text messages, that are defined in the Israeli Table of Signs as Sign 629P, the required color is White or Yellow.

This requirement **supersedes** the definition in The Guidelines for Variable Message Signs, 2009, Clause 11.2, page 67 (where White-Yellow color is defined).

Signs in the Israeli Table of Signs for which a **P** version is defined (such as: 127P, 150P, 410P, 426P, 723P, 724P, 725P), should be implemented as light-emitting signs. For these signs, it is required to implement the colors that are defined in the Israeli Table of Signs for that sign (for example: Red, White, Green, Blue, Orange), using the chromaticity coordinates that are defined in EN 12966:2014+A1:2018, on a Black background.

It is emphasized that when White color is defined in the Israeli Table of Signs, it is required to implement this light-emitting sign with White color, using the chromaticity coordinates that are defined in EN 12966:2014+A1:2018, on a Black background.

All elements of one sign in a particular color shall appear in a uniform color.

As defined in Appendix A, the color class required is Israel is: **C2**.

## **8. Luminance Levels and Light Sensor of Light-Emitting VMS**

Following Clause 4.4.3 and Annex M.2 in EN 12966:2014+A1:2018, in order for the sign to be capable of selecting the appropriate Luminance level, based on the external illumination, the sign shall allow to define at least 5 levels of Luminance, as defined in Tables 4 to 9 in EN 12966:2014+A1:2018.

Accordingly, the signs shall include at least two light sensors, one installed in the front face and one in the rear face of the sign, that allow an automatic selection of the Luminance level, based on the external illumination.

## **9. Beam Width Requirements for Light-Emitting VMS**

Following Clause 4.4.5 and Annexes N.3, N.4 in EN 12966:2014+A1:2018, for signs in Israel a Beam Width class B1 to B7 shall be selected. The Beam Width shall be defined based on the road characteristics (type of road, number of lanes, curvature of road, and existence of visual obstacles), location and nature of installation of a particular sign relative to the road, as defined in Annex N.

See also the Israeli Ministry of Transport Guidelines for Variable Message Signs, 2009, and the Israeli Ministry of Transport Guidelines for Lane Control Systems, 2013.

Table N.4 of EN 12966:2014+A1:2018 provides a few typical examples for selecting Beam Width class.

## **10. Graphical Requirements for Light-Emitting VMS**

The requirements in this section follow the requirements of Annex N.3 of EN 12966:2014+A1:2018.

In VMS with “color inversion” Black turns to White and White turns to Black, all other colors are not changed.

As described in Annex M.1, the use of regular matrix may not allow the re-production of oblique lines, circles and curves. In such cases there may be a “staircase effect”. To reduce this and to improve the quality of the displayed pictogram / symbol, it is advisable to limit the distance between the elements (also called: pixel pitch or element spacing).

Figures M.5, M.6, M.7 in Annex M.3 present examples for an improved representation of a symbol on a pixel matrix.

The smaller the element spacing is, the better the VMS resolution becomes, and it is possible to produce oblique and circle lines, in a better graphical quality.

### Summary of Requirements for VMS in Israel:

- The pictogram / symbol shape shall be as presented in the Israeli Table of Signs, thus producing oblique and circle shapes, that resemble, as much as possible, the shape in the Table of Signs. See detailed requirements in The Israeli Ministry of Transport Guidelines for Lane Control Systems, 2013, Part A, pages A-11, A-12.
- The maximal element spacing (pixel pitch) for VMS, including Lane Control Signs, in Israel, shall be: **25 mm**.

## 11. Text and Symbol Requirements for Light-Emitting VMS

This section follows the requirements of the European Standard / Annex N.2.

All the requirements indicated in this section are **obligatory for VMS in Israel**.

### A. Text

The main dimension in a text sign is the **Character Height**. All other dimensions are derived proportionally as a function of the Character Height, as detailed in the Table below.

**Dimensions for Text Messages**

<b>Dimension</b>	<b>Proportion to Character Height (CH)</b>
Character Width	5/7 of CH
Character Stroke (see note below)	1/7 to 1/5 of CH
Spacing between Characters	2/7 of CH
Spacing between Words	5/7 of CH
Spacing between Lines	At Least $\frac{3}{4}$ of CH
Character of Final Letter in Hebrew	8/7 of CH
Spacing between Text and Edge of Front Panel (in vertical and horizontal directions)	Character Height

The designed dimensions shall be as close as possible to those indicated in the Table above. However, a deviation of  $\pm 5\%$  may be allowed, if the above-mentioned dimensions cannot be materialized due to the number of elements in the sign.

For example, for a Character Height of 450 mm, a Character Width of 321 mm is required (based on 5/7 proportion). A deviation of  $\pm 5\%$  may be allowed for the Character Width – in the range of 305-337 mm, if this requirement cannot be materialized based on the number of elements in the sign.

The minimal number of elements for an alphanumeric character shall be derived from the maximal element spacing (pixel pitch) – which is required to be **25 mm**.

For example, for element spacing of 25 mm, and for a Character Height of 450 mm (514 mm for a Final Letter), in order to maintain the required proportions:

- A regular Hebrew Letter shall consist of 18 elements (vertical) X 13 elements (horizontal), [explanation:  $450 / 25 = 18$ ,  $18 * 5/7 = 13$ ].
- A final Hebrew Letter shall consist of 21 elements (vertical) X 13 elements (horizontal), [explanation:  $18 * 8/7 = 21$ ].

If decided that that the element spacing is smaller, say 20 mm, then for a Character Height of 450 mm (514 mm for a Final Letter), in order to maintain the required proportions:

- A regular Hebrew Letter shall consist of 23 elements (vertical) X 16 elements (horizontal), [explanation:  $450 / 20 = 23$ ,  $23 * 5/7 = 16$ ].
- A final Hebrew Letter shall consist of 26 elements (vertical) X 16 elements (horizontal).

#### Clarification for the Requirements for Character Stroke:

When designing characters for a VMS, the letter stroke shall be filled with light elements, in order to reach the required luminance. The Letter Stroke shall in the range between 1/7 (14.2%) and 1/5 (20%) of a Character Height, and then be rounded to a full pixel, within this range.

For example, following the first example above, with a Character Height of 18 elements, the Character Stroke shall be between 2.6 pixels ( $18 * 0.142$ ) and 3.6 pixels ( $18 * 0.2$ ). Therefore, the Character Stroke shall be set to 3 pixels.

Following the second example above, with a Character Height of 23 elements, the Character Stroke shall be between 3.3 pixels ( $23 * 0.142$ ) and 4.6 pixels ( $23 * 0.2$ ). Therefore, the Character Stroke shall be set to 4 pixels

The presentation of symbols in Light-Emitting Signs shall be in accordance with the requirements of clauses B-D below.

#### Letter Format:

Appendices 5-6 in The Israeli Ministry of Transport Guidelines for Variable Message Signs, 2009, define the format of letters, figures and other characters, in a structure of 7 elements (vertical) X 5 elements (horizontal). However, the smaller the spacing between

the elements (pixels) is, the better is the resolution of the sign. Consequently, the reproduction of oblique lines, circles and curves is in a better quality.

When a sign consists of an element matrix with a higher resolution than 7X5, and hence a character is built of a larger number of elements [such as 18 elements (vertical) X 13 elements (horizontal)], then the format of letters, figures and other signs in the above-mentioned Appendices – shall be maintained, but the oblique lines, circles and curves shall be improved, as defined in Appendix M, Figures M.5, M.6, M.7, of the European Standard.

## B. Symbols

The shape of all symbols to be presented on Light-Emitting Signs shall be similar to their shape as presented in the Israeli Table of Signs. The dimensions – in cm – required for signs and symbols, including shapes of circle and triangle, are defined in The Israeli Ministry of Transport Guidelines for Lane Control Systems, 2013, Part A, Section 4, Pages A-10 to A-12.

## C. Circle Shape Symbols

The minimal number of elements for a matrix including a circle shape shall be derived from the maximal element spacing (pixel pitch) – which is required to be 25 mm.

For example, for a circle with 120 cm diameter, the minimal size of the element matrix shall be 48x48 [explanation:  $120/2.5=48$ ]. However, the number of element (pixels) shall allow that the generated circle shape is similar, as much as possible, to the circle shape presented in the Israeli Table of Signs.

For example, for Sign 426P (speed limit), based on the graphical representation in the Table of Signs, the proportions between the various dimensions of the sign are presented in the Table below, second column from left. Based on these proportions, the required dimensions (expressed in number of pixels) are presented in the two right-side columns: for the external diameter of the circle, the width of the circle (the red stripe), character height, and the character stroke - all of them for 48x48 and 64x64 pixel matrix.

<b>Dimension</b>	<b>Proportion between the Dimension and the External Diameter in the Table of Signs</b>	<b>Number of Pixels for 64X64 Matrix</b>	<b>Number of Pixels for 48X48 Matrix</b>
External Diameter of Circle	1.00	64	48
Width of Circle	0.115	7.4	5.5
Character Height	0.400	25.6	19.2
Character Stroke	0.079	5.1	3.8



Explanation of the calculation for a 48x48 Matrix:

- Size of External Diameter of Circle should be 48 pixels
- Width of Circle would be  $0.115 \times 48 = 5.5$  pixels (can be rounded to 5 or 6)
- Character Height would be  $0.4 \times 48 = 19.2$  pixels (rounded to 19)
- Character Stroke would be  $0.079 \times 48 = 3.8$  pixels (rounded to 4).

Explanation of the calculation for a 64x64 Matrix:

- Size of External Diameter of Circle should be 64 pixels
- Width of Circle would be  $0.115 \times 64 = 7.4$  pixels (can be rounded to 7 or 8)
- Character Height would be  $0.4 \times 64 = 25.6$  pixels (can be rounded to 25 or 26)
- Character Stroke would be  $0.079 \times 64 = 5.1$  pixels (rounded to 5).

A similar calculation shall be carried out by the sign designer for all other components of the signs, for example, length and width of the lines in Signs 723P, 724P, 725P.

#### **D. Triangle Shape Symbols**

The minimal number of elements for a matrix including a triangle shape shall be derived from the maximal element spacing (pixel pitch) – which is required to be 25 mm.

For example, for a triangle with 135 cm side, the minimal size of the element matrix shall be  $54 \times 54$  [ $135/2.5=54$ ]. However, the number of element (pixels) shall allow that the generated symbol shape is similar, as much as possible, to the circle shape presented in the Israeli Table of Signs.

## **12. Electrical Requirements for VMS of all Types**

The electrical requirements shall be with the following priorities:

- The Israeli Electricity Law, 1954, and its Regulations, and in particular, the Israeli Electrical Regulations for Guidance Signs (Traffic Signal Lights), [In Hebrew: TAHARAM], 2001
- EN 12966:2014+A1:2018 and its Applicability Table in Appendix A.

### **13. Additional Requirements for Prismatic Signs in Israel**

Prismatic Variable Messages Signs are called in the European Standard “Continuous VMS”.

The requirements for Prismatic VMS (also called: Variable Prismatic Signs - VPS) are defined as follows:

- The basic requirements, as defined in the European Standard – See Appendix A
- The additional requirements – See this section below.

#### **A. The Basic Requirements**

The basic requirements are defined in the European Standard. Appendix A below defines the Applicability of the requirements to VMS in Israel.

Clause 6.2.2 of the European Standard, including Table 28, outlines the requirement clauses for the “Initial Type” of the VPS, and defines in particular for every requirement - whether a Declaration or Testing is required.

These requirements include, among others, Physical Performance Requirements (including Mechanical, Electrical and EMC requirements), that are applicable to all types of signs, Prismatic and Light-Emitting.

The faces of Variable Prismatic Signs in Israel shall be covered by Retroreflective material only.

Clause 4.3 of the European Standard defines the performance requirements for VPS, and as defined in Appendix A, Retroreflective material shall meet IS 12899-1, which is based on EN 12899-1:2007.

Similarly, Clause 4.4 of the European Standard defines the performance requirements for Light-Emitting VMS.

Table ZA.1 in Appendix ZA also defines the relevant clauses for VPS, in order to be entitled for CE marking.

## **B. The Additional Requirements**

1. The VPS shall be capable of displaying legends without undue distortion to, or gaps in, symbols, letters and borders.
2. The VPS shall include means to avoid displaying incorrect and inconsistent messages. When message is changed mechanically, means shall be incorporated to secure the moving parts in their correct relative positions to display the message. Consequently, a position of the prisms, all or a few of them, more than 10 degrees relative to the correct position – a Fault condition shall be generated. This requirement is important in particular when the VPS is composed of two different drive and transmission mechanisms.
3. During a VPS changing sequence, the time that any misleading message (message different than the designated one) is displayed, or within a transition mode – shall not exceed 5 seconds. If the designated message, selected for display locally or remotely, shall not be displayed within 7 seconds, a Fault condition shall be generated.
4. Any over-travel or tolerance of the operating mechanism shall be such that when a message is displayed, the VPS's legibility is maintained (qualitative test).
5. be the minimum necessary. Free play linkages shall also be kept to a minimum, consistent with the maintenance of a legible sign face.
6. Protection shall be provided to safeguard the drive and transmission mechanism from damage, when, for example, the prisms become jammed.
7. The VPS shall allow a definition of a Default Message. This definition shall be configurable, via local or remote access.
8. In case of power failure or communications / control fault, the VPS shall allow to select between the option of displaying the Default Message or the option of continuing to display the last presented message. This definition shall be configurable by software, via local or remote access. In case of such failures, the VPS shall display the message as defined.
9. The VPS shall include an internal power back-up system, as part of the sign assembly, that allows continued operation of the VPS for a short period after the start of the power failure. The duration of the power back-up shall allow the VPS to switch to the Default Message, as defined. During the power back-up operation, the VPS shall not respond to any request for message change, from any source, except for switching to the Default Message.
10. In any case of remote / external control or communications fault, a Fault condition shall be generated. The VPS shall switch to display the message (as defined in Clause 7). The Fault shall be identified if the duration of power or communications lost exceeds 10 continuous seconds.
11. Upon power failure to the VPS, a Fault condition shall be generated. Facilities shall be provided to monitor the condition locally and / or remotely.

12. Means shall be provided to operate the VPS locally, mechanically (not electrically), in the event of power failure.
13. Means shall be provided to operate the VPS locally, using a handle, lever, or other means of manual operation. These means shall be in easy reach of an operator standing on the ground or catwalk. A means of preventing the message being changed by unauthorized persons shall be incorporated. The force which is required to be applied to the handle, lever, or other means of manual operation shall be no more than 45 Newton. This shall apply over the whole range of climatic conditions.
14. Where a VPS is controlled remotely, a confirmation of sign status is required, to be provided by the VPS controller, for every operational condition and displayed message condition, including conditions where the required message is displayed, or the required message is not displayed exceeding the allowed time interval.
15. All pivots and bearings shall be non-corrodible and shall be sealed against the ingress of dirt and moisture, where this may degrade the performance of the VPS's operation.
16. The VPS shall include local means for electrical operation, allowing the operator to change messages using a selection switch, on a board located in an external cabinet or the enclosure of sign's controller. The local message change shall override any remote message change, while sending a response from the sign controller that the sign is in a local control. The sign shall be designed such that it is possible to operate and monitor the status of the sign locally. The sign status shall be displayed by indicators or displayed on a test set.
17. All printed circuit boards shall be protected against corrosion by a conformal coating.
18. (this clause was canceled)
19. VPS with moving parts forming the legends that are exposed to all weather conditions, shall have mechanisms capable of continued operation when subjected to all environmental conditions expected in Israel.
20. The Retroreflective material used for the VPS's face shall meet Israeli Standard IS 12899-1.
21. Each panel of the VPS shall be covered by only a single sheet of Retroreflective material along its entire length and width. Additionally, each message component (such as a letter or part of it, or a symbol or part of it) pasted on a VPS panel, shall be made by cutting and pasting a single Retroreflective sheet for that message component, without jointing parts of sheets.
22. VPS shall not include Front Screen over the face of the sign.

23. The characteristics and appearance of the presented messages, and their presentation over the VPS legend faces, shall be as defined in the MOT Guidelines for Signing Design in Inter-Urban or Urban Roads, and as defined in the MOT Table of Signs, and MOT Guidelines and Regulations for Signs, all in their latest editions.
24. The prism face that displays a Blank legend (for example when there is no need for a third legend), shall be painted with Matte (non-bright) Grey color.
25. All VPS components installed in the enclosure shall be fully covered, including the rear side of the sign.
26. The VPS's rear and lateral sides, and the front frame that is not covered by Retro-reflective material – shall be painted with Matte (non-bright) Grey color, in a uniform finish. The mounting device and enclosure of the VPS shall be painted with the same color, even if galvanized.
27. A prismatic component (window) can be incorporated as part of a Retro-reflective fixed sign. For example, the presentation of the number “3” or “4” in Signs 230 or 501. In such a case, the prismatic component shall look like the fixed part, as an integral part of it. The prismatic component shall be attached to the fixed sign, without front visible fixture elements on the sign face, without holes, and without bolts.
28. The Manufacturer shall declare that the Life-Cycle and Quality Parameters of the VPS, meet as a minimum the following requirements:
  - a. VPS Life-Cycle 25,000 message changes
  - b. Mean Time Between Failures (MTBF) – 50,000 hours
  - c. Mean Time To Repair (MTTR) – 1 hour (including fault diagnostics and repair).

See detailed description of the tests in Section 14 and Appendices A-C.

## 14. Guidelines for VMS Testing

The Test-Module of both types of the Variable Message Signs (VPS and Light-Emitting signs) shall be tested by a “Recognized Laboratory”, as defined by the Procedure of the Inter-Ministrial Committee for the Examination of Traffic and Safety Devices, in its latest edition (see Clause A below).

Variable Prismatic Signs – VPS, that are defined in the European Standard as “Continuous VMS”, shall also be tested by the Local Signage Authority (see Clause B below).

### A. Guidelines for Conducting the Test Report by the Recognized Laboratory

Testing of the Test-Module of the Variable Message Sign shall be conducted by a Recognized Optical Laboratory, as defined by the Procedure of the Inter-Ministrial Committee for the Examination of Traffic and Safety Devices, in its latest edition.

The test report of the Recognized Laboratory shall consist of two parts, as follows:

#### Part 1:

A report that follows the clauses of EN 12966:2014+A1:2018, clause-by-clause, in accordance with the guidelines of Appendix A.

- When it is written for a certain clause: **Fully Applicable**, the requirements shall be as defined in EN 12966:2014+A1:2018.
- When it is written for a certain clause: **Applicable**, the requirements shall be as defined in EN 12966:2014+A1:2018, but for the Category / Class defined in Appendix A.
- When it is written for a certain clause: **Modified**, the requirements shall be as defined in EN 12966:2014+A1:2018, but with some modifications, as defined in Appendix A.

All testing and measurements shall be conducted in accordance with the Testing Methods defined in the European Standard EN 12966:2014+A1:2018, as detailed in Appendix A.

#### Part 2:

A Supplementary Report for the VPS.

The supplementary report of the Recognized Laboratory shall contain all tests of the Test-Module, clause-by-clause, as detailed in **Appendix B** below, based on the requirements defined in Section 13-B.

The following should be enclosed to Test Report:

- Color photographs in good quality of the tested sign.
- Catalogue Numbers of the sign.

The laboratory shall sign the Test Report with original stamp and signature.

## **B. Guidelines for Conducting the VPS Testing by the Local Signage Authority**

As not all the characteristics of the VPS, in their final configuration, are tested as part of the Test-Module testing, by the Recognized Laboratory, the VPS's shall also be tested in Israel, prior to their installation on-site, by the Local Signage Authority.

The tests to be carried out by the Local Signage Authority for the signs in their final configuration, shall be as detailed in **Appendix C** below, based on the requirements defined in Section 13-B.

The VPS tested as part of this testing shall be all signs in their final configuration, designated to be installed on-site. The VPS shall be in their final dimensions, including the full enclosure and the power back-up system, fitted with all the peripheral equipment. The VPS shall include the Retroreflective sheets pasted on the panels, in accordance with the approved design, and shall display the complete planned messages and legends.

The testing shall be conducted using a computer that functions as a remote / external control, connected to the sign.

The testing shall be conducted by a Traffic Engineer, with "A certification of Traffic and Transportation Engineering expertise" (issued by MOT), with knowledge and experience in installation of Variable Message Signs.

**The Table in Appendix C shall be filled out for each and every VPS, indicating its Serial Number.**

**General Technical Specifications  
for Variable Message Signs  
in Israel**

**Edition 3.1**

**Appendix A**

**Applicability of the EN 123966:2014+A1:2018  
Standard to Israeli VMS**

## General

The EN 12966 European Standard applies to Variable Message Signs in Israel, both Continuous VMS and Discontinuous VMS.

The Table below specifies the applicability of the EN 12966 standard to the Israeli Variable Message Signs.

A clause can be:

- **Fully Applicable** – All of the EN 12966 requirements in this clause are applicable
- **Applicable, Required Class X** - The EN 12966 requirements in this clause are applicable, but when a few classes are defined, only the specified Class is required in Israel.
- **Fully Applicable (with comments)** - All of the EN 12966 requirements in this clause are applicable, but the comment explains the applicability to Israel.
- **Modified** - The EN 12966 requirements in this clause are applicable with modification. The modification is detailed.

## EN 12966:2014+A1:2018 Detailed Applicability

Applicable Clause(s) of EN 12966	Requirement	Criteria As Applicable
1	Scope	Fully Applicable
2	Normative References	Applicable. Additional / Modified Requirements in General Spec. Section 6.
3	Terms and Definitions	Fully Applicable
4	Product Characteristics	
4.1	Dimensions and Tolerance Requirements	Fully Applicable.
4.2	General Design Requirement	Fully Applicable
4.3	Visual Performance Requirements of Continuous VMS (VPS)	Modified. Requirements are defined in Israeli Standard IS 12899-1.
4.4	Visual Performance Requirements of Discontinuous VMS	-----
4.4.1	Classification	Fully Applicable
4.4.2	Color	Applicable. Required Class for all Colors: C2  Additional Requirements in General Spec. Section 7.
4.4.3	Luminance	Applicable. Required Class: L3, L3(*)  Additional Requirements in General Spec. Section 8.
4.4.4	Luminance Ratio	Applicable. Required Class: R3
4.4.5	Beam Width	Fully Applicable.  Additional Requirements in General Spec. Section 9.
4.4.6	Uniformity of Luminous Intensity	Fully Applicable
4.4.7	Visible Flicker	Fully Applicable
4.4.8	Durability of Visual Performance	Fully Applicable
4.5	Physical Performance Requirements	-----
4.5.1	Classification	Fully Applicable

4.5.2	Resistance to the Effects of External Conditions	
4.5.2.1	Temperature	Applicable. Required Class: T1
4.5.2.2	Resistance of Electrical / Electronic Components to the Effects of Pollution	Fully Applicable
4.5.2.3	Resistance to Corrosion	-----
4.5.2.3.1	Resistance to Corrosion of Continuous VMS (VPS)	Fully Applicable
4.5.2.3.2	Resistance to Corrosion of Discontinuous VMS	Fully Applicable
4.5.2.4	Ingress Protection against Water and Dust (IP) provided by Enclosures	Applicable. Required Class: <b>For Continuous Signs</b> (Variable Prismatic Signs) - IP54 <b>For Discontinuous Signs</b> (Light Emitting Signs) – IP56
4.5.2.5	Mechanical Performance Requirements	Fully Applicable
4.5.3	Electrical Performance Requirements	Applicable. Additional Requirements and Priority of Requirements - in General Spec. Section 12.
4.5.4	Electromagnetic Compatibility Requirements	Fully Applicable
4.6	Dangerous Substance	Fully Applicable
<b>5</b>	<b>Testing, Assessment and Sampling Methods</b>	
5.1	Test Sequence	Fully Applicable
5.2	Durability	Fully Applicable
5.3	Test Modules	Fully Applicable
5.4	Physical Performance Test Methods	Fully Applicable
5.5	Visual Performance Test Methods	Fully Applicable
<b>6</b>	<b>Assessment and Verification of Constancy of Performance (AVCP)</b>	
6.1	General	Fully Applicable
6.2	Type Testing	Fully Applicable
6.3	Factory Production Control (FPC)	Fully Applicable
<b>7</b>	<b>Classification and Designation</b>	
7.1	General	Fully Applicable
7.2	Continuous Retro-Reflective VMS	Fully Applicable

7.3	Continuous, Externally Illuminated Retro-Reflective VMS	Fully Applicable
7.4	Discontinuous VMS	Fully Applicable
<b>8</b>	Marking, Labeling and Packaging	Fully Applicable
<b>9</b>	Product Information	Fully Applicable
Annex A	Equivalent Area	Informative
Annex B	VMS Performance Declaration Codes for Marking	Informative
Annex L	Terminology used in this European Standard	Informative
Annex M	Guidance on Graphics for Discontinuous Light Emitting Signs	
M1	General	Informative
M2	Apparent Luminance of Lines and Letter Strokes	Informative
M3	VMS with Color Inversion	Requirements for VMS in Israel in General Spec. Section 10.
M4	VMS without Color Inversion	Not Applicable
Annex N	Guidance on Dimensions, Luminance, Beam Width, Legibility and Efficiency for Discontinuous Signs	
N1	General	Fully Applicable
N2	Dimensions	Requirements for VMS in Israel in General Spec. Section 11.
N3	Luminance and Beam Width Classes	Informative, See also General Spec. Section 9.
N4	Beam Width and distances of Legibility	Informative, See also General Spec. Section 9.
Annex O	Specific Design Issues	Informative
Annex P	Guidance for Design of VMS Messages	Requirements for VMS in Israel in General Spec. Section 11.
Annex Q	Technical Documentation	Informative

Annex R	Example of Recommended Summary of Class Combinations	Informative
Annex ZA	Clauses of this European Standard Addressing the Provisions of the EU Construction Products Regulation	Applicable. <ul style="list-style-type: none"><li>• Table ZA.1 – Relevant Clauses for Continuous VMS</li><li>• Table ZA.2 – Relevant Clauses for Discontinuous VMS</li></ul>

## Appendix B

### Supplementary Tests to be Carried Out by A Recognized Laboratory for the VPS Test-Module

These tests shall be carried out by A Recognized Laboratory, for the VPS Test-Module, based on the requirements described in Section 13.

(The No. in the first column is identical to the sub-clause number in Section 13-B).

No.	Requirement	Laboratory Approval	Comments
2	The VPS shall include means to avoid displaying incorrect and inconsistent messages. When message is changed mechanically, means shall be incorporated to secure the moving parts in their correct relative positions to display the message. Consequently, a position of the prisms, all or a few of them, more than 10 degrees relative to the correct position – a Fault condition shall be generated. This requirement is important in particular when the VPS is composed of two different drive and transmission mechanisms.		
3	During a VPS changing sequence, the time that any misleading message (message different than the designated one) is displayed, or within a transition mode – shall not exceed 5 seconds. If the designated message, selected for display locally or remotely, shall not be displayed within 7 seconds, a Fault condition shall be generated.		
4	Any over-travel or tolerance of the operating mechanism shall be such that when a message is displayed, the VPS's legibility is maintained (qualitative test).		
5	Protection shall be provided to safeguard the drive and transmission mechanism from damage, when, for example, the prisms become jammed.		

6	The VPS shall allow a definition of a Default Message. This definition shall be configurable, via local or remote access.		
7	In case of power failure or communications / control fault, the VPS shall allow to select between the option of displaying the Default Message or the option of continuing to display the last presented message. This definition shall be configurable by software, via local or remote access. In case of such failures, the VPS shall display the message as defined.		
8	The VPS shall include an internal power back-up system, as part of the sign assembly, that allows continued operation of the VPS for a short period after the start of the power failure. The duration of the power back-up shall allow the VPS to switch to the Default Message, as defined. During the power back-up operation, the VPS shall not respond to any request for message change, from any source, except for switching to the Default Message.		
9	In any case of remote / external control or communications fault, a Fault condition shall be generated. The VPS shall switch to display the message (as defined in Clause 7). The Fault shall be identified if the duration of power or communications lost exceeds 10 continuous seconds.		
10	Upon power failure to the VPS, a Fault condition shall be generated. Facilities shall be provided to monitor the condition locally and / or remotely.		
13	Where a VPS is controlled remotely, a confirmation of sign status is required, to be provided by the VPS controller, for every operational condition and displayed message condition, including conditions where the required message is displayed, or the required message is not displayed exceeding the allowed time interval.		

14	All pivots and bearings shall be non-corrodible and shall be sealed against the ingress of dirt and moisture, where this may degrade the performance of the VPS's operation.		
16	All printed circuit boards shall be protected against corrosion by a conformal coating.		
18	VPS with moving parts forming the legends that are exposed to all weather conditions, shall have mechanisms capable of continued operation when subjected to all environmental conditions expected in Israel.		
21	VPS shall not include Front Screen over the face of the sign.		
24	All VPS components installed in the enclosure shall be fully covered, including the rear side of the sign.		
25	The VPS's rear and lateral sides, and the front frame that is not covered by Retro-reflective material – shall be painted with Matte (non-bright) Grey color, in a uniform finish. The mounting device and enclosure of the VPS shall be painted with the same color, even if galvanized.		
27	<p>The Manufacturer shall declare that the Life-Cycle and Quality Parameters of the VPS, meet as a minimum the following requirements:</p> <ul style="list-style-type: none"> <li>a. VPS Life-Cycle 25,000 message changes</li> <li>b. Mean Time Between Failures (MTBF) – 50,000 hours</li> <li>c. Mean Time To Repair (MTTR) – 1 hour (including fault diagnostics and repair).</li> </ul>		

## Appendix C

### Tests to be Carried Out by the Local Signage Authority for all VPSs in their Final Configuration

Following the requirement defined in Section 14-B, these tests shall be carried out by the Local Signage Authority, for all VPSs in their Final Configuration, based on the requirements described in Section 13.

**This Table shall be filled out for each and every VPS, indicating its Serial Number.**  
(The No. in the first column is identical to the sub-clause number in Section 13-B).

**Sign Number** \_\_\_\_\_ :

No.	Requirement	Laboratory Approval	Comments
1	The VPS shall be capable of displaying legends without undue distortion to, or gaps in, symbols, letters and borders.		
2	The VPS shall include means to avoid displaying incorrect and inconsistent messages. When message is changed mechanically, means shall be incorporated to secure the moving parts in their correct relative positions to display the message. Consequently, a position of the prisms, all or a few of them, more than 10 degrees relative to the correct position – a Fault condition shall be generated. This requirement is important in particular when the VPS is composed of two different drive and transmission mechanisms.		
3	During a VPS changing sequence, the time that any misleading message (message different than the designated one) is displayed, or within a transition mode – shall not exceed 5 seconds. If the designated message, selected for display locally or remotely, shall not be displayed within 7 seconds, a Fault condition shall be generated.		

6	The VPS shall allow a definition of a Default Message. This definition shall be configurable, via local or remote access.		
7	In case of power failure or communications / control fault, the VPS shall allow to select between the option of displaying the Default Message or the option of continuing to display the last presented message. This definition shall be configurable by software, via local or remote access. In case of such failures, the VPS shall display the message as defined.		
8	The VPS shall include an internal power back-up system, as part of the sign assembly, that allows continued operation of the VPS for a short period after the start of the power failure. The duration of the power back-up shall allow the VPS to switch to the Default Message, as defined. During the power back-up operation, the VPS shall not respond to any request for message change, from any source, except for switching to the Default Message.		
9	In any case of remote / external control or communications fault, a Fault condition shall be generated. The VPS shall switch to display the message (as defined in Clause 7). The Fault shall be identified if the duration of power or communications lost exceeds 10 continuous seconds.		
10	Upon power failure to the VPS, a Fault condition shall be generated. Facilities shall be provided to monitor the condition locally and / or remotely.		
11	Means shall be provided to operate the VPS locally, mechanically (not electrically) in the event of power failure.		

12	<p>Means shall be provided to operate the VPS locally, using a handle, lever, or other means of manual operation. These means shall be in easy reach of an operator standing on the ground or catwalk. A means of preventing the message being changed by unauthorized persons shall be incorporated. The force which is required to be applied to the handle, lever, or other means of manual operation shall be no more than 45 Newton. This shall apply over the whole range of climatic conditions.</p>		
15	<p>The VPS shall include local means for electrical operation, allowing the operator to change messages using a selection switch, on a board located in an external cabinet or the enclosure of sign's controller. The local message change shall override any remote message change, while sending a response from the sign controller that the sign is in a local control. The sign shall be designed such that it is possible to operate and monitor the status of the sign locally. The sign status shall be displayed by indicators or displayed on a test set.</p>		
17	<p>(this clause was canceled)</p>		
19	<p>The Retroreflective material used for the VPS's face shall meet Israeli Standard IS 12899-1.</p>		

20	Each panel of the VPS shall be covered by only a single sheet of Retroreflective material along its entire length and width. Additionally, each message component (such as a letter or part of it, or a symbol or part of it) pasted on a VPS panel, shall be made by cutting and pasting a single Retroreflective sheet for that message component, without jointing parts of sheets.		
22	The characteristics and appearance of the presented messages, and their presentation over the VPS legend faces, shall be as defined in the MOT Guidelines for Signing Design in Inter-Urban or Urban Roads, and as defined in the MOT Table of Signs, and MOT Guidelines and Regulations for Signs, all in their latest editions.		
23	The prism face that displays a Blank legend (for example when there is no need for a third legend), shall be painted with Matte (non-bright) Grey color.		
24	All VPS components installed in the enclosure shall be fully covered, including the rear side of the sign.		
25	The VPS's rear and lateral sides, and the front frame that is not covered by Retro-reflective material – shall be painted with Matte (non-bright) Grey color, in a uniform finish. The mounting device and enclosure of the VPS shall be painted with the same color, even if galvanized.		
26	A prismatic component (window) can be incorporated as part of a Retro-reflective fixed sign. For example, the presentation of the number “3” or “4” in Signs 230 or 501. In such a case, the prismatic component shall look like the fixed part, as an integral part of it. The prismatic component shall be attached to the fixed sign, without front visible fixture elements on the sign face, without holes, and without bolts.		