

European Commission  
Directorate-General for Energy and Transport  
Inland Transport



# Croatia - Turkey



**Screening Land Transport**  
Brussels, 26<sup>th</sup> June 2006

**EU Tunnel Directive**  
**2004/54/EC**

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## Facts

- EU tunnels are aging (traffic conditions have changed, equipment obsolete, no mechanism to improve safety)
- EU tunnel users have changed (lack of harmonisation)
- Many lives have been lost in recent years
- Direct and indirect costs resulting from the closure of a tunnel are huge



# Objectives

## ● **Prevention of incidents**

- ◆ To prevent events that endanger human life, the environment and tunnel installations

## ● **Reduction of their consequences**

- ◆ Enable people involved in the incident to rescue themselves
- ◆ Allow intervention of road users to prevent greater damage
- ◆ Ensure efficient action by emergency services
- ◆ Protecting the environment
- ◆ Limiting material damage



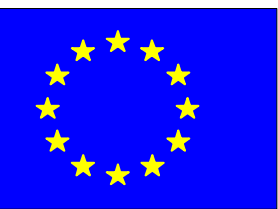
European Commission  
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**DIRECTIVE 2004/54/EC**  
**of the European Parliament and of the Council**  
**on minimum safety requirements for tunnels in the**  
**Trans-European Road Network**

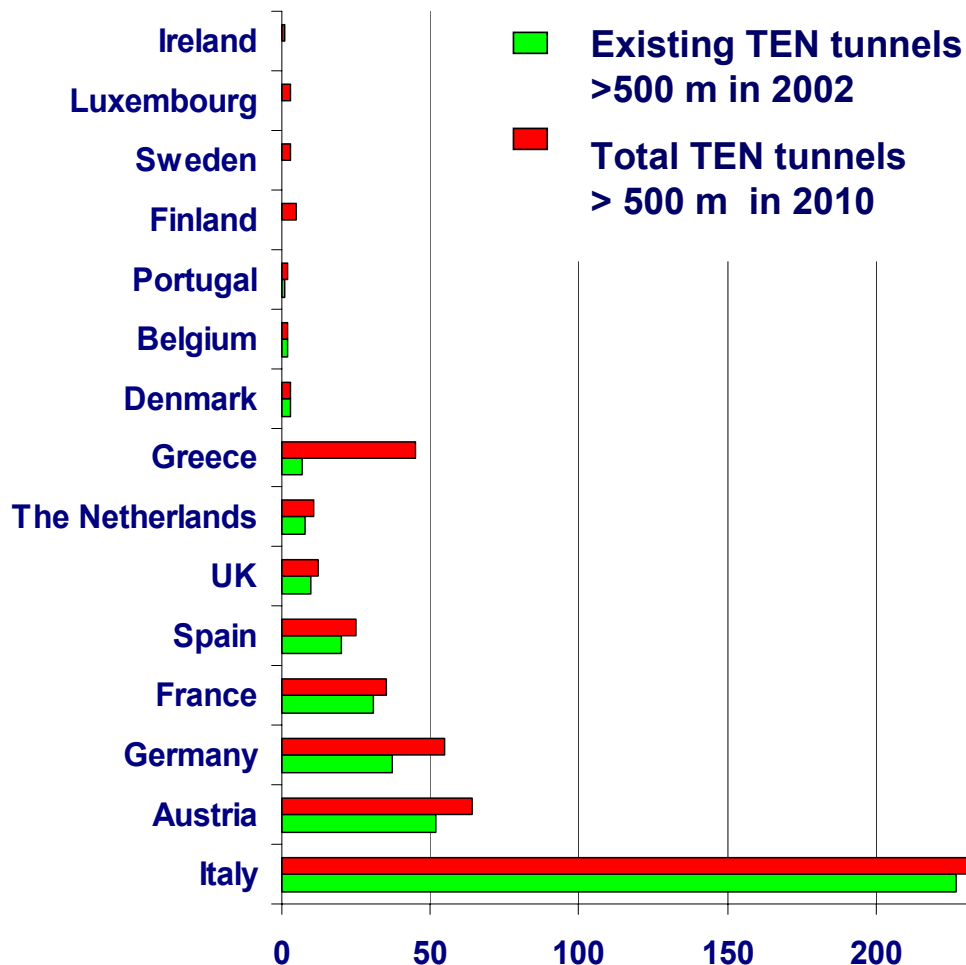
**29 April 2004**

[http://ec.europa.eu/transport/road/roadsafety/roadinfra/tunnels/index\\_en.htm](http://ec.europa.eu/transport/road/roadsafety/roadinfra/tunnels/index_en.htm)



# Targeted tunnels

Tunnels on the Trans European Network longer than **500 meters** in **operation**, under **construction** or at the **design stage**.





## Implementation schedule

1	E	Entry into force	30.4.2004
2	E + 2 years	transposition by Member states and notification of safety organisations	30.4.2006
3	E + 3 years	assessment of existing tunnels shall be completed	30.4.2007
4	E + 5 years	EU prepares a report about the risk analysis methodology used in MS	30.4.2009
5	E + 6 years	first round of technical inspections should be completed	30.4.2010
6	E + 10 years	end of the implementation period of the directive to existing tunnels	30.4.2014
7	E + 15 years	end of the extended implementation period of the directive to existing tunnels	30.4.2019



# Requirements



## 1. Organisational requirements

To harmonise the **organisation** of safety at national level and **clarify roles and responsibilities**.



## 2. Technical requirements (structural + equipment)

Based on existing harmonisation efforts at international level.

**5** equipment classes according to traffic and tunnel type, as well as traffic volume and tunnel length.

The specified requirements deal with: infrastructure, operation, vehicles in road tunnels and tunnel user information.



# Organisational requirements



## Administrative Authorities

Appointed by Member States.  
Overall responsibility for safety.  
Authorises the commissioning of  
new tunnels. Can suspend the  
operation of a tunnel.

## Tunnel Manager

Responsible for the safety of the tunnel.  
The two administrative authorities of  
national tunnels recognise one and the  
same Tunnel Manager.



## Inspection Body

One or more, appointed by Member  
States to carry out evaluations, tests  
and inspections on behalf of the  
administrative authority.

## Independent Safety officer

Nominated by the Tunnel Manager  
for each tunnel. Controls and supervises  
all preventive and safeguard  
measures.





# Organisational requirements



## Role of the administrative authority

- draw up requirements for safety inspections
- supervise emergency services training and equipping schemes
- specify the duties of Safety Officers
- supervise and implement risk reduction measures
- close tunnels for testing and for training of emergency services

## Role of the Safety Officers

Record and evaluate all fires in tunnels.

Compiles statistics on incidents and measures with safety facilities and measures.

## Role of the Tunnel manager

Secures safety for users in normal operation and emergency

Monitors the performance of all installations

Maintains structural and electromechanical installations.



# Technical requirements



## Tunnel classification

5 classes of tunnel equipment classes according to traffic and tunnel type, traffic volume and tunnel length. Class I tunnels need to comply with the strictest safety requirements

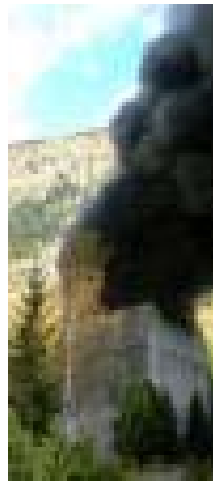


## Escape routes

For class I and II tunnels with directional traffic, the construction of special escape routes or safety galleries is mandatory.

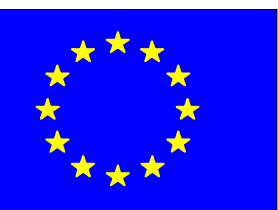
## Number of tubes

Single-tubes tunnels should only be built if long-term forecasts show that traffic will remain moderate.



## Ventilation

In the event of a fire the ventilation system either extracts smoke from tunnel or pushes smoke in one direction. Tunnels should respect ventilation equipment rules according to their type.



# Technical requirements



## Emergency exits



If local conditions show that the above mentioned provisions are insufficient, a short perpendicular escape gallery or a parallel safety gallery should be constructed.

## Distance between lay-bys

Shall not exceed 1000 m.

## Additional provisions for twin-tube tunnels

In the event of an incident the other tube is used as escape and rescue route. Pedestrian cross-connections shall link the tubes at maximum intervals of 500 m. Propagation of smoke or gases from one tube to the other shall be prevented.



# Technical requirements



## Additional provisions for tunnels with a gradient, congested or underwater

- longitudinal gradients above 5% shall not be permitted
- stricter ventilation standards apply to unidirectional congested tunnels
- transport of dangerous goods restricted in underwater tunnels

## Minimum equipment for all tunnels

Indication of escape routes by lighting and by signing every 25 m; fire extinguishers every 150 m and at entrances; water supply every 150 m; radio broadcasting with special channels for emergency; video monitoring system in tunnels longer than 1 000 m etc.

### Road signs

Specific uniform signs shall be used to designate safety facilities.

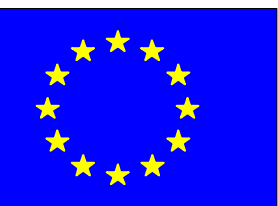


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### Control rooms

The administrative authority will decide whether tunnels should have a control room



# Additional technical requirements

- Works in tunnels
- Dangerous goods treatment
- Accident management
- Distance between vehicles
- Overtaking
- Tunnel closure
- Control center



# Structural measures Summary table

- mandatory for all tunnels
- \* mandatory with exceptions
- not mandatory
- ◐ recommended

## INFORMATIVE SUMMARY OF MINIMUM REQUIREMENTS

			Traffic ≤ 2000 veh. per lane		Traffic > 2000 vehicles per lane			Additional conditions for implementation be mandatory, or comments
			500-1000m	>1000m	500-1000m	1000-3000m	>3000m	
<b>Structural Measures</b>	2 tubes or more	§2.1						Mandatory where a 15-year forecast shows that traffic > 10 000 veh./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. In existing tunnels where there is neither an emergency lane, nor an emergency walkway additional / reinforcement measures shall be taken.
	Emergency exits at least every 500 m	§2.3.3 - §2.3.9	○	○	*	*	*	Implementation of emergency exits in existing tunnels to be evaluated case-by-case.
	Cross-connections for emergency services at least every 1500m	§2.4.1	○	○ / ●	○	○ / ●	●	Mandatory in twin-tube tunnels longer than 1500 m.
	Crossing of the central reserve outside each portal	§2.4.2	●	●	●	●	●	Mandatory outside twin- or multi-tube tunnels where geographically possible.
	Lay-bys at least every 1000m	§2.5	○	○	○	○ / ●	○ / ●	Mandatory in new bi-directional tunnels >1500m with emergency lanes. In existing bi-directional tunnels >1500m 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.



# Equipment Summary table

<ul style="list-style-type: none"> <li>● mandatory for all tunnels</li> <li>* mandatory with exceptions</li> </ul> <b>INFORMATIVE SUMMARY OF MINIMUM REQUIREMENTS</b>			<ul style="list-style-type: none"> <li>○ not mandatory</li> <li>⊙ recommended</li> </ul>					Additional conditions for implementation to be mandatory, or comments
			Traffic ≤ 2000 veh. Per lane		Traffic > 2000 vehicles per lane			
			500-1000m	>1000m	500-1000m	1000-3000m	>3000m	
<b>Lighting</b>	Normal lighting	§2.8.1	●	●	●	●	●	
	Safety lighting	§2.8.2	●	●	●	●	●	
	Evacuation lighting	§2.8.3	●	●	●	●	●	
<b>Ventilation</b>	Mechanical ventilation	§2.9	○	○	○	●	●	
	Special provisions for (semi-) transverse ventilation	§2.9.5	○	○	○	○	●	Mandatory in bi-directional tunnels where there is a control centre.
<b>Emergency stations</b>	At least every 250 m	§2.10	●	●	●	●	●	Equipped with telephone and 2 extinguishers.
<b>Water supply</b>	At least every 250 m	§2.11	●	●	●	●	●	If not available, mandatory to provide sufficient water otherwise.
<b>Road signs</b>		§2.12	●	●	●	●	●	For all safety facilities provided for tunnel users (see Annex III).
<b>Control centre</b>		§2.13	○	○	○	○	●	Surveillance of several tunnels may be centralised into a single control centre.
<b>Monitoring systems</b>	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.
<b>Equipment to close the tunnel</b>	Traffic signals before the entrances	§2.15.1	○	●	○	●	●	
	Traffic signals inside the tunnel at least every 1000m	§2.15.2	○	○	○	○	⊙	Recommended if there is a control centre and the length exceeds 3000 m.
<b>Communication systems</b>	Radio re-broadcasting for emergency services	§2.16.1	○	○	○	●	●	
	Emergency radio messages for tunnel users	§2.16.2	●	●	●	●	●	Mandatory where radio is rebroadcasted for tunnel users and where there is a control centre
	Loudspeakers in shelters and exits	§2.16.3	●	●	●	●	●	Mandatory where evacuating users must wait before they can reach the outside.
<b>Emergency power supply</b>		§2.17	●	●	●	●	●	To ensure the functioning of indispensable safety equipment at least at during evacuation of tunnel users.
<b>Fire resistance of equipment</b>		§2.18	●	●	●	●	●	Shall aim to maintain the necessary safety functions.



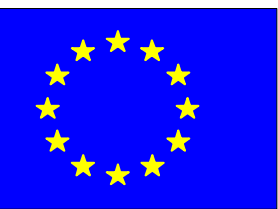
# Derogations

Where structural requirements cannot be achieved or can be achieved only at disproportionate cost, implementation of equivalent or improved risk reduction measures may be accepted.

The efficiency of these measures shall be demonstrated through a risk analysis, taking into account all design factors and traffic conditions (traffic volume, type of traffic, number of heavy goods vehicles, tunnel characteristics: e.g. length, gradients and geometry)

By 2009 the Commission shall publish a report on the practice followed in the Member States





# Reporting

- **Member states shall compile and evaluate every two years all fires and accidents in their tunnels**
- **Member states shall make a plan with a timetable for the application of the Directive to existing tunnels**
- **Member states shall inform the Commission every two years about the implementation of that plan**



***Thank you for your attention!***