BRITISH STANDARD

BS EN
12675:2001

Traffic signal controllers — Functional safety requirements

The European Standard EN 12675:2000 has the status of a British Standard

ICS 93.080.30

National foreword

This British Standard is the official English language version of EN 12675:2000.

The UK participation in its preparation was entrusted to Technical Committee EPL/526, Road traffic control signals, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

This standard contains a number of performance criteria which are defined by the selection of a class. This procedure has been adopted to enable European members to select a class that meets the regulatory requirements of the member.

Performance classes for application in the UK are contained in "Traffic Signs Regulations and General Directions" (TSRG), published by The Stationery Office. Advice should be sought from The Department of the Environment, Transport and the Regions when selecting classes.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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Contrôleurs de signaux de circulation routière — Exigences de sécurité fonctionnelle

Steuergeräte für Lichtsignalanlagen — Funktionale Sicherheitsanforderungen

This European Standard was approved by CEN on 9 March 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 226, Road equipment, the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

The objective of this European Standard is to specify the functional safety requirements of equipment used for the control of traffic signals. It relates to the control of signals to traffic, and any associated signalled traffic movements. The primary concern is to safeguard persons and objects against hazards due to conflicting signals to traffic.

The hazards to be considered include, but are not limited to, the following types of possible signal failures:

a) the failure to display a red signal to traffic;

b) the display of a green signal to conflicting traffic;

c) the failure to display the correct signal sequence to traffic;

d) the failure to provide the correct timing of all signals.

Persons to be safeguarded are:

a) users of traffic signals, drivers and passengers of vehicles (including public transport), pedestrians, cyclists and equestrians, persons with physical disabilities;

b) maintenance and inspection personnel.

1 Scope

This European Standard specifies the functional safety requirements for traffic signal controllers. It is applicable to traffic signal control equipment permanently and temporarily installed, but excludes portable traffic control equipment. Traffic signal controllers, as defined by this European Standard, are required to control conflicting traffic, both vehicular and pedestrian, e.g. junction signals, pedestrian crossings, shuttle signals, public transport signals, in a safe manner.

The electrical safety requirements and additional traffic safety requirements, the interfacing with external equipment and the test methods for verifying compliance with this European Standard, are contained in HD 638.

NOTE: National requirements may specify special conditions for public transport signals (PT) and for any other signal that is not specified in a European Standard.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12368, *Traffic control equipment — Signal heads and poles.*

HD 638:1999, *Road traffic signal systems.*

3 Definitions

For the purposes of this European Standard, the following definitions apply.

3.1
absent signal
intended signal the luminous intensity of which does not comply with the signal “ON” requirements as specified in HD 638:1999

3.2
bicycle signal
traffic signal for the exclusive purpose of directing bicycle traffic at signalized locations

3.3
central control
system for co-ordinating and monitoring a network or group of traffic signals using a central computer, or equivalent device, and transmission systems

3.4
conflicting green (green/green conflict)
simultaneous display of green signals allowing conflicting traffic movements

3.5
conflicting signal groups
two or more signal groups that will cause conflicting traffic movements if operated concurrently

3.6
failure mode
non-operational state of the traffic signal controller in which, as a result of a major fault, the normal operation mode is replaced with a flashing yellow or a signals off condition

3.7
green signal
signal that is displayed to traffic having the colour “green” as specified in EN 12368

3.8
major fault
fault the occurrence of which has the effect that the safe operation of the signal traffic system cannot be guaranteed as defined in the national requirements

3.9
manual operation mode
operational state of the traffic signal controller in which the state of the signals to traffic is controlled manually by an operator

3.10
memory device
means of storing information in a manner permitting its retrieval

3.11
minor faults
fault as defined in the national requirements, other than a major fault, that is capable of being identified and recorded

3.12
mode
specific condition of a traffic signal controller used to control the signals to traffic. Examples are:

– standby operation mode;

– manual operation mode;

– normal operation mode;

– failure mode.

3.13
monitoring
method of collecting information about the traffic signal controller including diagnostic checks used to detect a fault condition

3.14
national signal regulation
order and appearance of signal aspects, displayed to traffic, that are prescribed in national requirements

3.15
national signal sequence
sequential order and appearance of signals, to traffic, to satisfy a specific national condition and/or application (e.g. signal start-up sequence)

3.16
normal operation mode
any operational state of the traffic signal controller, other than failure mode, especially the operational state in which the signals are in accordance with the national signal regulation

3.17
pedestrian signal
traffic signal for the exclusive purpose of directing pedestrian traffic at signalized locations

3.18
portable traffic control equipment
traffic signal control equipment designed for temporary applications and designed for easy transportation from one site to another

3.19
power supply
power source providing energy to an active device or circuit

3.20
public transport signals (PT)
traffic signal for the exclusive purpose of directing public transport vehicles at signalized locations

3.21
red signal
signal that is displayed to traffic having a colour “red” as specified in EN 12368

3.22
safety timings
time settings that, in the event of an error, can affect the safety of the traffic signal control equipment

3.23
shuttle signals
set of traffic signals controlling a narrow section of road where traffic can only proceed in each direction alternatively

3.24
signal
dynamic message supplied to road users

3.25
signal group
group of signal heads that always receive identical signal light indications

3.26
signal head
device which comprises one or more optical units, including the housing(s), together with all the mounting brackets, fixings, hoods, visors, cowls and background screens, whose task is to convey a visual message to road users

3.27
standby operation mode
operational state of the traffic signal controller in which a flashing yellow signal, or signals off condition, is permitted by the national signal regulation

3.28
start-up sequence
when requested under normal operation of the controller, it may be required to go through a controlled start-up sequence to change from the display of either “all signals off” or “flashing yellow” to normal operation mode

3.29
time settings
all the time information relating to the traffic signal controller for a particular intersection

3.30
traffic control
regulation of traffic by traffic signals or traffic signs

3.31
traffic signal controller
equipment driving traffic signals

3.32
traffic signal control equipment
traffic signal controller, working together with the signal under control, and the associate interface equipment

3.33
unwanted signal
unintended signal the luminous intensity of which does not comply with the signal “OFF” requirements as specified in HD 638:1999

3.34
yellow signal
a signal that is displayed to traffic having a colour “yellow” as specified in EN 12368

4 Functional safety requirements

4.1 General

This European Standard specifies the minimum safety requirements for traffic signal controllers to ensure the safe state of signals displayed to traffic. This safety consists of preventing a fault, or the consequences of a fault, that could result in the display of information liable to present a hazard to road users. A hazard to road users is prevented by the ability of the traffic signal controller to detect a specified fault condition and to change to a safe state.

The change to a safe state is determined by the ability of the traffic signal controller to respond to the occurrence of faults in accordance with clause 5.

A fault condition may be dependent on the configuration of signal groups for specific application requirements. The specified fault condition shall be classified as a major or minor fault condition and acted on accordingly.

Diagnostic checks shall be provided within the traffic signal controller for the detection of specified fault conditions. This is achieved by monitoring the appropriate:

a) outputs;
b) logic circuits;
c) inputs.

4.2 Application of power

On application of power to the traffic signal controller, the controller shall undertake internal checks to ensure that the operating programs start in a pre-defined condition. These checks shall ensure that all memories are initialized to their correct state and that all memory devices are checked. In the event of an error, the traffic signal controller shall not change to the control mode of operation.

4.3 Diagnostic checks of traffic signal controller logic system

Diagnostic checks shall check the traffic signal controller logic system. The diagnostic check interval, and the action to be taken as a result of diagnostic checks, shall not be greater than 10 s. In the event of an error, the traffic signal controller shall change to the failure mode.

4.4 Classification of faults

This European Standard defines the minimum specification for a traffic signal controller with respect to safety for the road user. This safety consists of avoiding the display of incorrect messages on signals that are liable to endanger road users (e.g. conflicting signals, missing or unwanted signals, wrong timing). The controller shall be capable of taking action as required by the selected class and taking into account the following:

a) Where a class includes a “0” there is no requirement to provide checks. Therefore, this European Standard does not specify the requirement to provide the function, the monitoring for the fault condition or the action to be taken if the function is provided.

b) For specified major and minor faults the traffic signal controller shall record the faulty signal group outputs, record the affected signals, and record the fault as specified in 5.4.

c) For a traffic signal controller to comply with this European Standard, it shall comply with the requirements to declare a fault class including a “1” as follows:

- For a traffic signal controller to comply with this European Standard, at least one of the classes AA1, AE1 as specified in 4.5.1 or AF1 shall be declared.

- For a traffic signal controller to comply with this European Standard, class DA1 as specified in 4.8 shall be declared, or at least one of the classes CA1, CB1, CC1, or CD1 as specified in clause 4.7.1, and class CE1 as specified in clause 4.7.2, shall be declared.

d) The time interval for the traffic signal controller to detect the occurrence of a fault and change to a safe state shall be in accordance with HD 638:1999, 5.2.2.3.

e) The fault value of luminous intensity for an absent signal, signal “ON” requirement of signal intensity for safety, shall be as specified in HD 638:1999, 5.2.1.

f) The fault value of luminous intensity for an unwanted signal, signal “OFF” requirement of signal intensity for safety, shall be as specified in HD 638:1999, 5.2.1.

4.5 Conflict faults

4.5.1 Signal group conflicts (unwanted signals)

The simultaneous display of configured conflicting signal groups shall have an effect according to one or more of the following classes:

a) Green-green conflict

Class AA0: There is no requirement to check for conflicting green signals.

Class AA1: The occurrence of any signal group green signals displayed simultaneously with any conflicting signal group green signals shall register a fault.

b) Green-yellow conflict

Class AB0: There is no requirement to check for conflicting green and yellow signals.

Class AB1: The occurrence of any signal group green signals displayed simultaneously with any conflicting signal group yellow signals shall register a fault.

c) Yellow-yellow conflict

Class AC0: There is no requirement to check for conflicting yellow signals.

Class AC1: The occurrence of any signal group yellow signals displayed simultaneously with any conflicting signal group yellow signals shall register a fault.

d) Green-red/yellow conflict

Class AD0: There is no requirement to check for conflicting green and red/yellow signals.

Class AD1: The occurrence of any signal group green signals displayed simultaneously with any conflicting signal group red/yellow signals shall register a fault.

e) Green-green/yellow conflict

Class AE0: There is no requirement to check for conflicting green and green/yellow signals.

Class AE1: The occurrence of any signal group green signals displayed simultaneously with any conflicting signal group green/yellow signals shall register a fault.

4.5.2 Signal group green/absent red conflict

In the event that configured signal group red signals are not displayed with a signal group green signal, it shall have an effect according to one or more of the following classes:

a) Absence of any conflicting red signal

Class AF0: There is no requirement to check for any absent red signal.

Class AF1: The absence of any red signal with a conflicting green or conflicting yellow signal shall register a fault.

b) Absence of conflicting red on specified signal heads

Class AG0: There is no requirement to check for any absent red signal on specified signal heads.

Class AG1: The absence of any red signal on specified signal heads with a conflicting green signal shall register a fault.

c) Absence of the last conflicting red signal

Class AH0: There is no requirement to check for the absence of the last red signal.

Class AH1: The absence of the last red signal with a conflicting green signal shall register a fault.

4.5.3 Absent red/absent red conflicts

In the event that configured signal group red signals are absent on conflicting signal groups, it shall have an effect according to one of the following classes:

Class AJ0: There is no requirement to check absent red/absent red conflicts.

Class AJ1: The simultaneous absence of any not specified signal group red signals on conflicting signal groups shall register a fault.

4.6 National signal regulations (unwanted signals)

Unwanted signals on the same signal group which infringe the national signal regulations shall have an effect according to one of the following classes:

a) National signal regulations (infringement)

Class BA0: There is no requirement to check for unwanted signals.

Class BA1: Unwanted signals that infringe the national signal regulations shall register a fault.

b) Standby mode (flashing signals)

Where flashing signals are used, unwanted signals on the same signal group that display a flashing signal shall have an effect according to one of the following classes:

Class BB0: There is no requirement to check for unwanted signals.

Class BB1: Unwanted signals shall register a fault.

c) Failure mode (flashing signals)

Where flashing signals are used, unwanted signals on the same signal group that display a flashing signal shall have an effect according to one of the following classes:

Class BC0: There is no requirement to check for unwanted signals.

Class BC1: Unwanted signals shall cause the power supply to the signals to be removed.

d) Rate and duration of flashing signals during standby mode

The rate and duration of flashing signals that infringe the national regulation shall have an effect according to one of the following classes:

Class BD0: There is no requirement to check flashing signals.

Class BD1: If the rate and duration of the flashing signals are not in accordance with the national signal regulation, the controller shall register a fault.

e) Rate and duration of flashing signals during failure mode

The rate and duration of flashing signals that infringe the national signal regulation shall have an effect according to one of the following classes:

Class BE0: There is no requirement to check flashing signals.

Class BE1: If the rate and duration of the flashing signals are not in accordance with the national signal regulation, the power to the signals shall be removed.

f) National signal regulation (exclusions)

The monitoring of specified fault conditions may be excluded during certain national signal sequences.

4.7 Absent signals

4.7.1 Absent signal group red signals

Absent signal group red signals which are required by the traffic signal controller to be displayed shall have an effect in accordance with one or more of the following classes as defined in the national requirement. The absence of a signal group red shall not be dependent on the state of any other signal group.

a) Absence of a red signal on a specified signal group

Class CA0: There is no requirement to check for an absent red signal on a specified signal group.

Class CA1: The absence of a red signal on specified signal groups shall register a fault.

b) Absence of the last red signal

Class CB0: There is no requirement to check for the absence of the last red signal.

Class CB1: The absence of the last red signal on any vehicular signal group shall register a fault.

c) Absence of a number of red signals

Class CC0: There is no requirement to check for the absence of a number of red signals.

Class CC1: The absence of red signals on a number of signal heads specified for each signal group shall register a fault.

d) Absence of specified red signals

Class CD0: There is no requirement to check for the absence of specified red signals.

Class CD1: The absence of specified red signals shall register a fault.

4.7.2 Absent signal groups, yellow or green signals

Absent signal group yellow or green signals which are required to be present shall have an effect in accordance with one of the following classes:

Class CE0: There is no requirement to check for the absence of yellow or green signals.

Class CE1: The absence of specified yellow signals or green signals on a signal group shall register a fault.

4.8 Compliance checking

The traffic signal controller shall ensure that the state of the signals is in accordance with the commands given by the traffic signal controller logic. Compliance is ensured if, and only if, the state of the signals is in accordance with the command given.

Class DA0: There is no requirement to check for compliance.

Class DA1: Lack of compliance exceeding a time interval for the requirements for signalling specified in HD 638:1999, 5.2.2 shall register a fault.

4.9 Safety timings

The traffic signal controller shall check that the values of safety timings are in accordance with national requirements for the following classes:

a) Stored values of timings

Class FA0: There is no requirement to check for stored values of timings not being correct.

Class FA1: The stored values of timings shall be checked. The check shall ensure that the stored values are not corrupted. In the event of an error, the traffic signal controller shall register a fault.

b) Time base frequency

Class FB0: There is no requirement to check the time base frequency.

Class FB1: The time base frequency shall be checked to ensure that it is within the pre-defined limits. In the event of an error, the traffic signal controller shall register a fault.

c) Minimum values of time settings

Class FC0: There is no requirement to check for minimum values of time settings.

Class FC1: The values of time settings shall be checked to ensure that the minimum value is not less than a pre-defined value. In the event of an error, the traffic signal controller shall register a fault.

d) Maximum values of time settings

Class FD0: There is no requirement to check for maximum values of time settings.

Class FD1:The values of the time settings shall be checked to ensure that the maximum value is not greater than a pre-defined value. In the event of an error, the traffic signal controller shall register a fault.

e) Duration of timings

Class FE0: There is no requirement to check for the duration of timings.

Class FE1: An independent process shall check the duration of the timings. The process shall ensure that the timings are within the pre-defined tolerances. In the event of an error, the traffic signal controller shall register a fault.

4.10 National signal sequences

a) National signal sequences (infringement)

The effect of an infringement of the national signal sequence shall be as follows:

Class GA0: There is no requirement to check for the national signal sequence.

Class GA1: The national signal sequence shall be checked. In the event of a non-compliant signal sequence being detected, the traffic signal controller shall register a fault.

b) Specified signal group green to signal group green movements

The effect of signal group green to signal group green movements not occurring in a specified order shall be as follows:

Class GB0: There is no requirement to check for signal group green movements.

Class GB1: In the event of incorrect specified signal group green movements the traffic signal controller shall register a fault.

c) Specified signal start-up sequence signal group movements

The effect of signal start-up sequence signal group movements not occurring in a specified order shall be as follows:

Class GC0: There is no requirement to check for signal start-up sequence signal group movements not being correct.

Class GC1: In the event of incorrect specified signal group movements the traffic signal controller shall register a fault.

4.11 Faults of external inputs

Configured inputs indicating a fault of the external equipment, as defined in the national requirements, shall have an effect according to one of the following classes:

Class HA0: There is no requirement to check.

Class HA1: In the event of a configured input indicating a fault of the external equipment the traffic signal controller shall register a fault.

5 Fault condition

5.1 General

Diagnostic check facilities shall be provided within the traffic signal controller for the monitoring of specified fault conditions. As a result of this monitoring, appropriate action shall take place to ensure the safety of the traffic signal system in accordance with HD 638:1999. The action to be taken will depend on whether the fault is a major fault (see 5.2), or a minor fault (see 5.3).

NOTE 1: The effect of major faults on the operation of the traffic signal controller is normally irreversible until the traffic signal controller has been reset.

NOTE 2: The effect of minor faults on the operation of the traffic signal controller is reversible, e.g. if the cause of the fault disappears then the traffic signal controller may return to full functionality.

NOTE 3: A major or minor fault may provide an output indication to remote equipment or cause the presence of the fault to be indicated by some other means.

5.2 Major faults

A major fault shall cause the traffic signal controller to change to the failure mode.

For the occurrences of a major fault the master clock and, if possible, the maintenance facilities shall remain operative.

5.3 Minor faults

A minor fault shall not cause the traffic signal controller to change to the failure mode; the traffic signal controller may change the method of control but shall continue to operate in its current mode.

A minor fault may influence the duration and sequence of signal groups.

A minor fault shall not affect the safe operation of the intersection.

If required by the national requirements a number and/or combination of minor faults shall constitute a major fault. The consequential transition to the failure mode may be immediate or in a controlled manner as specified.

5.4 Storage of faults

A means of recording faults shall be provided. All fault information (major or minor faults) collected during operation of the traffic signal controller shall be stored. This stored information shall be displayed at the traffic signal controller; either by a device integral to the traffic signal controller, and/or a device external to the traffic signal controller that can retrieve and display the stored information.

The record of fault information shall include:

a) the details of the type of fault by code or text;

b) the date and time of the fault entry.

Where specified in national requirements, the record of fault information shall:

a) include the date and time of the fault clearance;

b) be preserved in the event of a power supply failure for a specified duration;

c) be capable of being manually detected;

d) include other events e.g. the state of the traffic signal controller.

The record of faults may be capable of being automatically cleared for minor faults and other events.

The number of faults to be stored shall be equal to, or greater than, the number specified in the national requirements.

When a major fault occurs, it shall be the design aim that any of the subsequent fault records do not overwrite existing records, including that of the major fault, until the fault record has been cleared manually.

6 User documentation

For the traffic signal control equipment to function safely on site, it should be programmed and installed correctly. The documentation supplied with the traffic signal controller shall include full instructions for programming and installation. The documentation supplied shall describe the following:

a) specification for the traffic signal controller;

b) type of input/output equipment that is compatible;

c) installation procedures;

d) recommended maintenance procedures;

e) list of facilities;

f) means of programming facilities on site and off site.

7 Marking and labelling

The marking and labelling system shall ensure that installation and maintenance do not adversely affect the safety parameters. Memory devices holding permanent data shall be marked with a unique designation and all replaceable modules shall be marked to ensure correct type and fitting. Additional requirements are given in HD 638:1999.

Annex ZB (informative)

A-type national deviation

A-deviation: National deviation due to regulations, the modification of which is currently not within the competence of the CEN/CENELEC member.

This European Standard does not fall under any Directive of the EC.

In the relevant CEN/CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Deviation

Country	**National Regulation**
Netherlands	Wegenverkeerswet 1994, Regeling verkeerslichten (National law 1994, article 14, Regulations for traffic lights). Concerning the requirements to the degree of reliability of traffic signal controllers (Paragraph 2, clause 6 refers to the national standard NEN 3384 in which the level of reliability is defined).

Clause	**Deviation**
5. Reliability requirements	Additional requirements: **Degree of reliability** The traffic signal controller shall reliably ensure that a safe state of signal group outputs is maintained. The degree of reliability shall be equal to, or less than 1 failure per 10^5 equipment years of operation for the occurrence of a major fault. The ability of the traffic signal controller shall respond to the fault and change to a safe state.

Country	**National regulation**
France	Décret no 99-756 du 31 août 1999 relatif aux prescriptions techniques concernant l'accessibilité aux personnes handicapées de la voirie publique ou privée ouverte à la circulation publique pris pour l'application de l'article 2 de la loi no 91-663 du 13 juillet 1991. Décret no 99-757 du 31 août 1999 relatif à l'accessibilité aux personnes handicapées de la voirie publique ou privée ouverte à la circulation publique devant faire l'objet des aménagements prévus par l'article 2 de la loi no 91-663 du 13 juillet 1991. Instruction ministérielle sur la sécurité routière, Livre I – Sixième partie, prise en application de l'article R 44 du Code de la Route.

Clause	**Deviation**
4. Functional safety requirements	Additional requirements: In France, two decrees on 31/08/1999 (decrees 99-756 and 99-757), make compulsory on all the new crossroads, the setting up of sound or tactile signal repeaters intended to reinforce the safety of blind or partially sighted persons when crossing traffic light junctions. The control of these repeaters is likely to be brought under control of the junction controller. The standard EN 12675 does not forecast any detection of a possible antagonism between the light signal and this signal repeater. This gap is particularly serious since it endangers the safety of the most vulnerable users. Article 110, chapter A of the ministerial directive referred to above provides the respect of a minimal period, said *period of red clearing*, between the red light and the green light (or the flashing amber in the place of the green) of the antagonistic signal. It results from it that the programming of the controller must make it possible to fix in seconds two values of red

of clearing for each couple of signal lines A and B declared antagonistic: a value between A and B on the one hand; a value between B and A on the other hand. The lack of attribution of these values must thus be detected.

The same article 110, chapter A, provides that all the signals of the same group must give at the same time the same message to the user. A possible programming error on this subject must obligatorily be able to be detected.

- Article 110, chapter C, paragraph 1 assigns the fixed order of the cyclic course of the states of lighting. The draft standard EN 12675 in its article 4.10, paragraph A, authorizes the absence of control of this national sequence by the choice of a class GA0, choice authorized without any restriction by article 4.4 paragraph C of the same standard.

- Same article 110,C, paragraph 1, fixes minimum green periods (or flashing amber), as well as the duration of the fixed yellow. The failure to observe these values must be detected by the automatism of the traffic phase which must then pass the crossroads to the safety flashing amber.

- The same article, in its paragraph 3, stipulates that the waiting time allotted to a user should not exceed 120 seconds. The failure to respect this value must be detected.

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