Technical rule for fire prevention for the design, construction, and operation of road tunnels not belonging to the trans-European road network.

The Minister for the Interior

in coordination with
The Minister for Infrastructure and Transport

Having regard to Law No 765 of 6 August 1967, *Amendments and additions to Urban Planning Law No 1150 of 17 August 1942*, as amended;

Having regard to Legislative Decree No 285 of 30 April 1992, laying down the *New Highway Code*, as amended;

Having regard to Legislative Decree No 139 of 8 March 2006, on the *Reorganisation of the provisions relating to the tasks and duties of the National Fire Service, in accordance with Article 11 of Law No 229 of 29 July 2003* and, in particular, the first sentence of Article 15(1), which provides that: "*Technical fire prevention standards shall be adopted by decree of the Minister for the Interior, in agreement with the Ministers concerned, after consulting the Central Technical and Scientific Fire Prevention Committee*";

Having regard to Legislative Decree No 264 of 5 October 2006, *Implementing Directive 2004/54/EC on minimum safety requirements for tunnels in the Trans-European Road Network*, as amended;

Having regard to Legislative Decree No 81 of 9 April 2008 on the *Implementation of Article 1 of Law No 123 of 3 August 2007 on workplace health and safety*, as amended;

Having regard to Decree-Law No 1 of 24 January 2012, *Urgent provisions for competition, infrastructure development and competitiveness*, converted, with amendments, into Law No 27 of 24 March 2012, and in particular Articles 53 and 55 thereof;

Having regard to Decree-Law No 109 of 28 September 2018, laying down *Urgent provisions for the city of Genoa, the safety of the national infrastructure and transport network, the 2016 and 2017 seismic events, work and other emergencies*, converted, with amendments, into Law No 130 of 16 November 2018, and in particular Article 12(4)a;

Having regard to Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU;

Having regard to Regulation (EU) 2019/515 of the European Parliament and of the Council of 19 March 2019 on the mutual recognition of goods lawfully marketed in another Member State and repealing Regulation (EC) No 764/2008;

Having regard to Regulation (EU) 2024/1679 of the European Parliament and of the Council of 13 June 2024 on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) No 1315/2013;

The Minister for the Interior

Having regard to Presidential Decree No 151 of 1 August 2011 on the *Regulation simplifying the guidelines for fire prevention procedures, pursuant to Article 49, paragraph 4c of Decree-Law No 78 of 31 May 2010, converted, with amendments, by Law No 122 of 30 July 2010* published in the Official Journal of the Italian Republic No 221 of 22 September 2011;

Having regard to Presidential Decree No 495 of 16 December 1992 on the *Regulation implementing and applying the new Highway Code*, published in the Official Gazette of the Italian Republic No 303 of 28 December 1992;

Having regard to Decree No 1444 of the Minister for Public Works, in agreement with the Minister for the Interior, of 2 April 1968, on *Mandatory limits on building density, height, the distance between buildings and maximum ratios between spaces intended for residential and productive settlements and public spaces or spaces reserved for collective activities, public green spaces or car parks to be observed for the purposes of the formation of new urban planning instruments or the revision of existing ones, pursuant to Article 17 of Law No 765 of 6 August 1967*;

Having regard to the Decree of the Minister for the Interior of 30 November 1983 on the *Terms, general definitions and graphical symbols for fire prevention*, published in the Official Journal of the Italian Republic No 339 of 12 December 1983, as amended;

Having regard to the Decree of the Minister for Public Works of 5 June 2001, on *Road tunnel safety*, published in the Official Journal of the Italian Republic No 217 of 18 September 2001, as amended;

Having regard to the Decree of the Minister for Infrastructure and Transport of 5 November 2001, laying down *Functional and geometrical rules for road construction*, published in the Official Journal of the Italian Republic No 3 of 4 January 2002;

Having regard to the Decree of the Minister for the Interior of 16 February 2007 on the *Fire resistance classification of construction products and elements*, published in the Official Journal of the Italian Republic No 74 of 29 March 2007;

Having regard to the Decree of the Minister for the Interior of 9 March 2007 on the *Fire resistance performance of buildings in operations subject to supervision by the National Fire Service*, published in the Official Journal of the Italian Republic No 74 of 29 March 2007;

Having regard to the Decree of the Minister for the Interior of 9 May 2007 on the *Guidelines implementing the engineering approach to fire safety*, published in the Official Journal of the Italian Republic No 117 of 22 May 2007;

Having regard to the Decree of the Minister for the Interior of 7 August 2012 on *Provisions relating to procedures for the submission methods for requests relating to fire prevention procedures and the documentation to be annexed, pursuant to Article 2(7) of Presidential Decree No 151 of 1 August 2011*, published in the Official Journal of the Italian Republic No 201 of 29 August 2012;

Having taken into consideration the Decree of the Minister for the Interior of 20 December 2012 on *Technical fire prevention rules for active fire protection systems installed in places subject to fire prevention controls*, published in the Official Journal of the Italian Republic No 3 of 4 January 2013;

The Minister for the Interior

Having regard to the Decree of the Minister for the Interior of 3 August 2015 on the *Approval of technical fire prevention standards, in accordance with Article 15 of Legislative Decree No 139 of 8 March 2006*, published in the Official Journal of the Italian Republic No 192 of 20 August 2015, as amended;

Having regard to the Decree of the Minister for the Interior of 1 September 2021 on *General criteria for the control and maintenance of fire safety systems, equipment and other systems, pursuant to Article 46(3)(a)(3) of Legislative Decree No 81 of 9 April 2008*, published in the Official Journal of the Italian Republic No 230 of 25 September 2021;

Having regard to the Decree of the Minister for the Interior of 2 September 2021 on *Criteria for the management of workplaces in operation and in an emergency and characteristics of the specific fire prevention and protection service, pursuant to Article 46(3)(a)(4) and (b) of Legislative Decree No 81 of 9 April 2008*, published in the Official Journal of the Italian Republic No 237 of 4 October 2021;

Having regard to the Decree of the Minister for the Interior of 13 September 2024 on *Amendments and additions to the Decree of 1 September 2021 on general criteria for the control and maintenance of fire safety systems, equipment and other systems, pursuant to Article 46(3)(a)(3) of Legislative Decree No 81 of 9 April 2008*, published in the Official Journal of the Italian Republic No 219 of 18 September 2024;

Whereas it is necessary to identify fire safety requirements for road tunnels that are not part of the trans-European road network;

Having obtained the favourable opinion of the Central Technical and Scientific Committee on fire prevention pursuant to Article 21 of Legislative Decree No 139 of 8 March 2006;

Having completed the information procedure under Directive (EU) 2015/1535 of 9 September 2015;

Hereby decrees

Article 1
Scope

1. The *technical rule for fire prevention for the design, construction and operation of road tunnels not belonging to the trans-European road network* referred to in Annex 1, which forms an integral part of this Decree, is approved.
2. The provisions of this Decree shall apply to road tunnels not belonging to the trans-European road network, as defined in Article 2(1)(a) of Legislative Decree No 264 of 5 October 2006, both newly built and those in operation on the date of entry into force of this Decree.

The Minister for the Interior

Article 2
Objectives

1. For the purposes of fire prevention, in order to achieve the primary safety objectives relating to the protection of persons and property against fire risks, road tunnels not belonging to the trans-European road network shall be constructed and operated in such a way as to:
   a) minimise the causes of fire;
   b) ensure the stability of the load-bearing structures in order to ensure the rescue of users;
   c) limit the formation and spread of a fire;
   d) ensure that users can leave the tunnel unscathed or be rescued;
   e) ensure that fire-fighter/rescue squads are able to work under safe conditions.

Article 3
Application of technical fire prevention provisions

1. The technical provisions set out in Title I of Annex 1 shall apply to newly built road tunnels not forming part of the trans-European road network.
2. The technical provisions set out in Title II of Annex 1 shall apply to road tunnels in operation which are not part of the trans-European road network.
3. Where the person responsible for the activity identifies particular risk factors for the safety of the infrastructure, he must implement measures additional to those already provided for the specific category referred to in Title II, point 3 of Annex 1.

Article 4
Use of fire-fighting products

1. Fire-fighting products used within the scope of this Decree must be:
   a) identified unequivocally under the responsibility of the manufacturer, according to the applicable procedures;
   b) qualified in relation to the performance requirements and intended use;
   c) accepted by the person responsible for the operation, or by the person responsible for performing works by acquiring and verifying the identification and qualification documentation.
2. The use of fire-fighting products is allowed if they are used in accordance with the intended use, if they meet the performance required by this decree and if:
   a) they comply with the applicable EU provisions;
   b) they comply, if not within the scope of Community provisions, with the appropriate national provisions applicable, already submitted with positive results to the procedure for the provision of information pursuant to Directive 2015/1535 of 9 September 2015, which provide for appropriate approval for the commercialisation on Italian territory and to this end, mutual recognition;

c) if not contemplated by letters *a* and *b*, they are legally marketed in a Member State of the European Union or in Turkey by virtue of specific international agreements reached with the European Union, or legally manufactured in a Signatory State to the European Free Trade Association (EFTA) that is party to the Agreement on the European Economic Area (EEA), for use under the same conditions, which guarantee a level of fire safety equivalent to that set out in the technical standards attached to this decree.

3. The equivalence of the level of protection guaranteed by the fire-fighting products referred to in paragraph 2 shall be assessed, where necessary, by the Ministry of the Interior, in application of the procedures laid down in Regulation (EU) 2019/515 of 19 March 2019, *"Regulation of the European Parliament and of the Council on the mutual recognition of goods lawfully marketed in another Member State and repealing Regulation (EC) No 764/2008"* published in the Official Journal of the European Union L 91 of 29 March 2019.

Article 5
Derogations from fire prevention rules

1. For tunnels with characteristics that do not allow for full compliance with the provisions of Annex 1, interested parties may submit to the locally responsible Fire Brigade Command Team an application for a derogation pursuant to Article 7 of Presidential Decree No 151 of 1 August 2011.

Article 6
Connection with the procedures laid down in Presidential Decree No 151 of 1 August 2011 and the Decree of the Minister for the Interior of 7 August 2012

1. Without prejudice to the obligations laid down by the safety legislation in force and by Presidential Decree No 151 of 1 August 2011, already existing and operating road tunnels that are not part of the trans-European road network referred to in Article 1(2) of this Decree shall be adapted to the fire safety requirements laid down in Title II of Annex 1 to the technical rule annexed to this Decree within the following time limits:
   a) on the date of entry into force of this Decree, the management measures referred to in point 5.1;
   b) within six months of the entry into force of this Decree, measures to facilitate the intervention of the rescue services referred to in point 4.3, paragraph 1, and point 5.2;
   c) within 1 year of the date of entry into force of this Decree, the measures to facilitate self-rescue referred to in point 4.2.1, paragraph 1, letters (a) and (b);
   d) within 5 years from the date of entry into force of this Decree, all remaining measures.
2. At the end of each of the adjustments provided for in points (a), (b), (c) and (d) of paragraph 1, and in any case at the end of the respective deadlines provided for, the certified notification of the start of activity referred to in Article 4 of Presidential Decree No 151 of 1 August 2011 shall be submitted.

The Minister for the Interior

Article 7

Entry into force

1. This Decree shall enter into force thirty days after its publication in the Official Gazette of the Italian Republic.

Rome,

THE MINISTER FOR THE INTERIOR	THE MINISTER FOR INFRASTRUCTURE AND TRANSPORT
Piantedosi	Salvini

Annex 1

TECHNICAL RULE FOR FIRE PREVENTION FOR THE DESIGN, CONSTRUCTION AND OPERATION OF ROAD TUNNELS NOT BELONGING TO THE TRANS-EUROPEAN ROAD NETWORK

Title 1
Fire prevention rules for NEWLY BUILT tunnels
not belonging to the trans-European road network

0. Terms and definitions

1. Infrastructure measures
- 1.1 Escape routes and emergency exits
- 1.2 Driveways for emergency services
- 1.3 Drainage
- 1.4 Fire resistance of structures
- 1.5 Fire resistance of materials

2. Plant requirements
- 2.1 Emergency communication systems
- 2.2 Emergency ventilation
  - 2.2.1 General provisions
  - 2.2.2 Design methods
  - 2.2.3 Activation and control of the ventilation system for fire-fighting purposes
  - 2.2.4 Type of emergency ventilation
    - 2.2.4.1 Twin-tube tunnels with fluid one-way traffic
    - 2.2.4.2 Tunnels with two-way traffic and tunnels with congested one-way traffic
  - 2.2.5 Fire behaviour characteristics of ventilation system components
  - 2.2.6 Performance requirements
    - 2.2.6.1 Twin-tube tunnels with fluid one-way traffic
    - 2.2.6.2 Tunnels with two-way traffic and tunnels with congested one-way traffic
- 2.3 Road and safety signs
- 2.4 Control centre
- 2.5 Surveillance installations
- 2.6 Traffic light system to prevent access to tunnels
- 2.7 Fire resistance and reaction to fire of installations and systems and components thereof
- 2.8 Emergency stations
- 2.9 Water supply
  - 2.9.1 Architecture of the plant
    - 2.9.1.1 Tunnels without an emergency lane
    - 2.9.1.2 Tunnels with an emergency lane
  - 2.9.2 Implementation and performance characteristics
- 2.10 Electrical systems
  - 2.10.1 General provisions
  - 2.10.2 Safety installations
  - 2.10.3 Electrical panels for safety services
  - 2.10.4 Head of safety services
  - 2.10.5 Emergency disconnection
  - 2.10.6 Safety lighting system

3. Operational requirements for fire safety

Title II
Fire prevention rules for already EXISTING and OPERATIONAL tunnels not belonging to the trans-European road network

TITLE I

FIRE PREVENTION RULES FOR NEWLY CONSTRUCTED TUNNELS NOT BELONGING TO THE TRANS-EUROPEAN ROAD NETWORK

0. Terms and definitions

The terms used in this technical rule refer to the definitions set out in Legislative Decree No 264 of 5 October 2006, in the Decree of the Minister for the Interior of 30 November 1983, as well as the following additional definitions.

Access: the transition from the open environment to the underground section of the road.

Urbanised area: a totally built-up homogeneous territorial area, where the density of the existing buildings, within a radius of two hundred metres from the tunnel entrances, exceeds three cubic metres per square metre.

Activation: a situation in which an emergency facility switches from the ordinary standby mode to the in-action mode of emergency management. Activation may be of the following types:

a) manual – the system is activated by an operator on the basis of information received from other systems or sources;
b) automatic – the system is activated automatically on the basis of information collected by other systems;
c) semi-automatic – the system is activated by an operator through a computerised system, to which the operator provides some information as input data. The operator may also refuse activation.

Back-layering: a phenomenon whereby a layer of smoke and heat flows in the opposite direction to the prevailing airflow (natural or created by a ventilation system) within a tunnel.

Fire compartment (or compartment): part of a construction work project organised to meet the safety requirements in the event of a fire and delimited by construction elements suitable for ensuring, under the action of fire and for a given period of time, the characteristics of fire resistance; where no compartmentalisation is provided, the compartment shall be considered as the entire construction work.

Protected type (or protected): qualification of a volume within the tunnel constituting a fire compartment.

Control: ability of an emergency system to reach certain operating modes (e.g. longitudinal speed). The control may be of the following types:

a) **automatic -** an operator selects the values and reference parameters of the emergency system (e.g. depending on the location of the fire, traffic conditions) and the value is entered into a closed-loop control system;
b) **open-loop** - the control of the system is carried out by means of predetermined regimes based on predefined scenarios (e.g. fire location and traffic situation);
c) **closed-loop or feedback control** - the control of the system is carried out by means of an algorithm which, on the basis of parameters measured in real time, modifies the operating regimes accordingly;

d) **manual** - the operating regime of the system is selected by a designated operator in an open-loop control logic context;

e) **semi-automatic -** an operator provides input data to a computer system. This system, in turn, determines the operating regime of the system.

Tube: a structural element that characterizes a section of road enclosed on four sides.

Tunnel: a structural and plant engineering complex consisting of one or more interconnected tubes connecting two or more access points with two or more outlets of an underground road route.

Urban tunnel: a tunnel built in an urban area.

Tunnel length: the length of the longest traffic lane, measured taking into account the part of the tunnel continuously enclosed on four sides.

Effective length: the distance between the entrance and exit or the maximum distance between usable emergency exits.

Safe place: a place outside the tunnel where there is no danger to users who are stationed or passing through in the event of a fire.

Temporary safe place: a place inside the tunnel or consisting of one of the tunnel's two tubes and a shelter, where there is no imminent danger to users stationed in or passing through the tunnel in the event of a fire. From any temporary safe place, users must be able to reach a final safe place.

Opening: in the 'spatial' sense, indicates the entry or exit points to the underground structure; in the 'structural' sense, it also refers to the specific structures that can be constructed at each end.

Person responsible for the activity: a natural person who is subject to the obligations associated with the exercise of the activity, including fire prevention obligations; unless specifically appointed and empowered, the person responsible for the activity is identified as the legal representative of the company managing the infrastructure.

Trans-European road network: the road network referred to in Regulation (EU) 2024/1679 of the European Parliament and of the Council of 13 June 2024**,** on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) No 1315/2013.

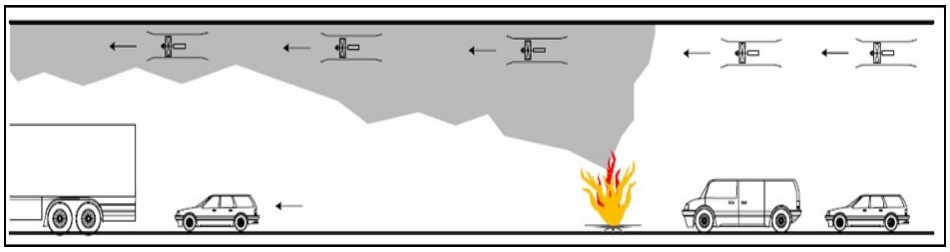
Exit system: a set of life-saving fire-fighting measures enabling tunnel users to reach a safe place in the event of a fire.

Stratification: a condition that occurs when the hot combustion products form a layer of hot, opaque fumes above a layer of cold, transparent air.

Congested one-way traffic: a condition related to traffic density such that for a long part of the tunnel's daily operating time vehicle speeds are less than 50 % of the maximum value imposed in the tunnel, so that it is likely that, in the event of an accident, vehicles may find themselves stuck both upstream and downstream of the accident. This condition is to be verified by the person responsible for the purposes of determining the consequent technical measures to be adopted.

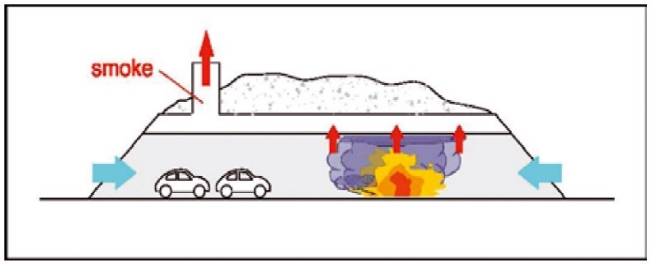
Critical speed: the minimum longitudinal speed (possibly imposed by the mechanical ventilation system) necessary to avoid the phenomenon of *back-layering* in the event of a fire inside a tunnel.

Longitudinal ventilation: a ventilation system consisting of forcing an air flow along the axis of the tunnel in order to push the smoke in the direction of the openings.

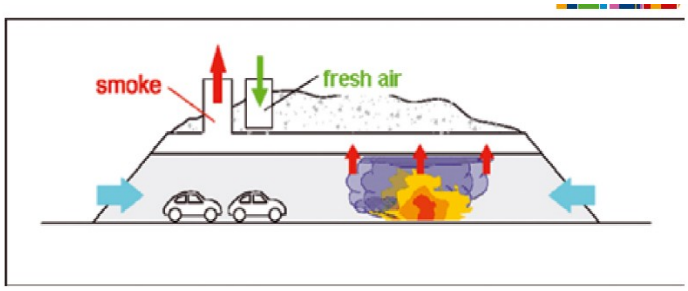


Natural ventilation: air flow occurring within the tunnel due to the difference in pressure between the openings, the inclination of the tunnel, and the difference in temperature between the surface of the tunnel structures and the ambient air.

Semi-transversal extraction ventilation: a ventilation system capable of extracting contaminated air or fire fumes through a special duct, allowing the entry of fresh air through the tunnel openings.



Transverse ventilation: a ventilation system in which generally fresh air is conveyed into a ventilation duct parallel to the axis of the tunnel and the stale air is extracted from another duct. The fresh air injected and the stale air extracted 'purify' the tunnel transversally.



Escape route (or emergency route): an unobstructed path within the escape system that allows tunnel users to reach a safe place.

Traffic volume (TGM): the annual average daily traffic in a tunnel, per lane. When calculating the volume of traffic, each motor vehicle counts for one unit.

Note: *if the number of heavy-duty vehicles carrying more than 3.5 tonnes exceeds 15 % of the annual average daily traffic and if the seasonal daily traffic significantly exceeds the annual average daily traffic, the additional risks shall be assessed and taken into account by increasing the traffic volume of the tunnel.*

1. Infrastructure measures

1.1 Escape routes and emergency exits

Escape routes must allow users to leave the tunnel on foot and reach a safe place in the event of an accident or fire and may also constitute pedestrian access to the tunnel, on foot, for emergency services.

In tunnels without emergency lanes, emergency pedestrian platforms must be provided, including elevated platforms that users use in the event of a breakdown or accident to reach an emergency exit, with the characteristics described in the decree referred to in Article 13(1) of Legislative Decree No 285 of 30 April 1992.

In urban and non-urban tunnels with a traffic volume of more than 2000 vehicles/day per lane, emergency exits shall be provided with a distance between two exits of not more than 500 metres.

For urban tunnels longer than 500 metres and which also allow pedestrians to pass through, the distance between two emergency exits shall not exceed 300 metres.

Escape routes consist of:

1. direct exits to the outside of the tunnel;
2. exits leading to the other tunnel tubes, if of a fire-protected type;
3. exits leading to an emergency tunnel, if of a fire-protected type;
4. exits leading to temporary safe places connected to the outside via protected routes.

In cases 3 and 4, the escape route shall be constructed using load-bearing and separating structures with fire resistance characteristics of at least REI 120.

1.2 Driveways for emergency services

In double-tube tunnels, the driveway connections defined in the rules referred to in Article 13(1) of Legislative Decree No 285 of 30 April 1992, if present, must be protected by load-bearing and separating structures with fire resistance characteristics of at least REI 120, in order to prevent the spread of smoke and heat in the tube not affected by the fire.

If the geomorphologic characteristics of the ground allow it, gaps must be created outside each opening of a multi-tube tunnel to allow emergency services immediate access to each of the tubes.

1.3 Drainage

The drainage system for flammable and toxic liquids serving the tunnel, where provided, shall be designed to reduce the likelihood of fires starting and the spread of flammable and toxic liquids within the tunnel.

Alternatively, the competent authorities assess whether to authorise the transport of dangerous goods or to adopt measures to manage and regulate vehicle flows, in order to mitigate the risk on the basis of a safety analysis drawn up by the person responsible for the activity, also in relation to the availability of any alternative routes and the related risks.

In any case, procedures and tools aimed at limiting and confining any dangerous liquids spilled on the road platform must be adopted, using specialised personnel.

1.4 Fire resistance of structures

Tunnel structures must be made of non-combustible materials that ensure a level of fire resistance performance sufficient to guarantee the safe evacuation of users and the intervention of rescue teams, in accordance with the objectives set out in Article 2 of the Decree of the Minister for the Interior of 9 March 2007, with fire resistance characteristics of not less than R 90.

In the event that a local failure may have catastrophic consequences, such as for submerged tunnels or tunnels that may cause the collapse of buildings or infrastructure above or adjacent

to them, tunnel structures shall be non-combustible and with fire resistance characteristics of not less than R 120, to be assessed against the hydrocarbon fire curve according to EN 1991-1-2, where the transit of dangerous goods is permitted.

1.5 Reaction of materials to fire

In tunnels, wall covering materials shall be non-combustible.

The lighting fixtures distributed along the axis of the tunnel, even consisting of point-like or ribbon-like elements, may be devoid of fire-retardant characteristics provided that the impossibility of the spread of any fire is confirmed.

In protected routes, walls, ceilings and floors must be made of non-combustible material, while lighting fixtures and other minor fittings in tunnels must be of an appropriate fire class, unless otherwise specified below.

2. Plant requirements

Technological installations, communication systems, and fire prevention systems shall be designed in such a way that a local failure, due, for example, to a fire, does not adversely affect the overall operation of the systems and the operation of the uninvolved part of the installation.

The choice of devices, safety systems, and the contingency plan must take into account the risk of explosion.

The requirements indicated must be applied in both tubes, even if of different lengths, in double-tube tunnels.

2.1 Emergency communication systems

In all tunnels with a length of more than 1 000 metres and a traffic volume of more than 2 000 vehicles/day per lane, and in urban tunnels with a length of more than 500 metres, in order to ensure the maximum timeliness and effectiveness of interventions by teams of the National Fire Service, repetition systems must be installed for the radio signal by means of telecommunications equipment conforming to the radio networks and equipment already supplied to the same Service.

The installations shall be constructed to ensure the repetition of the signal in the tunnel (with a cracked cable or other repetition modes) both in the 73.000 - 74.600 MHz frequency band and in the 410 - 450 MHz UHF frequency band.

If, in the context of local contingency planning, particular management problems arise due to increased risk conditions for public safety due to:

- anthropogenic factors;
- natural factors;
- difficulty in accessing the tunnel;
- multiple tunnels on the same route;
- particularly long tunnels;
- tunnels crossing administrative boundaries between provinces and regions;

the transmission of VF radio signals may be envisaged.

2.2 Emergency ventilation

2.2.1 General provisions

In all tunnels longer than 1 000 metres and with a traffic volume of more than 2 000 vehicles/day per lane, an emergency mechanical ventilation system shall be installed to ensure both the evacuation of fumes and heat, the safe evacuation of users, and the access of rescuers.

2.2.2 Design methods

The emergency ventilation system must be designed and constructed by the book according to good engineering practice.

The designer shall define the performance of the installation taking into account the expected vehicle flows, the types of vehicles and dangerous goods passing through the tunnel, the foreseeable fires and their smoke characteristics, at least in terms of visibility, temperature and toxicity.

The mechanical emergency ventilation system must be designed and equipped with the appropriate redundancies for safe operation, taking into account that fans above or near the outbreak may be damaged or not active.

2.2.3 Activation and control of the ventilation system for fire-fighting purposes

In the event of a fire, the emergency ventilation system shall be capable of being activated or controlled automatically or remotely.

Where provided, the manual control system command at the tunnel entrance, located in a position protected from accidental activation, shall take precedence over the remote automatic or manual control system.

The use of the manual control system at the entrance to the tunnel by the staff of the public rescue services, to be used only at the end of the escape, must be planned and agreed with the person responsible for the activities in accordance with the procedures set out in the contingency plan, including specific training activities.

2.2.4 Type of emergency ventilation

2.2.4.1 Twin-tube tunnels with fluid one-way traffic

The ventilation system shall, as a general rule, be longitudinal.

2.2.4.2 Tunnels with two-way traffic and tunnels with congested one-way traffic

The ventilation system shall, as a general rule, be of the transverse or semi-transverse extraction type.

If the length of the tunnel exceeds 3 000 metres, the following minimum measures shall be taken with regard to transverse or semi-transverse ventilation in extraction:

a) installation of air and smoke extraction devices that can be operated separately or in groups;

b) constant control of the longitudinal air speed and consequent regulation of the control process of the ventilation system (extractors, fans, etc.).

2.2.5 Fire behaviour characteristics of ventilation system components

Regardless of the type of ventilation system, all components exposed to fire and high temperatures must ensure performance and operation for a minimum of 90 minutes at a temperature of 400 °C.

The fans of the emergency ventilation system shall be capable of moving from stationary to maximum rotational speed in no more than 60 seconds; reversible fans (e.g.: induction jet-fans) must be capable of completely reversing the rotation motion in no more than 90 seconds.

2.2.6 Performance requirements

2.2.6.1 Twin-tube tunnels with fluid one-way traffic

The longitudinal ventilation system shall be designed and constructed in such a way as to prevent the occurrence of back-layering.

The installation must ensure a smoke-free layer suitable for the safe evacuation of the occupants.

To prevent back-layering, the designer, applying the criteria according to the international literature (e.g.: NFPA 502 – Standard for Road Tunnels, Bridges, and Other Limited Access Highways), establishes a minimum longitudinal air speed greater than the critical speed**.**

2.2.6.2 Tunnels with two-way traffic and tunnels with congested one-way traffic

The transverse or semi-transverse extraction ventilation system shall be made in such a way as to guarantee the undisturbed stratification of the fumes. For this purpose, the longitudinal speed of the air shall be controlled in such a way as to ensure, in the extraction zone, values of less than 1 metre/second.

2.3 Road and safety signs.

Road signs and panels shall comply with Presidential Decree No 495 of 16 December 1992.

In addition, the following additional requirements shall be observed for signs:

a) fire doors, if fitted, must be marked on both sides with the sign UNI EN ISO 7010-M001 or equivalent, bearing the text “Fire door keep closed” or “Self-closing fire door”;

b) all fire-fighting systems and devices must be provided with safety signs in accordance with the applicable rules and legislation;

c) appropriate indications regarding the available equipment shall be applied to emergency stations;

d) emergency exits must be indicated using the prescribed signs;

e) signs or double-sided composite light signals must be placed on the side walls every 25 metres to indicate the distance to the portals, the direction to travel and the distances to the nearest safe places, if any;

f) at the entrances of each tunnel, the tunnel sign must have supplementary panels installed showing:

- the name of the tunnel;
- the overall length of the tunnel;

g) in all tunnels, the connections for the passage between the tubes (by-pass), safe places, and emergency stations must be accompanied by signs, visible from both inside and outside the locations, indicating:
- the name of the tunnel;
- the mileage progress;
- the identification number.

2.4 Control centre

In all tunnels with a length of more than 3 000 metres and a traffic volume of more than 2 000 vehicles/day per lane, a continuously manned control centre shall be established.

All signalling systems must converge within the same centre, with particular reference to:
- the alarm system for accidents and fires in the tunnel;
- the remote control system for the ventilation system;
- equipment for the control, management, and recording of the video surveillance system;
- voice-operated communication systems, for communication with rescue services.

The premises in which the centre is built must also be suitable for the intervention needs of public service personnel.

Surveillance of several tunnels may be centralised in a single control centre, provided that unity of management in ordinary and emergency operation is guaranteed.

2.5 Surveillance installations

Surveillance installations with cameras and an automatic fire detection system must be installed in all tunnels where the control centre is planned.

The installation must be designed and constructed to cover the entire tunnel.

Automatic fire detection systems shall be installed in all tunnels without a control centre to activate and control the emergency mechanical ventilation system and any other active protection systems.

When available, the images can be reported to the operations room of the Fire Brigade Command Team responsible for the area, in accordance with arrangements defined at local level between that Command Team and the person responsible for the activity to be reported in the contingency planning.

2.6 Traffic light system to prevent access to tunnels

Before the entrances to all tunnels longer than 1 000 metres, traffic lights shall be installed to prevent users from accessing the tunnel in emergency situations. Additional measures (e.g. variable message panels and barriers) may be provided to give instructions and to report accidents or fires in tunnels to users.

If the tunnel is equipped with a control centre, the traffic lights must be activated and controlled remotely and/or automatically, to indicate with a red light the prohibition of access from the moment of detection of the accident.

Where a control centre is provided, it is also recommended that devices be installed inside the tunnel to stop vehicles in the event of an emergency, at intervals not exceeding 1 000 metres.

These systems shall consist of traffic lights and, where appropriate, additional devices, such as loudspeakers, variable message panels and barriers.

2.7 Fire resistance and reaction to fire of installations and systems and components thereof

The choice of the fire resistance and reaction to fire characteristics of the components that are part of the tunnel surveillance systems must be made according to the exposure to fire in order to ensure continuity of service.

2.8 Emergency stations

Emergency stations consist of places within the tunnel where safety equipment and tools are made available (e.g. emergency telephones and portable fire extinguishers) and do not constitute a safe place.

Emergency stations can be constructed using a cabinet or within a niche, preferably a window, created in the side wall of the tunnel, protecting the edges caused by the lack of continuity in the coating.

Emergency stations shall be constructed close to the openings and within the tunnel at intervals not exceeding 250 metres and equipped with at least one emergency telephone and two fire extinguishers of suitable extinguishing capacity.

In any case, the parking spaces must be equipped with an emergency station.

2.9 Water supply

All urban and non-urban tunnels longer than 500 metres shall be equipped with a fire-fighting water system. The fire-fighting water network must be designed, built and maintained in accordance with the Decree of the Minister for the Interior of 20 December 2012.

The fire-fighting water system shall be protected against accidental vehicle impacts and fire. In the case of ‘wet’ installations, they must be protected from frost by adopting appropriate technical or management solutions, such as to guarantee the continuity of the service, including by burying the pipes.

2.9.1 Architecture of the plant

The water network of the tunnels must be ring-shaped or comb-shaped but supplied by both tunnel openings.

A UNI 70 above-ground column hydrant for refuelling fire-fighting vehicles must be installed near each tunnel opening.

2.9.1.1. Tunnels without an emergency lane

UNI 45 hydrants must be installed inside the tube, at intervals not exceeding 250 meters, equipped with a nozzle and at least two flexible fire-fighting hoses of 20 meters.

For single-tube two-way tunnels, UNI 45 hydrants are positioned on both sides of the tunnel, at constant intervals, i.e. in a quincunx pattern if lane separation structures are present in the middle of the carriageway.

2.9.1.2. Tunnels with an emergency lane

Only UNI 70 above-ground column hydrants for supplying fire-fighting vehicles with two UNI 45 connections, also without hose and nozzle, located at intervals of no more than 150 metres, may be installed.

2.9.2 Implementation and performance characteristics

The hydrant network and its components must be protected from impact, frost, and fire. The supply to the fire-fighting water network must ensure operation for not less than two hours during the extinguishing operations.

The fire-fighting water system must be able to guarantee uniform flow rates between the different hydrants and in any case not less than 120 litres/minute for UNI 45 hydrants and 300 litres/minute for UNI 70 hydrants. The system must be sized to ensure the simultaneous operation of at least two UNI 45 hydrants with 120 litres/minute each and a residual pressure of not less than 0.2 MPa, and at least one UNI 70 hydrant with 300 litres/minute and a residual pressure of not less than 0.4 MPa, in the hydraulically most unfavourable position. The hydrant network must be made 'wet'. The water supply must be at least of a single superior type according to standard UNI EN 12845, as defined in point 4.1 of the technical regulation annexed to the Decree of the Minister for the Interior of 20 December 2012.

2.10 Electrical systems

2.10.1 General provisions

Installations must be constructed in accordance with national and international standards.

In particular, installations for the production, processing, transport, distribution and use of electricity must be constructed in such a way as to:

- limit the probability of ignition and spread of a fire in accordance with the provisions of the reference technical standards for places characterised by high crowd density and long evacuation times;
- not constitute, in the event of a fire, a danger to users due to the combustion products;
- ensure the continuity of operation of the safety services intended to function in the event of a fire for the duration provided for in the contingency plan and, in any case, for a time not less than that estimated for the evacuation of users from the tunnel in the worst-case scenario;
- not constitute a danger during fire-extinguishing operations.

2.10.2 Safety installations

The power supply to the safety systems listed below, if required, must meet the requirements for supplying the safety services laid down in the reference technical standards and must be such as to ensure that the system is supplied in the event of a fire.

The following are equipped with an emergency power supply:

a) safety lighting installations;

b) alarm systems, including local alarm systems (e.g. optical and audible alarm of an emergency station);

c) fire detection systems;

d) communication systems (e.g. through pre-set messages or from a control room or remote location);

e) video surveillance systems;

f) supervisory and control systems (e.g. local command and control station located outside the tunnel);

g) remote control and monitoring systems of safety services;

h) traffic light systems and variable message panels;

i) smoke control systems (tunnel ventilation for fire effluent management, escape route ventilation, etc.);

l) fire mitigation and extinguishing systems (e.g. electric pump supply circuits, etc.);

m) systems and plant equipment used for the collection of flammable and polluting liquids;

n) lighting systems aimed at enabling the evacuation of the tunnel.

The construction characteristics must be such that, in the event of a fire, wherever located:

- continuity of operation of the installations referred to in points (i), (l) and (n) is ensured throughout the tunnel, including by dividing them into separate and independent sectors;
- there is no interruption of the service of the other safety installations in a section of tunnel of such a length as to prevent the pursuit of the safety objectives set out above, including by dividing them into separate and independent sectors.

The installations referred to in points (i), (l) and (n) shall have a power security source with the following minimum characteristics:

- installations referred to in point (i): autonomy > 90 minutes;
- installations referred to in point (l): autonomy > 120 minutes;
- installations referred to in point (n): autonomy > 60 minutes.

For all other systems, the autonomy depends on the requirements of the contingency plan and is in any case not less than 30 minutes.

The normal power source shall be located in a protected position in relation to the environmental stresses to which it is subjected during all intended operating conditions.

2.10.3 Electrical panels for safety services

The switchboards containing the circuits supplying the safety systems, intended to operate in the event of fire, shall be protected against fire for the intended duration of operation. The devices installed there, intended to be operated during the emergency, must bear clear indications for their correct use.

2.10.4 Safety service pipelines

Continuity of operation, in the event of a fire, of the power supply, data transmission and emergency control circuits shall be ensured by the following measures:

- the construction of all backbones with cables of fire resistance not less than the expected service life of the supplied service or with cables laid within housings of equivalent resistance performance;
- mechanical protection against impact, as far as possible, of the supply backbones of the installations referred to in point (i);
- creation of all the connections for the supply of the equipment of the safety systems inside boxes equipped with electrical protection, able to avoid the interruption of the service of the backbone, in case of electrical failures of the user equipment hit by the fire.

2.10.5 Emergency disconnection

All utilities not intended to operate in the event of an emergency shall be equipped with a sectioning device located in a marked position, protected from fire and easily accessible to rescuers.

2.10.6 Safety lighting system

Tunnels shall be equipped with a safety lighting system designed to allow the use of safety equipment and the evacuation of users in the event of fire.

The safety lighting system must ensure the levels of illumination required by the applicable technical reference standards at the tubes, in safe places and, in general, in the various environments of the escape route system.

In case of interruption of the ordinary power supply in a section of the tunnel, the safety lighting is automatically activated, if not already normally active, with consequent signalling to the control centre, where provided.

In the absence of the control centre, the anomaly shall in any case be reported to the person responsible for the activity in accordance with the procedures laid down in the contingency plan.

The side walls of the tunnel shall be light in colour in order to facilitate visibility during the activation of the emergency lighting system.

For the reaction to fire characteristics, the indications given in point 1.5 shall apply.

3. Operational requirements for fire safety

Those responsible for the activity shall apply the provisions of Article 6 of Presidential Decree No. 151 of 1 August 2011.

3.1 Emergency means of operation

Those responsible for the activity must have the necessary organisation and means to ensure the safety of traffic and users in the event of an accident or fire. Employees involved in the operation and emergency response must receive specific training and updates, including on safety in the event of fire.

3.2 Contingency plans

All tunnels must be equipped with contingency plans.

Specific instructions on the management of accidents and fires in tunnels shall be included in the planning.

3.2.1 Objectives

Contingency planning shall have the following objectives:

a) limit any harmful effects arising from emergency situations through proper management and by optimising the use of rescue devices put in place by the person responsible for the activities;

b) provide for the autonomous activation of the envisaged procedures, pending decisions by the decision-making bodies.

3.2.2 Stages of intervention

The contingency plan shall provide for two distinct phases of intervention:

- an internal phase, during which the person in charge of the activity applies his own procedures;
- an external phase, involving the interaction between the person responsible for the activity and the public rescue services.

3.2.3 Reference scenarios

The baseline scenarios to be considered shall be at least:

A) a road accident without a fire;

B) a vehicle fire;

C) a fire in the technical installations of the tunnel.

The involvement of a vehicle used for the transport of dangerous goods, with or without fire, always implies reference to scenario B.

3.2.4 Contents of the contingency plan

The contingency plan shall contain the following minimum documentary content:

- a description of the tunnel and its equipment;
- the characteristics of the works;
- a description of the internal and external access methods to the tunnel;
- the description and characteristics of the safety installations;
- the characteristics and the principle of operation of the ventilation system;
- the distribution list and the list of telephone numbers for communications;
- any additional safety documentation.

The person responsible for the activity estimates the number of persons directly exposed to the risk in the cases envisaged by the various accident scenarios and in the heaviest traffic situation, considering at least one accident scenario in the middle of the tunnel.

The ventilation action during the first phase of evacuation is described in order to achieve optimal conditions for the evacuation of people from the tunnel through appropriate smoke management.

The person responsible for the activity shall describe, in the contingency plan, the arrangements for alerting and deploying employees.

The person responsible for the activity shall also define the procedures adopted to communicate, in the event of an emergency, to the public rescue services at least the following elements:

- place of the accident;
- the mileage progress and the identification number of the SOS niche;
- the lane;
- the accident scenario between the aforementioned types A, B, and C referred to in point 3.2.3.

3.3 Regular exercises

The person responsible for the activity organises regular exercises for his tunnel safety staff.

The exercises:

- represent the accident scenarios defined in the contingency plan;
- provide clear safety assessment results;
- may also, in part, take the form of simulations to obtain complementary results.

Exercises on a full-scale basis and under conditions which are as realistic as possible or based on experience in sample galleries representative of the real case scenario shall be carried out at intervals of not less than four years for each gallery.

For each intermediate year, real partial or simulation exercises shall be carried out, possibly alternately. Simulation means a 'command post' exercise.

Where tunnels are located in close proximity to each other, the full-scale exercise shall involve at least one of every three tunnels, choosing the one with the most significant characteristics for the assessment of safety conditions.

3.4 Works in tunnels and maintenance plans

The complete or partial closure of lanes for construction or maintenance works always starts outside the tunnel. For indicating works, variable message panels, traffic lights, and mechanical barriers are used.

Each tunnel is equipped with a maintenance and cleaning plan to preserve the colouring characteristics of the side walls and the functionality of the systems, drawn up in compliance with the reference technical or harmonised standards.

The Ministerial Decree of 1 September 2021 applies to the maintenance of fire-fighting devices *'General criteria for the inspection and maintenance of fire safety installations, equipment and other systems, pursuant to Article 46(3)(a)(3) of Legislative Decree no. 81 of 9 April 2008'*.

3.5 Accident management

In the event of a serious accident, as specified in the contingency plan (scenario B of point 3.2.3), all access to the tubes shall be immediately closed to traffic.

In tunnels longer than 1 000 metres, road traffic is stopped by activating not only the devices located in front of the openings, but also the variable message panels, traffic lights, and

mechanical barriers inside the tunnel, if present, so that all traffic is blocked as soon as possible both inside and outside the tunnel. Traffic shall be managed in such a way as to allow vehicles not involved in the accident to exit the tunnel quickly.

3.6 Control centre activities

The control centre monitors the situation of the tunnel at all times.

3.7 Transport of dangerous goods

Where the transport of dangerous goods within the tunnel is prohibited, appropriate signals shall be installed before the exit preceding the tunnel and at the entrance to the tunnel in order to allow drivers to use alternative routes.

TITLE II

FIRE PREVENTION RULES FOR ALREADY EXISTING AND OPERATIONAL TUNNELS NOT BELONGING TO THE TRANS-EUROPEAN ROAD NETWORK

1. Objectives

In identifying fire prevention measures for existing tunnels, due to the timing of the development of a fire in a confined environment, the potential magnitude of the fire, as well as the time required for the intervention of rescue workers, the objectives to be achieved are to ensure adequate levels of safety for users, workers and persons in charge of rescue operations, through the adoption of prevention and protection measures aimed at reducing critical situations that may endanger human life, the environment and tunnel installations, as well as aimed at limiting the consequences in the event of fire or accident.

To this end, tunnels shall be maintained and operated in such a way as to:

a) minimise the causes of fire;

b) limit the effects of accidents;

c) facilitate the self-rescue and/or evacuation of persons involved in an accident;

d) allow a safe, rapid and effective intervention by rescue teams.

2. Terms and definitions

The terms and definitions in Title I above shall apply.

3. Minimum risk categorisation of tunnels according to road type, length, and average daily traffic

For the purposes of applying the provisions of this Title, tunnels shall be grouped into categories according to the functional and geometrical characteristics of the road, traffic characteristics, length and average daily traffic per lane.

If the person responsible for the activity assesses that other risk aggravating factors may exist, he must increase the level compared to the results of the method described below.

Categorisation based on the functional and geometric characteristics of the type of road, and the traffic characteristics:

- non-urban tunnels with one-way traffic;
- non-urban tunnels with two-way traffic;
- urban tunnels.

Categorisation by length

- tunnels with a length greater than 500 metres and less than or equal to 1 000 metres;
- tunnels with a length greater than 1 000 metres and less than or equal to 1 500 metres;
- tunnels with a length greater than 1 500 m and less than or equal to 3 000 m;
- tunnels with a length greater than 3 000 metres.

Traffic volume categorisation (TGM)

- Daily TGM less than 2 000 vehicles per lane;
- Daily TGM between 2 000 and 10 000 vehicles/day per lane;
- Daily TGM exceeding 10 000 vehicles/day per lane.

3.1. Categorisation of non-urban one-way tunnels

For the purposes of applying safety measures, non-urban one-way tunnels may be grouped into risk categories as set out in the following table:

Length	*TGM Lane <2000*	*2000<=TGM lane<=10000*	*TGM Lane >10000*
500<L≤1000 metres	*1*	*2*	*3*
1000<L≤1500 metres	*1*	*3*	*3*
1500<L≤3000 metres	*2*	*3*	*4*
L>3000 metres	*3*	*4*	*4*

3.2 Categorisation of non-urban two-way tunnels

For the purposes of applying safety measures, non-urban two-way tunnels may be grouped into risk categories as set out in the following table:

Length	*TGM Lane <2000*	*2000<=TGM lane<=10000*	*TGM Lane >10000*
500<L≤1000 metres	*1*	*2*	*3*
1000<L≤1500 metres	*2*	*3*	*4*
1500<L≤3000 metres	*3*	*3*	*4*
L>3000 metres	*3*	*4*	*4*

3.3 Categorisation of urban tunnels

For the purposes of applying safety measures, urban tunnels may be grouped into risk categories as set out in the following table:

Length	*TGM Lane* <2000	2000<=TGM lane<=10000	*TGM Lane* >10000
500<L≤1000 metres	2	3	3
1000<L≤1500 metres	2	3	4
1500<L≤3000 metres	3	4	4
L>3000 metres	4	4	4

4. Safety measures

The safety measures to be taken for the tunnels referred to in this Title are set out below.

4.1. Measures for the early detection of incidents and fire alarms

Accident detection and alarm devices shall be manual, user-activated, or automatic.

4.1.1 Manual alarms by users for tunnels with risk category 2

In order to allow users to send manual accident alarms, tunnels must be equipped with mobile telephone network coverage or, alternatively, with SOS columns positioned every 250 m, each equipped with a 6 kg powder extinguisher.

4.1.2 Automatic alarms for tunnels with risk categories 3 and 4

1. In addition to the provisions of point 4.1.1, tunnels in risk category 3 must be equipped with a fire detection and alarm system using thermal speed cables or opacimeters.
2. In addition to the provisions of points 4.1.1 and 4.1.2.1, tunnels with risk category 4 must be mandatorily equipped with a DAI system (automatic accident detection with video surveillance).
3. The alarm signals must be directed to a control and command room of installations, even serving several stretches of road, or they must allow the automatic activation of the emergency procedures prepared by the tunnel manager.

4.2 Measures to facilitate self-rescue, reduce the potential number of users involved and limit the spread of fire.

4.2.1 Measures to facilitate self-rescue

1. Tunnels, regardless of the risk category, shall be equipped with the following devices:

a) safety signs with the characteristics specified in point 2.3 of Title I;

b) safety lighting and illuminated signs for both emergency exits, if any, and openings, with the characteristics set out in point 2.10.6 of Title I.

2. One-way tunnels with risk category 4 shall be equipped with a controlled longitudinal ventilation system with the characteristics set out in point 2.2.6.1 of Title I.
3. In one-way double-tube tunnels with risk category 4, the passage connections (by-passes) between the two tubes, if any, shall be closed with fire-resistant separating elements having the characteristics referred to in point 1.4 of Title I, equipped with an emergency exit.
4. For two-way tunnels with risk category 4, the effectiveness of longitudinal ventilation systems, if any, or the need to install extractive semi-transverse ventilation systems, must be assessed using the fire safety engineering methods set out in the Decree of the Minister for the Interior of 9 May 2007.
5. For tunnels with risk category 4, the need to create additional intermediate emergency exits, besides the entrance portals, in addition to those that may already be present, must be assessed using the fire safety engineering methods referred to in the Decree of the Minister for the Interior of 9 May 2007.

4.2.2 Measures to limit the spread of the fire and reduce the number of potentially affected users.

1. Tunnels with risk categories 3 and 4 must be equipped with traffic lights, located at the openings, to indicate the impossibility of access to the tunnel in the event of an emergency.
2. Urban tunnels must be equipped with traffic lights to prevent the formation of jams inside; where there are particular traffic congestion situations, appropriate systems for diverting traffic onto other roadways must be provided, if necessary.
3. Tunnels with risk category 4 must be equipped with variable message panels, positioned before the entrance, displaying, in real time, the necessary information.
4. Tunnels with risk category 4 shall be equipped with barriers to prevent the entry of vehicles into the tunnel in the event of an emergency.
5. Tunnels with risk categories 3 and 4 shall be equipped with automatic FM radio messaging and appropriate signals indicating the frequency of transmission and the possible presence of telephone network coverage.

4.3. Measures to facilitate the intervention of rescue services

1. For tunnels under their responsibility and regardless of the level of risk, the persons responsible for the activity prepare specific plans and measures to facilitate the intervention of rescuers.
2. Tunnels with risk categories 3 and 4 shall be equipped with a fire-fighting water system with the characteristics set out in point 2.9 of Title I. The fire-fighting water network may be constructed in such a way as to ensure operation for a period of not less than 60 minutes. The fire-fighting water network can be installed ‘dry’, provided that the availability of water to all hydrants is guaranteed within ten minutes of the opening of the least favoured hydrant. This must be stated in the forms laid down by the Decree of the Minister for the Interior of 7 August 2012. The water supply must be at least of a single type according to standard UNI EN 12845 as defined in point 4.1 of the technical regulation annexed to the Decree of the Minister for the Interior of 20 December 2012.
3. The fire resistance characteristics of the structures of non-urban tunnels with risk category 4 and urban tunnels must be displayed on a dedicated panel, located at the entrances.
4. In urban tunnels with risk categories 3 and 4 and in non-urban tunnels with risk category 4, an emergency communication system for public services shall be implemented, having the characteristics set out in point 2.1 of Title I.

5. Management measures

5.1. Speed limitation measures

Pending the adaptation of the tunnel to the above provisions, the person responsible for the activity shall take appropriate management measures to reduce the likelihood of an accident occurring, such as, for example, by reducing the speed limit by at least 20 km/h with respect to that imposed for the type of road, by maintaining a safe distance between vehicles to minimise the risk of collisions, taking into account the braking distances as a function of the maximum speed and the maximum conceivable traffic volume.

The parameters of speed and inter-distance shall be reported in the contingency plan, together with the provisional measures applied (speed limits, distance between vehicles, or others) deriving from a specific risk analysis, based on the historical accident data (minimum time horizon of 5 years) that affected the tunnel and the areas in front of the openings for a length of not less than 1 000 meters.

5.2. Operation and maintenance measures

Tunnels covered by this Title shall be equipped with contingency plans in accordance with point 3.2 of Title I.

The persons responsible for the tunnel shall apply the provisions of Article 6 of Presidential Decree No 151 of 1 August 2011.

The operation of the tunnels referred to in this Title, under conditions other than normal, shall comply with the requirements of point 3 of Title I.