L.N. 149 of 2006

MALTA TRANSPORT AUTHORITY ACT (CAP. 332)

Safety Requirements for Tunnels in the Trans-European Road Network Regulations, 2006

IN exercise of the powers conferred by article 32 of the Malta Transport Authority Act, the Minister for Urban Development and Roads has, after consultation with the Malta Transport Authority, made the following regulations:-

Title.

1. The title of these regulations is the Safety Requirements for Tunnels in the Trans-European Road Network Regulations, 2006.

Interpretation.

2. In these regulations, unless the context otherwise requires:

"the Authority" means the Malta Transport Authority established under the Malta Transport Authority Act;

"emergency services" means all local services, whether public or private or part of the tunnel staff, which intervene in the event of an accident, including police services, fire brigades and rescue teams;

"Trans-European Road Network" means the road network identified in Section 2 of Annex I to Decision No 1692/96/EC of the European Parliament and the Council on Community guidelines for the development of the trans-European transport network and illustrated by maps and, or described in Annex II to that Decision;

"tunnel" means, for the purpose of these regulations, an underground passage with a length of over 500 metres;

"tunnel length" means the length of the longest traffic lane, measured on the fully enclosed part of the tunnel.

Minimum safety requirements.

3. (1) The Authority shall be responsible for ensuring that any tunnel constructed along the Trans-European Road Network route in Malta shall meet the minimum safety requirements laid down in the First Schedule to these regulations.

(2) The Authority shall ensure that:

(a) tunnels are tested and inspected on a regular basis and that safety requirements pertaining thereto are drawn up;

(b) organisational and operational schemes, including emergency response plans, for the training and equipping of emergency services are put in place;

(c) the procedure for immediate closure of a tunnel in an emergency is clearly defined; and

(d) the necessary risk reduction measures are implemented.

Commissioning of tunnels.

4. The Authority shall only commission tunnels in accordance with the procedure laid down in the Second Schedule to these regulations.

Tunnel Manager.

5. The Authority shall either itself appoint a Tunnel Manager to be responsible for the management of each tunnel along the Trans-European Road Network route in Malta, whether it is in the design, construction or operating stage, or else shall identify as Tunnel Manager any other public or private body responsible for the management of the tunnel at the stage in question.

Appointment of Safety Officer.

6. (1) The Tunnel Manager shall, with the prior approval of the Authority, nominate one Safety Officer for each tunnel.

(2) The Safety Officer shall coordinate all preventive and safeguards measures to ensure the safety of users and operational staff.

(3) The Safety Officer may be a member of the tunnel staff or the emergency services, shall be independent in all road tunnel safety issues and shall not be under instructions from an employer in respect of those issues.

(4) The said officer may perform his tasks and functions in more than one tunnel along the route.

(5) The Safety Officer shall perform the following tasks and functions:

(a) ensure coordination with emergency services and take part in the preparation of operational schemes;

(b) take part in the planning, implementation and evaluation of emergency operations;

(c) take part in the definition of safety schemes and the specification of the structure, equipment and operation in respect of both new tunnels and modifications to existing tunnels;

(d) verify that operational staff and emergency services are trained, and he shall take part in the organisation of exercises held at regular intervals;

(e) give advice on the commissioning of the structure, equipment and operation of tunnels;

(f) verify that the tunnel structure and equipment are maintained and repaired; and

(g) take part in the evaluation of any significant incident or accident as mentioned in regulation 7 of these regulations.

Incident report.

7. (1) The Tunnel Manager shall prepare an incident report on any significant incident or accident occurring in a tunnel along the Trans-European Road Network route in Malta.

(2) The said report shall be forwarded to the Safety Officer, referred to in regulation 6 of these regulations, to the Authority and to the emergency services within a maximum period of one calendar month.

(3) Where an investigation report is drawn up analysing the circumstances of the incident or accident referred to in sub-regulation (1) hereof or the conclusions that can be drawn from it, the Tunnel Manager shall forward this report to the Safety Officer, the Authority and the emergency services no later than one calendar month after he receives it himself.

Inspections.

8. (1) The Authority shall appoint highly competent and qualified inspection entities to perform on a regular basis inspections, evaluations and tests in tunnels falling within the scope of these regulations to ensure that the tunnels comply with the provisions of these regulations.

(2) The Authority shall ensure that such inspection entities are functionally independent from the Tunnel Manager.

(3) The period between two consecutive inspections of any given tunnel shall not exceed six years.

(4) Where, on the basis of the report of the inspection entity, the Authority finds that a tunnel does not comply with the provisions of

these regulations, the Authority shall notify the Tunnel Manager and the Safety Officer that appropriate measures to increase tunnel safety shall be adopted. The Authority shall also define the conditions for continuing to operate the tunnel or for re-opening the tunnel which will apply until remedial measures and any further relevant restrictions or conditions are implemented.

(5) Where the remedial measures include any substantial modification in the tunnel's construction or operation, once these measures have been taken, the tunnel shall be subject to a new authorisation to operate in accordance with the procedure laid down in the Second Schedule to these regulations.

Risk analysis.

9. (1) Where certain structural requirements laid down in the First Schedule to these regulations can only be satisfied through technical solutions which either cannot be achieved or can be achieved only at disproportionate cost, the Authority may accept the implementation of risk reduction measures, provided that such measures will result in equivalent or improved protection.

(2) The efficiency of these measures shall be demonstrated through a risk analysis in conformity with this regulation.

(3) The risk analysis, where necessary, shall be carried out by a body which is functionally independent from the Tunnel Manager.

(4) The risk analysis shall take into account all design factors and traffic conditions that affect safety, notably traffic characteristics and type, tunnel length and tunnel geometry, as well as the forecast number of heavy goods vehicles each day.

(5) The content and results of the risk analysis shall be included in the safety documentation submitted to the Authority.

FIRST SCHEDULE

(Regulations 3 and 9)

Safety measures

1. Basis for deciding on safety measures

1.1. Safety parameters

1.1.1. Safety measures to be implemented in a tunnel shall be based on a systematic consideration of all aspects of the system composed of the infrastructure, operation, users and vehicles.

1.1.2. The following parameters shall be taken into account:
— tunnel length,
— number of tubes,
— number of lanes,
— cross-sectional geometry,
— vertical and horizontal alignment,
— type of construction,
— uni-directional or bi-directional traffic,
— traffic volume per tube (including its time distribution),
— risk of congestion (daily or seasonal),
— access time for the emergency services,
— presence and percentage of heavy goods vehicles,
— presence, percentage and type of dangerous goods traffic,
— characteristics of the access roads,
— lane width,
— speed considerations,
— geographical and meteorological environment.

1.1.3. Where a tunnel has a special characteristic as regards the aforementioned parameters, a risk analysis shall be carried out in accordance with regulation 9 of these regulations to establish whether additional safety measures and, or supplementary equipment is necessary to ensure a high level of tunnel safety. This risk analysis shall take into consideration possible accidents, which clearly affect the safety of road users in tunnels and which might occur during the operating stage and the nature and magnitude of their possible consequences.

1.2. Minimum requirements

1.2.1. The safety measures required by the following paragraphs shall be implemented at a minimum in order to ensure a minimum level of safety in all the tunnels covered by these regulations. Limited derogations from these requirements may be allowed provided that the following procedure is completed successfully. The Authority shall send to the European Commission information on the following:
— the limited derogation(s) envisaged,
— the imperative reasons underlying the limited derogation envisaged,

— the alternative risk reduction measures which are to be used or reinforced in order to ensure at least an equivalent level of safety, including proof therefor in the form of an analysis of relevant risks.

The Commission shall transmit any request for a limited derogation to the Authority as soon as possible, and in any case within one month of receipt.

If, within a period of three months after receipt of the request by the Commission, neither the Commission nor the Authority formulates objections, the limited derogation shall be deemed granted and the Commission shall inform the Authority accordingly. If objections are expressed, the Commission shall make a proposal in accordance with the procedure referred to in articles 5 and 7 of Council Decision 1999/468/EC laying down the procedures for the exercise of implementing powers conferred on the Commission. Where the decision is negative, the limited derogation shall not be allowed.

1.2.2. In order to provide a unified interface in all tunnels to which these regulations apply, no derogation from the requirements of the following paragraphs shall be allowed regarding the design of the safety facilities at the disposal of the tunnel users (emergency stations, signs, lay-bys, emergency exits, radio re-broadcasting when required).

1.3. Traffic volume

1.3.1. Where “traffic volume” is mentioned in this Schedule, it refers to the annual average daily traffic through a tunnel per lane. For the purpose of determining the traffic volume, each motor vehicle shall be counted as one unit.

1.3.2. Where the number of heavy goods vehicles over 3.5 tons exceeds 15% of the annual average daily traffic, or seasonal daily traffic significantly exceeds the annual average daily traffic, the additional risk will be assessed and taken into account by increasing the traffic volume of the tunnel for the application of the following paragraphs.

2. Infrastructure measures

2.1. Number of tubes and lanes

2.1.1. The main criteria for deciding whether to build a single or a twin-tube tunnel shall be projected traffic volume and safety, taking into account aspects such as the percentage of heavy goods vehicles, gradient and length.

2.1.2. In any case, where, for tunnels at the design stage, a 15-year forecast shows that the traffic volume will exceed 10,000 vehicles per day per lane, a twin-tube tunnel with unidirectional traffic shall be in place at the time when this value will be exceeded.

2.1.3. With the exception of the emergency lane, the same number of lanes shall be maintained inside and outside the tunnel. Any change in the number of lanes shall occur at a sufficient distance in front of the tunnel portal; this distance shall be at least the distance covered in 10 seconds by a vehicle travelling at

the speed limit. When geographic circumstances prevent this, additional and, or reinforced measures shall be taken to enhance safety.

2.2. Tunnel geometry

2.2.1. Special consideration shall be given to safety when designing the cross-sectional geometry and the horizontal and vertical alignment of a tunnel and its access roads, as these parameters have a significant influence on the probability and severity of accidents.

2.2.2. Longitudinal gradients above 5% shall not be permitted in new tunnels, unless no other solution is geographically possible.

2.2.3. In tunnels with gradients higher than 3%, additional and, or reinforced measures shall be taken to enhance safety on the basis of a risk analysis.

2.2.4. Where the width of the slow lane is less than 3,5 m and heavy goods vehicles are allowed, additional and, or reinforced measures shall be taken to enhance safety on the basis of a risk analysis.

2.3. Escape routes and emergency exits

2.3.1. In new tunnels without an emergency lane, emergency walkways, elevated or not, shall be provided for use by tunnel users in the event of a breakdown or an accident. This provision does not apply if the construction characteristics of the tunnel do not allow it or allow it only at disproportional cost and the tunnel is unidirectional and is equipped with a permanent surveillance and lane closure system.

2.3.2. In existing tunnels where there is neither an emergency lane nor an emergency walkway, additional and, or reinforced measures shall be taken to ensure safety.

2.3.3. Emergency exits allow tunnel users to leave the tunnel without their vehicles and reach a safe place in the event of an accident or a fire and also provide access on foot to the tunnel for emergency services. Examples of such emergency exits are:
— direct exits from the tunnel to the outside,
— cross-connections between tunnel tubes,
— exits to an emergency gallery,
— shelters with an escape route separate from the tunnel tube.

2.3.4. Shelters without an exit leading to escape routes to the open shall not be built.

2.3.5. Emergency exits shall be provided if an analysis of relevant risks, including how far and how quickly smoke travels under local conditions, shows that the ventilation and other safety provisions are insufficient to ensure the safety of road users.

2.3.6. In any event, in new tunnels, emergency exits shall be provided where the traffic volume is higher than 2,000 vehicles per lane.

2.3.7. In existing tunnels longer than 1,000 metres, with a traffic volume higher than 2,000 vehicles per lane, the feasibility and effectiveness of the implementation of new emergency exits shall be evaluated.

2.3.8. Where emergency exits are provided, the distance between two emergency exits shall not exceed 500 metres.

2.3.9. Appropriate means, such as doors, shall be used to prevent smoke and heat from reaching the escape routes behind the emergency exit, so that the tunnel users can safely reach the outside and the emergency services can have access to the tunnel.

2.4. Access for emergency services

2.4.1. In twin-tube tunnels where the tubes are at the same level or nearly, cross-connections suitable for the use of emergency services shall be provided at least every 1,500 metres.

2.4.2. Wherever geographically possible, crossing of the central reserve (median strip) shall be made possible outside each portal of a twin- or multi-tube tunnel. This measure will allow emergency services to gain immediate access to either tube.

2.5. Lay-bys

2.5.1. For new bi-directional tunnels longer than 1,500 metres where traffic volume is higher than 2,000 vehicles per lane, lay-bys shall be provided at distances which do not exceed 1,000 metres, if emergency lanes are not provided.

2.5.2. In existing bi-directional tunnels longer than 1,500 metres with a traffic volume higher than 2,000 vehicles per lane but no emergency lane, the feasibility and effectiveness of the implementation of lay-bys shall be evaluated.

2.5.3. If the construction characteristics of the tunnel do not allow it or allow it only at disproportionate cost, lay-bys do not have to be provided if the total tunnel width which is accessible to vehicles, excluding elevated parts and normal traffic lanes, is at least equal to the width of one normal traffic lane.

2.5.4. Lay-bys shall include an emergency station.

2.6. Drainage

2.6.1. Where the transport of dangerous goods is permitted, the drainage of flammable and toxic liquids shall be provided for through well-designed slot gutters or other measures within the tunnel cross sections. Additionally, the drainage system shall be designed and maintained to prevent fire and flammable and toxic liquids from spreading inside tubes and between tubes.

2.6.2. If in existing tunnels that requirement cannot be met or can be met only at disproportionate cost, this shall be taken into consideration when deciding whether to allow the transport of dangerous goods on the basis of an analysis of relevant risks.

2.7. Fire resistance of structures

The main structure of all tunnels where a local collapse of the structure could have catastrophic consequences, e.g. immersed tunnels or tunnels which can cause the collapse of important neighbouring structures, shall ensure a sufficient level of fire resistance.

2.8. Lighting

2.8.1. Normal lighting shall be provided so as to ensure appropriate visibility day and night for drivers in the entrance zone as well as in the interior of the tunnel.

2.8.2. Safety lighting shall be provided to allow a minimum visibility for tunnel users to evacuate the tunnel in their vehicles in the event of a breakdown of the power supply.

2.8.3. Evacuation lighting, such as evacuation marker lights, at a height of no more than 1.5 m, shall be provided to guide tunnel users to evacuate the tunnel on foot, in the event of emergency.

2.9. Ventilation

2.9.1. The design, construction and operation of the ventilation system shall take into account:

— the control of pollutants emitted by road vehicles, under normal and peak traffic flow,

— the control of pollutants emitted by road vehicles where traffic is stopped due to an incident or an accident,

— the control of heat and smoke in the event of a fire.

2.9.2. A mechanical ventilation system shall be installed in all tunnels longer than 1,000 m with a traffic volume higher than 2,000 vehicles per lane.

2.9.3. In tunnels with bi-directional and, or congested unidirectional traffic, longitudinal ventilation shall be allowed only if a risk analysis according to regulation 9 of these regulations shows it is acceptable and, or specific measures are taken, such as appropriate traffic management, shorter emergency exit distances, smoke exhausts at intervals.

2.9.4. Transverse or semi-transverse ventilation systems shall be used in tunnels where a mechanical ventilation system is necessary and longitudinal ventilation is not allowed under point 2.9.3. These systems must be capable of evacuating smoke in the event of a fire.

2.9.5. For tunnels with bi-directional traffic, with a traffic volume higher than 2,000 vehicles per lane, longer than 3,000 metres and with a control centre and transverse and, or. semi-transverse ventilation, the following minimum measures shall be taken as regards ventilation:

— air and smoke extraction dampers shall be installed which can be operated separately or in groups,
— the longitudinal air velocity shall be monitored constantly and the steering process of the ventilation system (dampers, fans, etc.) adjusted accordingly.

2.10. Emergency stations

2.10.1. Emergency stations are intended to provide various items of safety equipment, in particular emergency telephones and extinguishers, but are not intended to protect road users from the effects of fire.

2.10.2. Emergency stations can consist of a box on the sidewall or preferably a recess in the sidewall. They shall be equipped with at least an emergency telephone and two fire extinguishers.

2.10.3. Emergency stations shall be provided near the portals and inside at intervals which for new tunnels shall not exceed 150 metres and which in existing tunnels shall not exceed 250 metres.

2.11. Water supply

A water supply shall be provided for all tunnels. Hydrants shall be provided near the portals and inside at intervals which shall not exceed 250 metres. If a water supply is not available, it is mandatory to verify that sufficient water is provided otherwise.

2.12. Road signs

Specific signs shall be used for all safety facilities provided for tunnel users. Signs and panels for use in tunnels are given in the Third Schedule.

2.13. Control centre

2.13.1. A control centre shall be provided for all tunnels longer than 3,000 metres with a traffic volume higher than 2,000 vehicles per lane.

2.13.2. Surveillance of several tunnels may be centralised at a single control centre.

2.14. Monitoring systems

2.14.1. Video monitoring systems and a system able to automatically detect traffic incidents (such as stopping vehicles) and, or fires shall be installed in all tunnels with a control centre.

2.14.2. Automatic fire detection systems shall be installed in all tunnels which do not have a control centre where the operation of mechanical ventilation for smoke control is different from the automatic operation of ventilation for the control of pollutants.

2.15. Tunnel closing equipment

2.15.1. In all tunnels longer than 1,000 metres, traffic signals shall be installed before the entrances so that the tunnel can be closed in case of an emergency. Additional means, such as variable message signs and barriers, can be provided to ensure that instructions are obeyed.

2.15.2. Inside all tunnels longer than 3,000 metres, with a control centre and a traffic volume higher than 2,000 vehicles per lane, equipment to stop vehicles in the event of an emergency is recommended at intervals not exceeding 1,000 m. This equipment shall consist of traffic signals and possibly additional means, such as loudspeakers, variable message signs and barriers.

2.16. Communication systems

2.16.1. Radio re-broadcasting equipment for emergency service use shall be installed in all tunnels longer than 1,000 metres with a traffic volume higher than 2,000 vehicles per lane.

2.16.2. Where there is a control centre, it must be possible to interrupt radio re-broadcasting of channels intended for tunnel users, if available, in order to give emergency messages.

2.16.3. Shelters and other facilities where evacuating tunnel users must wait before they can reach the outside shall be equipped with loudspeakers for the provision of information to users.

2.17. Power supply and electrical circuits

2.17.1. All tunnels shall have an emergency power supply capable of ensuring the operation of safety equipment indispensable for evacuation until all users have evacuated the tunnel.

2.17.2. Electrical, measurement and control circuits shall be designed in such a way that a local failure, such as one due to a fire, does not affect unimpaired circuits.

2.18. Fire resistance of equipment

The level of fire resistance of all tunnel equipment shall take into account the technological possibilities and aim at maintaining the necessary safety functions in the event of a fire.

2.19. Table displaying informative summary of minimum requirements

The table set out hereafter gives a summary of the minimum requirements laid down in the previous paragraphs. The minimum requirements are those set out in the operative text of this Schedule.

SUMMARY OF MINIMUM REQUIREMENTS

● mandatory for all tunnels ❍ not mandatory
✸ mandatory with exceptions ☯ recommended

			Traffic ≤ 2,000 vehicles per lane		Traffic > 2,000 vehicles per lane			Additional conditions for implementation to be mandatory, or comments
			500-1,000 m	>1,000 m	500-1,000 m	1,000 – 3,000 m	>3,000 m	
Structural measures	2 tubes or more	§2.1						Mandatory where a 15-year forecast shows that traffic > 10,000 vehicles per lane.
	Gradients ≤ 5 %	§2.2	✸	✸	✸	✸	✸	Mandatory unless not geographically possible.
	Emergency walkways	§2.3.1 . §2.3.2	✸	✸	✸	✸	✸	Mandatory where there is no emergency lane, unless the condition in §2.3.1 is respected. In existing tunnels where there is neither an emergency lane, nor an emergency walkway additional / reinforced measures shall be taken.
	Emergency exists at least every 500 m	§2.3.3 - §2.3.9	❍	❍	✸	✸	✸	Implementation of emergency exists in existing tunnels to be evaluated case-by-case.
	Cross-connections for emergency services at least every 1,500 m	§2.4.1	❍	❍ / ●	❍	❍ / ●	●	Mandatory in twin-tube tunnels longer than 1,500 m.
	Crossing of the central reserve outside each portal	§2.4.2 .	●	●	●	●	●	Mandatory outside twin- or multi-tube tunnels wherever geographically possible.
	Lay-bys at least every 1,000 m	§2.5	❍	❍	❍	❍ / ●	❍ / ●	Mandatory in new bi-directional tunnels > 1,500 m without emergency lanes. In existing bi-directional tunnels > 1,500 m: depending on analysis. For both new and existing tunnels, depending on extra usable tunnel width.
	Drainage for flammable and toxic liquids	§2.6	✸	✸	✸	✸	✸	Mandatory where transport of dangerous goods is allowed.
	Fire resistance of structures	§2.7	●	●	●	●	●	Mandatory where a local collapse can have catastrophic consequences.

SUMMARY OF MINIMUM REQUIREMENTS

● mandatory for all tunnels ❍ not mandatory
✸ mandatory with exceptions ☯ recommended

			Traffic ≤ 2,000 vehicles per lane		Traffic > 2,000 vehicles per lane			Additional conditions for implementation to be mandatory, or comments
			500-1,000 m	>1,000 m	500-1,000 m	1,000 – 3,000 m	>3,000 m	
Lighting	Normal lighting	§2.8.1	●	●	●	●	●	
	Safety lighting	§2.8.2	●	●	●	●	●	
	Evacuation lighting	§2.8.3	●	●	●	●	●	
Ventilation	Mechanical ventilation	§2.9	❍	❍	❍	●	●	
	Special provisions for (semi-) transverse ventilation	§2.9.5	❍	❍	❍	❍	●	Mandatory in bi-directional tunnels where there is a control centre.
Emergency stations	At least every 150 m	§2.10	✸	✸	✸	✸	✸	Equipped with telephone and 2 extinguishers. A maximum interval of 250 m is allowed in existing tunnels.
Water supply	At least every 250 m	§2.11	●	●	●	●	●	If not available, mandatory to provide sufficient water otherwise.
Road signs		§2.12	●	●	●	●	●	For all safety facilities provided for tunnel users (see the Third Schedule)
Control centre		§2.13	❍	❍	❍	❍	●	Surveillance of several tunnels may be centralised into a single control centre.
Monitoring systems	Video	§2.14	❍	❍	❍	❍	●	Mandatory where there is a control centre.
	Automatic incident detection and/or fire detection	§2.14	●	●	●	●	●	At least one of the two systems is mandatory in tunnels with a control centre.
Equipment to close the tunnel	Traffic signals before the entrances	§2.15.1	❍	●	❍	●	●	
	Traffic signals inside the tunnel at least every 1,000 m	§2.15.2	❍	❍	❍	❍	☯	Recommended if there is a control centre and the length exceeds 3,000 m.

SUMMARY OF MINIMUM REQUIREMENTS

● mandatory for all tunnels ❍ not mandatory
✸ mandatory with exceptions ☯ recommended

			Traffic ≤ 2,000 vehicles per lane		Traffic > 2,000 vehicles per lane			Additional conditions for implementation to be mandatory, or comments
			500-1,000 m	>1,000 m	500-1,000 m	1,000-3,000 m	>3,000 m	
Communication system	Radio re-broadcasting for emergency services	§2.16.1	❍	❍	❍	●	●	
	Emergency radio messages for tunnel users	§2.16.1	●	●	●	●	●	Mandatory where radio is re-broadcasted for tunnel users and where there is a control centre.
	Loudspeakers in shelters and exists	§2.16.3	●	●	●	●	●	Mandatory where evacuating users must wait before they can reach the outside.
Emergency power supply		§2.17	●	●	●	●	●	To ensure the functioning of indispensable safety equipment at least during evacuation of tunnel users.
Fire resistance of equipment		§2.18	●	●	●	●	●	Shall aim to maintain the necessary safety functions.

3. Measures concerning operations

3.1. Operating means

Tunnel operation shall be organised and dispose of such means as will ensure the continuity and safety of the traffic through the tunnel. The personnel involved in the operation as well as the emergency services shall receive appropriate initial and continuing training.

3.2. Emergency planning

Emergency response plans shall be available for all tunnels.

3.3. Works in tunnels

Complete or partial closure of lanes due to construction or maintenance works planned in advance shall always begin outside the tunnel. Variable message signs, traffic signals and mechanical barriers may be used for this purpose.

3.4. Management of accidents and incidents

In the event of a serious accident or incident, all appropriate tunnel tubes shall be closed immediately to traffic.

This shall be done by simultaneous activation not only of the abovementioned equipment before the portals, but also of variable message signs, traffic signals and mechanical barriers inside the tunnel, if available, so that all the traffic can be stopped as soon as possible outside and inside the tunnel. Tunnels of less than 1,000 m may be closed by other means. Traffic shall be managed in such a way that unaffected vehicles can quickly leave the tunnel.

The access time for emergency services in the event of an incident in a tunnel shall be as short as possible and shall be measured during periodic exercises. In addition, it may be measured during incidents. In major bi-directional tunnels with high traffic volumes, a risk analysis in accordance with regulation 9 of these regulations shall establish whether emergency services shall be stationed at the two extremities of the tunnel.

3.5. Activity of the control centre

For all tunnels requiring a control centre a single control centre shall have full control at any given time.

3.6. Tunnel closure

In the event of tunnel closure (long or short-term), users shall be informed of the best alternative itineraries, by means of easily accessible information systems.

Such alternative itineraries shall form part of systematic contingency plans. They should aim to maintain traffic flow as much as possible and minimise secondary safety effects on the surrounding areas.

3.7. Transport of dangerous goods

The following measures shall be applied concerning access to tunnels for vehicles transporting dangerous goods, as defined in the relevant European legislation regarding the transport of dangerous goods by road:

— perform a risk analysis in accordance with regulation 9 of these regulations before the regulations and requirements regarding the transportation of dangerous goods through a tunnel are defined or modified,
— place appropriate signs to enforce the regulation before the last possible exit before the tunnel and at tunnel entrances, as well as in advance so as to allow drivers to choose alternative routes,
— consider specific operating measures designed to reduce the risks related to some or all of the vehicles transporting dangerous goods in tunnels, such as declaration before entering or passage in convoys escorted by accompanying vehicles, on a case by case basis further to the aforementioned risk analysis.

3.8. Overtaking in tunnels

A risk analysis shall be carried out in order to decide whether heavy goods vehicles should be allowed to overtake in tunnels with more than one lane in each direction.

3.9. Distances between vehicles and speed

The appropriate speed of vehicles and the safe distance between them are especially important in tunnels and shall be given close attention. This shall include advising tunnel users of appropriate speeds and distances. Enforcement measures shall be initiated as appropriate.

Road users driving passenger cars should under normal conditions maintain a minimum distance from the vehicle in front of them equivalent to the distance travelled by a vehicle in 2 seconds. For heavy goods vehicles this distance should be doubled. When traffic stops in a tunnel, road users should maintain a minimum distance of 5 metres from the vehicle in front, except if this is not possible due to an emergency stop.

4. Information campaigns

Information campaigns regarding safety in tunnels shall be regularly organised and implemented in conjunction with interested parties on the basis of the harmonised work of international organisations. These information campaigns shall cover the correct behaviour of road users when approaching and driving through tunnels, especially in connection with vehicle breakdown, congestion, accidents and fires.

Information on the safety equipment available and proper road user behaviour in tunnels shall be provided in convenient places for tunnel users (i.e. at rest areas before tunnels, at tunnel entrances when the traffic is stopped or on the internet).

SECOND SCHEDULE

(Regulation 4)

Approval of the design, safety documentation, commissioning of a tunnel, modifications and periodic exercises

1. Approval of the design

1.1. The provisions of these regulations shall be applied from the preliminary design stage onward.

1.2. Before any construction work begins, the Tunnel Manager shall compile the safety documentation described under points 2.2 and 2.3 for a tunnel at the design stage and shall consult the Safety Officer. The Tunnel Manager shall submit the safety documentation to the Authority and attach the opinion of the Safety Officer, and, or of the Inspection Entity when available.

1.3. The design, as appropriate, shall be approved by the Authority, which shall inform the Tunnel Manager of its decision.

2. Safety documentation

2.1. The Tunnel Manager shall compile safety documentation for each tunnel and keep it permanently up-to-date. He shall provide a copy of the safety documentation to the Safety Officer.

2.2. The safety documentation shall describe the preventive and safeguard measures needed to ensure the safety of users, taking into account people with reduced mobility and disabled people, the nature of the route, the configuration of the structure, its surroundings, the nature of the traffic and the scope for action by the emergency services defined in regulation 2 of these regulations.

2.3. In particular, the safety documentation for a tunnel at the design stage shall include:

— a description of the planned structure and access to it, together with the plans necessary for understanding its design and anticipated operating arrangements,
— a traffic forecast study specifying and justifying the conditions expected for the transport of dangerous goods, together with the risk analysis requested by point 3.7 of the First Schedule,
— a specific hazard investigation describing possible accidents which clearly affect safety of road users in tunnels which might occur during the operating stage and the nature and magnitude of their possible consequences; this investigation must specify and substantiate measures for reducing the likelihood of accidents and their consequences,

— an opinion on safety from an expert or organisation specialising in this field, which could be the Inspection Entity.

2.4. The safety documentation for a tunnel which is at the commissioning stage shall include in addition to the documentation required at the design stage:

— a description of the organisation, human and material resources and instructions specified by the Tunnel Manager to ensure operation and maintenance of the tunnel,
— an emergency response plan drawn up jointly with the emergency services which also takes into account people with reduced mobility and disabled people,
— a description of the system of permanent feedback of experience through which significant incidents and accidents can be recorded and analysed.

2.5. The safety documentation for a tunnel which is in operation shall include in addition to the documentation required at the commissioning stage:

— a report and analysis on significant incidents and accidents, which have taken place since the entry into force of these regulations,
— a list of the safety exercises carried out and an analysis of the lessons learned from them.

3. Commissioning

3.1. The initial opening of a tunnel to public traffic shall be subject to authorisation by the Authority (commissioning) in accordance with the following procedure.

3.2. This procedure also applies to the opening of a tunnel to public traffic after any major change in construction or operation or any substantial modification work on the tunnel which might significantly alter any of the constituent components of the safety documentation.

3.3. The Tunnel Manager shall transmit the safety documentation mentioned in point 2.4 to the Safety Officer, who shall give his opinion on the opening of the tunnel to public traffic.

3.4. The Tunnel Manager shall forward this safety documentation to the Authority, and shall attach the opinion of the Safety Officer. The Authority shall decide whether or not to authorise the opening of the tunnel to public traffic, or whether to do so with restrictive conditions, and shall notify this to the Tunnel Manager. A copy of this decision shall be forwarded to the emergency services.

4. Modifications

4.1. For any substantial modification in the structure, equipment or operation, which might significantly alter any of the constituent components of the safety documentation, the Tunnel Manager shall ask for a new authorisation of operation following the procedure described under point 3.

4.2. The Tunnel Manager shall inform the Safety Officer of any other change in construction and operation. Furthermore, prior to any modification work on the tunnel, the Tunnel Manager shall provide the Safety Officer with documentation detailing the proposals.

4.3. The Safety Officer shall examine the consequences of the modification and in any event give his opinion to the Tunnel Manager, who shall send a copy to the Authority and to the emergency services.

5. Periodic exercises

The Tunnel Manager and the emergency services shall, in cooperation with the Safety Officer, organise joint periodic exercises for tunnel staff and the emergency services.

The exercises:

— should be as realistic as possible and should correspond to the defined incident scenarios,
— should yield clear evaluation results,
— should prevent any damage to the tunnel,
— may also, in part, be conducted as table top or computer simulation exercises for complementary results.

(a) Full scale exercises under conditions that are as realistic as possible shall be conducted in each tunnel at least every four years. Tunnel closure will only be required if acceptable arrangements can be made for diverting traffic. Partial and, or simulation exercises shall be conducted every year in between. In areas where several tunnels are located in close proximity to each other, a full scale exercise must be conducted in at least one of those tunnels.
(b) The Safety Officer and the emergency services shall evaluate jointly these exercises, draw up a report and make appropriate proposals.

THIRD SCHEDULE

(First Schedule)

Signing for tunnels

1. General requirements

The following are road signs and symbols to be used for tunnels. Road signs mentioned in this section are described in the Vienna Convention on Road Signs and Signals of 1968, unless otherwise specified.

In order to facilitate international understanding of signs, the system of signs and signals prescribed in this Schedule is based on the use of shapes and colours characteristic of each class of sign and, wherever possible, on the use of graphic symbols rather than words.

1.1. Road signs shall be used to designate the following safety facilities in tunnels:

Lay-bys;

Emergency exits: the same sign shall be used for all kinds of emergency exits;

Escape routes: the two nearest emergency exits shall be signed on the sidewalls at distances of no more than 25 metres, at a height of 1.0 to 1.5 metres above escape route level, with an indication of the distances to the exits;

Emergency stations: signs to indicate the presence of emergency phones and fire extinguishers.

1.2. Radio:

In tunnels where users can receive information via their radio, appropriate signs placed before the entrance shall inform users on how to receive this information.

1.3. Signs and markings shall be designed and positioned so that they are clearly visible.

2. Description of signs and panels

Appropriate signs shall be used, if necessary, in the advance warning area of the tunnel, inside the tunnel and after the end of the tunnel. When designing the signs for a tunnel, local traffic and construction conditions as well as other local conditions shall be considered. Signs according to the Vienna Convention on Road Signs and Signals shall be used.

2.1. Tunnel sign

The following sign shall be put at each entrance of the tunnel:



Sign El 1A for Road Tunnels of the Vienna Convention;
The length shall be included either in the lower part of the panel or on a additional panel H2.
For tunnels over 3,000 metres, the remaining length of the tunnel shall be indicated every 1,000 metres .
The name of the tunnel may also be indicated.

2.2. Horizontal signing

Horizontal delineation should be used at the roadside edge.
In the case of bi-directional tunnels, clearly visible means should be used along the median line (single or twin) separating the two directions.

2.3. Signs and panels for signing of facilities

Emergency stations

Emergency stations shall bear informative signs, which shall be F signs according to the Vienna Convention and indicate the equipment available to road users, such as:

Emergency telephone



Extinguisher



In emergency stations which are separated from the tunnel by a door, a clearly legible text, written in appropriate languages, shall indicate that the emergency station does not ensure protection in case of fire. An example is given below:

"THIS AREA DOES NOT PROVIDE
PROTECTION FROM FIRE

Follow signs to emergency exits"

Lay-bys

The signs to indicate lay-bys should be E signs according to the Vienna Convention. Telephones and fire extinguishers shall be indicated by an additional panel or incorporated in the sign itself.







Emergency exits

The signs to indicate “Emergency exits” should be G signs according to the Vienna Convention. Examples are shown below:





It is also necessary to sign the two nearest exits on the sidewalls. Examples are shown below.





Lane signals

These signs can be circular or rectangular



Variable message signing

Any variable message signs shall have clear indications to inform tunnel users of congestion, breakdown, accident, fire or any other hazards.