



ITA COSUF

ITA Committee on
Operational Safety of
Underground Facilities

Survey of existing regulations and recognised recommendations (road tunnels)

30 april 2008



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1 INTRODUCTION

The ITA Committee on Operational Safety of Underground Facilities (COSUF) was created in May 2005 following a joint initiative of 8 European research projects aiming at improved tunnel safety. The committee's scope concerns the operational safety in tunnels and other underground facilities. Starting from this the objectives were defined and the work programme derived. In order to carry out its ambitious work programme, ITA-COSUF set up three Activity Groups (AG):

- AG 1 - Interaction with European and international initiatives
- **AG 2 - Regulation and best practice**
- AG 3 - Research and new findings.

The first action proposed in the action plan set up by AG 2 is to prepare a general survey of existing regulations and recognised recommendations regarding tunnels. It was decided to use the products of the thematic network FIT (Fire In Tunnels) as a starting point for this survey.

This report is focused on road tunnels for which the most important FIT product is entitled "Fire safe design-road tunnels". This document can be downloaded from the following address (public area of ITA COSUF web site): <http://www.ita-aites.org/cms/1607.html>.

This updated version of the document is based on the contributions provided in reply to a questionnaire disseminated in March 2007 to relevant contacts in different countries and organisation concerned.

We thank all these contacts for their detailed and fruitful contributions. All readers are kindly invited to provide data to update the available information if appropriate and/or to provide additional contributions regarding this document. Any contributions can be sent to the following contact: marc.tesson@developpement-durable.gouv.fr.

As far as rail and metro tunnels are concerned similar surveys have been performed within the context of the thematic network FIT. The relevant reports can be downloaded from the following address: <http://www.ita-aites.org/cms/1607.html> (public area of ITA COSUF web site).



2 OBJECTIVE AND CONTENTS OF THE DOCUMENT

The objective of this report is to provide a list of existing legislations, regulations and recognised guidelines regarding safety in operation of road tunnels. This survey intends to be a useful tool for all those involved in road tunnel safety. It will be used to prepare further investigations planned by AG 2 as listed below:

- To identify 2 or 3 fields to be deepened
- To compare the approaches in different countries/organisation in order to identify best practice
- To propose requirements for new regulations
- To propose extension to other underground facilities and other fields.

The topics focused on in this report are those dealing with safety facilities, safety approaches/procedures, risk analysis.

The report takes into account:

- **Legislation and regulations** – compulsory (National or plurinational): law, Ministerial decree, order, governmental circular, etc.
- **Recognised recommendations** – advisory , that is to say any kind of recommendation which is applicable to several tunnels and provided by governmental or professional bodies (handbook, technical note, report, etc.).

It includes lists of collected guidelines concerning: EU member states, other countries and international organizations.

Those interested by a comparative analysis of several existing legislations and recommendations are invited to refer to the report “Comparison and Review of safety Design for road tunnels” (Hak Kuen Kim, Anders Lönnermark and Haukur Ingason – SP Technical Research Institute of Sweden 2007:08). This report can be downloaded from the following address :

<http://www.sp.se/sv/publications/Sidor/Publikationer.aspx> .¹

¹ *This study pays attention to the ways of ensuring advanced fire safety level of road tunnels on the tunnel design stage. A few kinds of road tunnel guidelines of several countries and organizations are compared to each other. The main focus of the comparison is the application criteria of guidelines and installation spacing. The comparison provides several interesting discussion topics; similarities or differences between detailed requirements and popularity of each fire safety equipment or facility.*



3 LIST OF COLLECTED GUIDELINES (EU Members States)

3.1 EUROPEAN UNION DIRECTIVE

This paragraph deals with the European Union (EU) Directive 2004/54/EC and its implication on the national regulations of the EU member states. This Directive applies to all tunnels longer than 500 m on the Trans-European Road Network (TERN). It must be transposed into national laws, regulations and administrative provisions by all Member States.

This introduced some harmonisation in the national organisation and procedures to ensure the safety of road tunnels, and in the minimum safety measures to be implemented. This is all the more true since many EU countries decided to apply all or part of these provisions to tunnels beyond the scope of the Directive.

For these reasons, the EU countries are dealt with separately in this report.

3.1.1 Legislation

Date of last update of the table: 4/01/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Directive 2004/54/EC of the European Parliament and of the Council of 29 April 2004 on minimum safety requirements for tunnels in the Trans-European Road Network	2004/54/EC (Corrigendum published in the Official Journal of the European Union of 7 June 2004)	29/04/04	Directive		yes

3.1.2 Recognised recommendations

Date of last update of the table: 4/01/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					



3.1.3 Transposition of the European Directive into national regulations (EU members states)

The Directive has been transposed by all EU Member States. In most of them, the minimum requirements will be applied also for tunnels beyond the scope of the Directive. More detailed information is provided in the following table.

Country	Situation of the transposition	Date of last update of the informations	Comments
Austria	The Directive has been transposed in 2006. National law is stricter than the Directive. The Federal Ministry will act as Administrative Authority. The Safety Officer will be nominated by the Tunnel Manager and the Inspection entity will be organised within the Administrative Authority. 59 tunnels are concerned, among which many are quite long. For new tunnels on motorways a chapter on road safety is required in the Environmental Impact Assessment. Since 2006, incidents forms are drafted for all motorways tunnels. Since 04/2007, the form will be electronically filled-in. A risk analysis methodology is available (PIARC).	15/05/07	
Belgium	The Directive has been transposed on Federal level. There are 5 tunnels on TERN and longer than 500 m. However, requirements of the Directive will be extended also to other tunnels on Belgian territory not being in the scope of the directive. Experts are working on the methodology for risk analysis; it is expected to be approved soon.	15/05/07	
Bulgaria	The Directive has been transposed. Refurbishing works have already started. The Ministry of Transport will act as Administrative Authority and as Inspection entity. Tunnel Manager will be the National Road Infrastructure Entity, which will nominate the Safety Officers. 4 tunnels are concerned. Their compliance assessment is under progress. A risk analysis methodology is still missing.	31/10/07	
Czech Republic	The Directive has been transposed. Technical details are being modified in the national legislation to be fully in line with the Directive. This involves coordinated work of the Ministries of Interior and Transport. By 2014, 24 tunnels in the scope of the Directive will be in operation. The Ministry of Transport acts as the administrative authority. The Directorate for Roads acts as the tunnel manager. The risk analysis method is largely inspired from the French method developed by CETU.	11/02/08	
Denmark	The Directive has been transposed for public tunnels on the national highway network. Two separate Administrative Authorities have been appointed by the Ministry of Transport to be responsible for the implementation of the EU Directive 2004/54/EC for tunnels concerned. The Road Directorate (1) administers 5 major tunnels on the national road network and Sund & Bælt Holding (2) administers two major tunnels on the Oresund Highway and Link to Sweden covered by the EU Directive. For the remaining road tunnels under planning and design the Road Directorate will be appointed as Administrative Authority. This requires a	28/02/08	

Country	Situation of the transposition	Date of last update of the informations	Comments
	<p>revision and extension to the existing Law on Public Roads expected to be approved in 2008. The assessment of compliance has been made to all tunnels covered by the EU Directive. For the international tunnel between Denmark and Sweden, an intergovernmental agreement was established in January 2007. Administrative authorities are working together to agree on a common methodology for risk analysis.</p>		
Finland	<p>Directive was transposed into national legislation in June 2006. The Finnish Road Administration will act as administrative authority. Preliminary guidelines on risk analysis were prepared in 2005. They are currently being revised: final version is expected to be ready by 2009 and will be based on the PIARC quantitative method.</p> <p>Requirements will be applied to all tunnels > 200 m.</p>	31/10/07	
France	<p>Requirements of the French national legislation were already very close to the requirements of the Directive and in some cases stricter. The national legislation concerns all tunnels longer than 300 m (about 200 existing tunnels). So, mainly edits and additions were necessary to ensure full transposition.</p> <p>A transposing law on administrative procedures was adopted in January 2006, a transposing decree was published in november 2006. Very similar procedures will be applied to all tunnels longer than 300 m.</p> <p>The transposition concerns 28 existing tunnels and 4 tunnels in construction longer than 500 m and on TERN, fully in France. For the 3 international tunnels concerned by the Directive, 2 shared with Italy and 1 with Spain, transposition has taken place in the framework of the preexisting bilateral agreements. The <i>Préfets</i> of the different <i>départements</i> (<i>local representatives of the government</i>) will act as Administrative Authorities.</p> <p>A guide on tunnels safety documentation, including the description of the risk analysis method, has been produced and made available on CETU web site (http://www.cetu.equipement.gouv.fr/) in both French and English. The risk analysis method for transport of dangerous goods will be updated to accommodate the ADR 2007 modifications. Data on accidents in tunnels are collected and have been published every year since 2001.</p>	15/05/07	
Germany	<p>The Directive has been transposed into national legislation (RABT). With regard to the technical equipment of road tunnels, German guidelines exceed the EC requirements. 11 Administrative Authorities are responsible for a total of 26 tunnels on TERN: they all have 2 tubes and are on motorways. A single reporting system has been created and will concern all tunnels longer than 400 m.</p> <p>The risk analysis method is already being applied ; it also takes costs/benefits considerations into account. Preliminary results of the work on the risk analysis method for transport of dangerous goods will be available by the end of 2008. The methodology will be ready by 2009.</p>	15/05/07	

Country	Situation of the transposition	Date of last update of the informations	Comments
Greece	The Directive has been transposed into national legislation in November 2007. There is one Administrative Authority which has national jurisdiction and comprises 5 members coming from the Ministry of Public Works, Ministry of Transportation, Fire Brigade and Egnatia Odos A.E. (public motorway company). Tunnel Managers have not been appointed and a methodology for risk analysis has not been adopted yet. National design guidelines are stricter than the Directive.	01/02/08	
Hungary	The Directive has been transposed. No tunnels in the scope of the Directive are currently in operation on the 750 km of TERN. In order to ensure full compliance with EU laws, renewal and modification of the Hungarian Design Code was necessary and will be ready soon.	31/10/07	
Ireland	The Directive has been transposed. The National Roads Authority acts as Administrative Authority. 3 tunnels on TERN are concerned, 1 of them is under construction. A methodology for risk analysis is missing. Safety Officers have been already designated for 2 tunnels.	15/05/07	
Italy	The Directive has been transposed in 2006. The <i>Commissione Permanente del Consiglio Superiore dei Lavori Pubblici</i> will act as Administrative Authority. 535 tubes are concerned for a total length of about 635 km.	15/05/07	
Latvia	The Directive will be transposed by end of 2006. In Latvia there are no tunnels concerned.	31/10/06	
Luxembourg	The Directive has been transposed in October 2007. All tunnels on TERN are covered by the regulation. Currently, 2 relatively new tunnels fall within the scope of the Directive, but some others are under construction or planned. The risk analysis method for transport of dangerous goods is inspired from the Swiss method. It will be finalised this year and will only be applied where transit of dangerous goods is permitted. An external and independent body (" <i>L'inspection du Travail des Mines</i> ") will act as Administrative Authority. Tunnel Manager will be the also independent "Central Highways Division". Inspection entities will be selected by the Administrative Authority. In order to conciliate safety and economic reasons, a Higher Council of interested Ministries has been created, acting as Supervisory Body.	15/05/07	
The Netherlands	The Directive has been transposed in June 2006. 8 existing tunnels are concerned. Quantitative risk analysis and risk analysis based on scenarios is being developed. Stricter requirements than those of the EU directive apply to all tunnels > 250 m, also to those not being part of the TERN. The Municipalities where the tunnels are situated will act as Administrative Authorities. The Safety Officer will instead be centralised, as far as the state owned tunnels are concerned. For the private ones and those, who are owned by provinces and municipalities, this is not quite clear at the moment. A Committee on Tunnel Safety will act as Advisory Board. A standard quantitative risk analysis methodology is being developed (<i>Rijkswaterstaat</i>).	15/05/07	
Poland	The directive was transposed by the end of 2008.	18/01/08	

Country	Situation of the transposition	Date of last update of the informations	Comments
Portugal	Directive is transposed by a decree law referring to all tunnels > 500 m on national roads. The administrative organisation and the development of a risk analysis methodology will be the work for the future.	31/10/06	
Romania	The Directive has been transposed. There are currently no tunnels > 500 m on TERN. A tunnel with a length of 800 m is planned (feasibility study made) and should be ready by 2010. The Ministry for Transport will act as administrative authority. The Directorate for Roads will act as tunnel manager. A risk analysis method should be ready by beginning of 2009.	15/05/07	
Slovakia	The Directive has been transposed by an administration act in 2006. There are 3 tunnels concerned on TERN that are longer than 500 m. Stricter requirements than those of the EU directive are applied to all tunnels (not only for those on TERN). The administrative organisation and the development of a risk analysis methodology is still in progress.	22/01/2008	
Slovenia	The Directive has been transposed in May 2006. Parts which are not covered by national standards rely on Austrian RVS. There are 10 tunnels longer than 500m, which are part of TERN in the country. On TERN a tunnel of length 1.2 km is under construction and it is planned to be opened in 2008. Risk analysis of all the tunnels is about to be carried out in 2008.	20/02/2008	
Spain	The Directive has been transposed in 2006. Provisions of the Directive have been extended also to tunnels which are not part of TERN. 396 tunnels are concerned, 232 of them are on TERN. Technical requirements in some cases go further than the Directive. The <i>Secretaría de Estado de Infraestructuras y Planificación</i> acts as Administrative Authority. Safety Officers can be different at each stage of the life of a tunnel. Experts are working on a method for risk analysis, but there is still low national and international experience on the issue.	15/05/07	
Sweden	A law and an ordinance to transpose the Directive incl. Annex 2 have been adopted in July 2006. A transposing regulation on Annex 3 has been adopted in February 2006 and the transposing regulation on Annex 1 has been adopted in July 2007. The Administrative Boards in the different Counties will act as Administrative Authorities. Regional Officers of the Road Administrations will be the Tunnel Managers. The tasks of the Safety Officer will be performed by an expert group in the Road Administration. The requirements will be applied to all tunnels that are longer than 500m and designed after June 2006. To date, on the TERN there is 1 tunnel in operation, 1 tunnel under construction and 2 in the planning/design phase.	28/02/08	
United Kingdom	- to be completed -		

3.2 AUSTRIA

3.2.1 Legislation

Date of last update of the table: 30/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Guidelines and Regulations for Road Construction:	RVS ref:		Guideline supported and funded by the Administration	****Guidelines are considered sufficient	
1 Tunnel cross section	09.01.22	1994	National Roads		yes
2 Interior Construction	09.01.23	2001		In revision	yes
3 Ventilation, Fundamentals	09.02.31	1997+ 2001		in revision (2007)	
4 Ventilation, Calculation of fresh air demand	09.02.32	2004+ 2005			yes
5 Lighting	09.02.41	1991		in revision (2007)	
6 Operational and safety measures, Structure	09.01.24	2002		in revision (2007)	
7 Operational and safety measures, Equipment	09.02.22	2002		in revision (2007)	
8 Operational and safety measures, Radio equipment	09.02.61	1987		in revision	yes ?
9 Monitorings, control and test - Structurally constructive parts	13.03.31	1995			yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
10 Maintenance of tunnel equipment	13.03.41	1999			yes
11 Training matters – Qualifications and training of staff involved in the operation of tunnels and above-ground tunnels	14.02.15	2007		new guideline	
12 Constructional fire protection in transportation buildings for roads	09.01.45	2006			yes
Austrian Association for Research on Road-Rail-Transport) ww.fsv.at	09.02.51	2006		Instruction leaflet	yes

3.2.2 Recognised recommendations

Date of last update of the table: 30/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

3.3 BELGIUM

3.3.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force



3.3.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.4 CZECH REPUBLIC

3.4.1 Legislation

Date of last update of the table: 12/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
1. Design of the road tunnels	ČSN 73 75 07	2005	Czech Standard	Basic standards for construction, spatial arrangements, safety and technological equipment. There is an English version available.	YES
2. Road Tunnel Equipment	TP 98	2004	Technical requirements (Guidelines issued by Ministry of Transport)	Basic guidelines for the design of technological equipments of road tunnels. There is English version available.	YES expected update 2009

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
3. Operation, administration and maintenance of road tunnels	TP 154	2002	Technical requirements (Guidelines issued by Ministry of Transport)	Guidelines for preparing the operation and emergency plan, safety documentation and maintenance plan	YES expected update 2009
4 . Safety (the exact name has not been decided yet)	TP *****	2008	Guidelines issued by Ministry of Transport	Guidelines for the risk analysis methodology	NOT YET

3.4.2 Recognised recommendations

Date of last update of the table: 12/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
-	-	-	-	-	-

3.5 DENMARK

3.5.1 Legislation

Date of last update of the table: 28/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Law on Public Roads			Law	Legislation is being developed. Expected to be approved and operational during 2008.	

3.5.2 Recognised recommendations

Date of last update of the table: 28/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published. In Denmark there are no Standards, Codes or Guidelines to be applied related to existing and new tunnels. In each case a complex of requirements to follow are elaborated separately.					

3.6 FINLAND

3.6.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

3.6.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.7 **FRANCE**

All the documents mentioned in the table below are available. The French versions can be downloaded on the CETU website: <http://www.cetu.equipement.gouv.fr/> . All the booklets of the “Guide to road tunnels safety documentation” as well as the technical instruction of 25 august 2000 can also be downloaded in English.

3.7.1 Legislation

Date of last update of the table: 5/09/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Legislation applicable to all tunnels (Length > 300m):					
Inter-ministerial circular n°2000-63 of 25 August 2000 concerning safety in the tunnels of National road network: - <i>appendix 1 (procedures) – no longer in force</i> - - appendix 2 (technical instruction)	Circ2000-3A2	Aug. 2000	Governmental circular	also considered as a ref. document for locally owned tunnels	No Yes
Law of 3 January 2002 relating to safety of infrastructures and transport systems	Law2002-J2	Jan. 2002	Law	Law 2002-3 art. 2 makes it possible to impose similar procedure to locally owned tunnels as to those owned or conceded by the State.	Yes
Decree N° 2005-701 (24/06/05) - relating to safety of parts of the road network, which extended the previous procedures (circ 2000-63) to all road tunnels longer than 300 m, whoever their owner.	Decree N° 2005-701	June 2006	Decree	New tunnels and tunnels in operation (all owners)	Yes
Circular N° 2006-20 (29/03/06)	Circular N° 2006-20	March 2006	Circular	Replaces the circ2000-63 appendix 1 (procedures)	Yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Decree N° 2006-1354 (8/11/06)	Decree	Nov. 2006	Decree	Adapts procedures and participants for all tunnels (length > 300m)	yes
Interministerial order (18/04/07) – Related to: contents and update of the safety documentation, review of the incidents and accidents.	Order 18/04/07	April 2007	Interministerial order		Yes
Inter-ministerial circular n°2000-82 of 30 November 2000 concerning the regulation of traffic with dangerous goods in road tunnels of the national network.	Circ. N°2000-82N2	Nov. 2000	Governmental circular	**** It is recognised that Circular no. 2000-82 needs to be improved to take account of the prohibition of dangerous goods in five levels ref. the OECD/PIARC project.	No
Legislation applicable to Trans-European Road Network tunnels (Length > 500m):					
Law 2006-10 of 5 January 2006 relating to safety and development of transports (article 10 of this law is devoted to the legislative part of the transposition)	Law 2006-10 art.10	Janv. 2006	Law	Adaptation of the EU Directive to the French law	yes
Decree 2006-1354 of 8 November 2006 relating to Safety of Parts of the Road Network (which was devoted to the regulatory part of the transposition)	Decree N° 2006-1354	Nov. 2006	Decree	Adapts procedures and participants for TERN tunnels (Length > 500m)	yes
Interministerial order of 8 November 2006 giving the minimal safety requirements applicable to tunnels longer than 500 m on the Trans-European Road Network (TERN)	Order 8/11/06	Nov. 2006	Interministerial order	Defines safety measure for TERN tunnels (Length > 500m)	Yes
Interministerial order of 9 November 2007 adapting the previous Interministerial order of 8 November 2006 (minimal safety requirements applicable to tunnels longer than 500 m on the TERN.	Order 9/11/07	Nov. 2007	Interministerial order	Adapts safety measure for TERN tunnels (Length > 500m)	Yes

All the legislative and regulatory texts which apply to road tunnels are compiled in a single document “textes législatifs et réglementaires sur la sécurité des tunnels routiers – version consolidée à la date du 9 novembre 2007”. This document must be completed by the two applicable circulars:

- Appendix 2 (technical instruction) of the circular of 25 August 2000
- Circular of 29 March 2006

3.7.2 Recognised recommendations

Date of last update of the table: 5/09/2007

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Guide to road tunnels safety documentation: <ul style="list-style-type: none"> • Booklet 0 Safety Documentation Objectives. • Booklet 1 Practical method of compiling the safety documentation. • Booklet 2 Tunnels in operation “from the existing condition to the reference condition”. • Booklet 3 Risks analyses related to dangerous goods transport. • Booklet 4 Specific Hazard Investigations • Booklet 5 Emergency Response Plans 		2003 2003 2005 2003 2006	Recommendation	All booklets available in French and English except booklet No.1 (to be published)	yes
Information note related to the course of emergency operations in case of fire in road tunnels	Information note N° 13	2003	Technical note / information		yes
Fire behaviour of road tunnels		2005	Recommendation	French version available	yes

3.8 GERMANY

3.8.1 Legislation

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
RABT Guidelines for equipment and operation of road tunnels (Richtlinien für die Ausstattung und den Betrieb von Strassentunneln) Forschungsgesellschaft für Strassen- und Verkehrswesen. (Road and Transportation Research Association)	RABT 02	2002	Guidelines recommended by the Federal Ministry of Traffic.	****Amendments are made with respect to e.g. smoke and fire control, emergency exits, communication measures, tunnel barriers emergency cabins etc.	
ZTV Additional Technical Conditions for the Construction of Road Tunnels (Zusätzlichen Technischen Vertragsbedingungen und Richtlinien für den Bau von Strassentunneln) Part 1 Closed Construction Part 2 Open Construction Forschungsgesellschaft für Strassen- und Verkehrswesen.	ZTV - Tunnel	1995 1999	Technical addendum		

3.8.2 Recognised recommendations

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

3.9 GREECE

3.9.1 Legislation

Date of last update of the table: 5/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Design Guidelines for Road Works	O.M.O.E.				
1. Tunnels (civil works)		19.2.03	Ministerial Decree	(Cross section, lay-bys, emergency exits etc)	yes
2. Tunnels (electromechanical works)		19.2.03	Ministerial Decree	(Ventilation, lighting, safety equipment etc)	yes
3. Signing (including tunnels)		02.04	To be approved		
Motorway Maintenance Guidelines					
1. Tunnel Electromechanical Equipment Routine Maintenance Guidelines		12.7.04	Ministerial Decree		yes
Transportation of Dangerous Goods in Road Tunnels		12.03	To be approved		

3.9.2 Recognised recommendations

Date of last update of the table: 5/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
-	-	-	-	-	-

3.10 HUNGARY

3.10.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

3.10.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.11 IRELAND

3.11.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

3.11.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use



3.12 ITALY

3.12.1 Legislation

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Circular 6 Dec. 1999. Safety of Traffic in Road Tunnels with Particular Reference to Vehicles Transporting Dangerous Materials (Sicurezza della circolazione nelle gallerie stradali con particolare riferimento ai veicoli che trasportano materiali pericolosi) Ministero dei Lavori Pubblici (Ministry of Public Works)	Circ. 06.12.1999	Dec. 1999	Governmental circular	Covers transport of dangerous goods only	
Functional and geometrical standard for construction of roads (Norme funzionali e geometriche per la costruzione della Strade) Ministero della Infrastrutture e dei Trasporti. Ispettorato Generale per la Circolazione e la Sicurezza Stradale. (Ministry of Infrastructure and transport. General Inspectorate for Traffic and Road Safety)	Norm 05.11.2001	Nov. 2001	Ministerial Decree	Only 4 pages deal with tunnels, showing tunnel cross section.	
Light and lighting Tunnel lighting (Luce e illuminazione Illuminazione delle gallerie) UNI - Milano U29000240	UNI 29000240	Jul. 2003	Norm	Covers tunnel lighting only.	

3.12.2 Recognised recommendations

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

3.13 LUXEMBOURG

3.13.1 Legislation

Date of last update of the table: 17/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
DIN and SIA			Not imposed Self decision	Used for the design and construction of a tunnel	
Directive 2004/54/CE et RABT 2006			Law is on voting	Used for the equipment of a tunnel > 500m	
Directive 2004/54/CE			Law is on voting	Organisation of TM of safety officer	

3.13.2 Recognised recommendations

Date of last update of the table: 17/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

3.14 THE NETHERLANDS

3.14.1 Legislation

Date of last update of the table: 27/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Technical standards for the provisions and installations: a.o.					
The Dutch Tunnel Law (WARVW- BARVW- RARVW)	www.overheid.nl	2006	Law	For tunnels > 250 m	
Recommendations on ventilation in Road Tunnels (in Dutch: Aanbevelingen ventilatie van verkeerstunnels, Steunpunt Tunnelveiligheid)	ISBN 90-369-0001-8	2005	Recommendation		
Safety Guidelines Part C / Basic measures for Safety in Tunnels, (Veiligheidsrichtlijnen Deel C / Basismaatregelen). Main Report and Appendixes (Centre for tunnel safety). Version 1.0	NL-Safe	2004	Guidelines for safety technical and operational features regarding state-owned tunnels.	Actions to remove the contradictions with the Dutch Tunnel Law will be finished in 2008	
Fire Protection for Tunnels (Tunnel Department) RWS (Ministry of Transport, Public Works and Water Management)	GT-98036a	1999	Requirements for tests and materials. Draft.	Draft status. The document was never finalised.	
Guideline for Safety Documentation (in Dutch: Leidraad Veiligheidsdocumentatie)	ISBN 9789036900102	2007	Finalised		
Guideline for Risk Analysis (in Dutch: Handreiking Risicoanalyse Tunnelveiligheid)		2005	Draft status		



Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Guideline for Scenario Analysis, part 1 Road Tunnels (in Dutch: Leidraad Scenarioanalyse, deel 1 Wegtunnels)	ISBN 90-77374-03-5 COB J304-W-04-130 RWS 4818-2004-0103	2003	Finalised		
QRA model RWSQRA version 1.0		2006	Finalised		

3.14.2 Recognised recommendations

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

3.15 POLAND

3.15.1 Legislation

Date of last update of the table: 18/01/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Law on Public Roads	D.U nr 204 – 2086 (official journal)	2004	Law	Legislation is being developed now and is expected to be processed and operational in 2008	
Decree (D.U.2000 nr 63) – relating to technical requirements for highway structures and its localisation Ministry of Transport and Maritime Economy	Decree 2000 nr 63 - 735	2000	Decree	Legislation is being developed now and is expected to be processed and operational in 2008	

3.15.2 Recognised recommendations

Date of last update of the table: 18/01/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
<i>No document published</i>					

3.16 PORTUGAL

3.16.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

3.16.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.17 ROMANIA

3.17.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

3.17.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.18 SLOVAKIA

3.18.1 Legislation

Date of last update of the table: 01-2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Zákon č. 135/1961 Zb. o pozemných komunikáciách (cestný zákon) v znení neskorších predpisov; Law on road transports;	www.zbierka.sk	2005	law		yes



Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Zákon č. 50/1976 Zb. o územnom plánovaní a stavebnom poriadku (stavebný zákon) v znení neskorších predpisov, Law on Construction Works	www.zbierka.sk		law		yes
Vyhláška MV SR č. 94/2004 Z. z. ktorou sa ustanovujú technické požiadavky na protipožiarnu bezpečnosť pri výstavbe a pri užívaní stavieb, Decree on technical requirements on structural fire protection	www.zbierka.sk	2004	decree		yes
Nariadenie vlády SR č. 344/2006 Z. z. o minimálnych bezpečnostných požiadavkách na tunely v cestnej sieti, Administration act on minimum safety requirements for tunnels in the Trans-European Road Network;	www.zbierka.sk	2006	administration act	Transposing the European directive into National legislation	yes
STN 73 7507 Projektovanie cestných tunelov, Technical standard for design of road tunnels	http://www.sutn.gov.sk/	2008	Slovakian technical standard	Tunnel cross section, Interior Construction, Structural safety measures, list of technological equipment,	Yes
STN 92 0201, Part: 1-4 Požiarna bezpečnosť stavieb. Technical standard for structural fire protection. Common regulations. Part 1-4	www.sutna.gov.sk	2001	Slovakian technical standard		yes
TP 04/2006 Požiarna bezpečnosť cestných tunelov Guideline on road tunnel fire safety	www.ssc.sk/custom/tp/2006/TP_04_2006_konecne.pdf	2006	Technical guideline	Includes recommendation on: structural fire safety, fire safety, safety and technological equipment, fire ventilation requirements	yes
TP 09C1/2005 Prehliadky, údržba a opravy cestných komunikácií. Tunely - stavebné konštrukcie Road tunnel structures – inspections, maintainance and repairs	www.ssc.sk	2005	Technical guideline		yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
TS 1003 Dokumentácia tunelov; Tunnel documentation	www.ssc.sk	2003	Technical guideline		yes
TP 10/2005 Katalóg porúch tunelov na pozemných komunikáciách Road tunnels damage catalogue	www.ssc.sk	2005	Technical guideline		yes
TP 05/2006 Tunelové názvoslovie Tunnel terminology	www.ssc.sk	2006	Technical guideline		yes
TP 06-1/2006 Podzemné stavby. Časť 1: Cyklické razenie Underground constructions, Part 1 : Sequential excavation	www.ssc.sk	2006	Technical guideline		yes
TP 06-2/2006 Podzemné stavby. Časť 2: Kontinuálne razenie Underground constructions, Part 2 : Cyclic excavation	www.ssc.sk	2006	Technical guideline		yes
TKP č.26 – Tunely. SSC, Technical and qualitative conditions for tunnels	www.ssc.sk	2004	Technical guideline		yes

3.18.2 Recognised recommendations

Date of last update of the table: 01-2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.19 SLOVENIA

3.19.1 Legislation

Date of last update of the table: 20/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Zakon o javnih cestah (ZJC) Public roads act	http://zakonodaja.gov.si/rpsi/r06/predpis_ZAKO1366.html UL RS 29/1997	1997 (appended in 2002,2004,2005 and 2006)	law		yes
Uredba o tehničnih normativih in pogojih za projektiranje cestnih predorov v Republiki Sloveniji Decree on technical standards and requirements for road tunnel designing in the Republic of Slovenia	http://zakonodaja.gov.si/rpsi/r03/predpis_PRAV6453.html UL RS 48/2006	2006	decree		yes
Pravilnik o prometni signalizaciji in prometni opremi na javnih cestah Rules on traffic signs and equipment on public roads	http://zakonodaja.gov.si/rpsi/r07/predpis_PRAV2547.html UL RS 46/2000 UL RS 110/2006	2000 (appended in 2006)	administration act		yes

3.19.2 Recognised recommendations

Date of last update of the table: 20/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

3.20 SPAIN

3.20.1 Legislation

Date of last update of the table: 2006 ? (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Manual for the design, construction and operation of tunnels (Orden por la que se aprueba la instruccion para el proyecto, construccion y explotacion de obras subterraneas para el transporte terrestre)	IOS-98	Nov. 1998	Manuals are effectively standards	**** The existing texts are not sufficient at all. Infrastructure, safety requirements, operation management rules and measures to be carried out on existing tunnels are not considered. Ventilation and signalling are barely treated.	

3.20.2 Recognised recommendations

Date of last update of the table: 2006 ? (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Road Instruction, Norm, Alignment (Instrucción de Carreteras, Norma- Trazado) 3.1 IC, [refers to tunnels and especially to cross section and slopes]	Norma 3.1	Dec. 1999			
Road Instruction, Norm, Vertical signals (Instrucción de Carreteras, Norma - Señalización vertical) 8.1 IC [refers to signalling at tunnel entries]	Norma 8.1	Dec. 1999			

3.21 SWEDEN

3.21.1 Legislation

Date of last update of the table: 28/02/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Byggnadsverkslagen Act on Technical Requirements for Construction Works	SFS 1994:847	1994- 06-09	Law		Yes, Last amendm ent in SFS 2007:457
Lagen om skydd mot olyckor Civil Protection Act	SFS nr: 2003:778	2003- 11-20	Law		Yes, Last amendm ent in SFS 2006:547



Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Lagen om säkerhet i vägtunnlar Act on Road Tunnel Safety	SFS 2006:418	2006- 05-24	Law		Yes
Förordningen om tekniska egenskapskrav för byggnadsverk Decree on Technical Requirements for Construction Works	SFS 1994:1215	1994- 08-25	Ordinance		Yes, Last amendm ent in SFS 2007:621
Förordningen om skydd mot olyckor Decree on Civil Protection	SFS nr: 2003:789	2003- 11-20	Ordinance		Yes, Last amendm ent in SFS 2006:640
Förordningen om säkerhet i vägtunnlar Decree on Road Tunnel Safety	SFS 2006:421	2006- 05-24	Ordinance		Yes
Föreskrifter och allmänna råd om säkerhet i vägtunnlar Regulations on Road Tunnel Safety	BFS 2007:11 BVT 1	2007- 05-28	Mandatory provisions and general recommendations		Yes

3.21.2 Recognised recommendations

Date of last update of the table: 10/10/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Tunnel 2004 Swedish National Road Administration	VV Publ. 2004:124	2004	Guideline. Internal regulation within the Swedish National Road Administration. (general tech. specification)	Available at http://www.vv.se/filer/20213/Tunnel2004_publ2004_124.pdf	Yes
The Design of Roads and Streets, VGU Swedish National Road Administration	VV Publ. 2004:80	2004	Guideline. Internal regulation within the Swedish Road Administration and recommendation for the Swedish municipalities	Several documents, table of contents is available at http://www.vv.se/templates/page3Listing_8090.aspx	Yes
Personssäkerhet i vägtunnlar. Safety in Road Tunnels. Report from the National Board of Housing, Building and Planning, the Swedish Rescue Services Agency, Banverket and the Swedish Road Administration.	ISBN 91-7147- 893-0	2005	Guideline	Report and 5 appendices are available at http://www.boverket.se/shopping/ShowItem.aspx?id=1542&epslanguage=SV	Yes
Sikkerhetskoncept 2004 for vegtunneler Safety concept 2004 for Road Tunnels Nordic Road Association	Report 3:2004	2004	Advisory guideline	Enclosed doc; 2004_Sikkerhetskoncept 2004	Yes



3.22 UNITED KINGDOM

3.22.1 Legislation

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Design manual for roads and bridges, Volume 2 Highway structure design (substructures and special structures) materials, Section 2 : Special structures, Part 9, BD 78/99 :Design of road tunnels, 1999 The Highways Agency *	BD 78/99	1999	Guideline and requirements issued by public authority	**** Yes, sufficient.	

3.22.2 Recognised recommendations

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

4 LIST OF COLLECTED GUIDELINES (Other Countries)

4.1 AUSTRALIA

4.1.1 Legislation

Date of last update of the table: 26/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
No legislation in force					

4.1.2 Recognised recommendations

Date of last update of the table: 26/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Road Tunnel Design Guideline - Fire Safety Design / Roads and Traffic Authority, NSW / attached to email	RTA/Pub. 06.357A	Nov 2006	Guideline	This document is in three parts which follow the concept, procurement and detailed design phases of a tunnel. Recommended fire safety measures as well as a fire engineering process to verify the adequacy of the chosen fire safety system is provided in the guidelines.	yes

4.2 CHINA

4.2.1 Legislation

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

4.2.2 Recognised recommendations

Date of last update of the table:

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use

4.3 CROATIA

4.3.1 Legislation

Legal procedure for design preparation is in short - through the Location permit of the Ministry of Internal Affairs, and its jurisdiction over the fire protection procedure, special construction requirements are defined, which are legally binding and applicable. In such cases usually application of the Austrian Guidelines RVS, dating from 2002, are recommended. (since the valid regulations are outdated), thus considering the above mentioned, have a legal, compulsory application, value. In case that the requirements given in the Directive are stricter than the defined RVS, the Directive is applicable.

Therefore it would be very difficult to fill out a table which would define the actual state in this field in Croatia, since from the above given it is obvious that actually, the valid regulation is outdated and that, through other legally binding means, the Directive or the RVS are applicable.

Date of last update of the table: 2/04/07



Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Regarding the regulations tunnel designing, the valid document is the Book of Rules on technical standards for design preparation and construction of road tunnels	(Official gazette no. 59/73.)	?	Book of Rules on technical standards		
<ul style="list-style-type: none"> • Law on Building (Official Gazette N° 175/03.) http://www.nn.hr/clanci/sluzbeno/2003/2552.htm • Law on fire protection (Official gazette N°58/93,33/05) http://www.nn.hr/clanci/sluzbeno/1993/1161.htm • Law on flammable liquids and gasses (Official gazette 108/95) http://www.nn.hr/clanci/sluzbeno/1995/1778.htm • Law on transport of hazardous substances (Official gazette 97/93 AND 151/03) http://www.nn.hr/clanci/sluzbeno/1993/1889.htm 	<p>Off. Gaz N° 175/03</p> <p>Off. Gaz. N°58/93,33/05</p> <p>Off. Gaz. N° 108/95</p> <p>Off. Gaz. 97/93 AND 151/03</p>	?	Laws	In general, System of fire protection in tunnels has been regulated in Croatian legislature with the mentioned Acts, which are valid for all structures, i.e. on the overall fire protection system.:	Yes

4.3.2 Recognised recommendations

Date of last update of the table: 2/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
No document published					

4.4 JAPAN

4.4.1 Legislation

Date of last update of the table: 26/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
National Safety Standard of Emergency Facilities on Road Tunnel		April 1981	Governmental instruction	Written only in Japanese	yes

4.4.2 Recognised recommendations

Date of last update of the table: 26/04/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Road Tunnel Technology in Japan Public Works Research Institute, Ministry of Construction	PWRI n°3023	Oct 1991	Technical Memorandum	This report shows the abstract of the technological standards applied to Japanese road tunnels.	yes
State of the Road Tunnel Equipment Technology in Japan – Ventilation, Lighting, Safety Equipment Public Works Research Institute, Ministry of Construction	PWRI Vol. 61	Sept. 1993	Technical Note	This report shows the state of the road tunnel equipment technology in Japan.	
Report on Survey and Research on Tunnel Ventilation Design Principles (Tunnel Ventilation Design Principles – Draft) Technology Centre of Metropolitan Expressway (*).	None	Feb. 1993	Survey Report	A general approach and technical standards for construction and maintenance of tunnel ventilation facilities for the Metropolitan Expressway	No

(*). This is the only report written in English by metropolitan expressway Co. Ltd. The report was renewed in March 2003 (written in Japanese).



4.5 NORWAY

Further to an agreement with the European Union through the EFTA agreement, Norway will apply Directive 2004/54/EC.

4.5.1 Legislation

Date of last update of the table: 06/01/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
Forskrift om minimum sikkerhetskrav til visse vegtunneler (Tunnelsikkerhetsforskriften)		May 15th 2007	Legislation	A Norwegian adaption of the Eu-directive including some adjustments that apply to Norway	Yes

4.5.2 Recognised recommendations

Date of last update of the table: 06/01/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Norwegian design guide, Roads Tunnels Public Roads Administration, Directorate of Public Roads	Håndbok 021	Dec 2006	Guideline/ manual issued by public authority	In revision 2008 The 2006 version only in Norwegian	Yes
Guidance for risk analysis of road tunnels (Veiledning I risikoanalyser av vegtunneler)	Report no: TS 2007: 11	Oct 2007	Report /guidance	To be tested before it is published as a manual	Yes
Water and frost insulation in Tunnels (Vann og frostsikring i tunneler)	Håndbok 163	Oct 2006	Guidlinne	In Norwegian only	

4.6 SWITZERLAND

Further to an agreement with the European Union, Switzerland will apply Directive 2004/54/EC.

4.6.1 Legislation

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force

4.6.2 Recognised recommendations

Date of last update of the table: 2006 (FIT report)

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
1 Guidelines for the Design of Road Tunnels. (Richtlinien für die Projektierung von Strassentunnel) ASTRA (Swiss Federal Roads Office).	ASTRA Road Tunnels	1995	Guidelines by the federal roads office	New version to be issued in 2005	
2 Ventilation of Road Tunnels, Selection of System, Design and operation. Project. (Ventilation des tunnels routiers, choix du système, dimensionnement et exploitation, Projet), version 6.1. ASTRA (Swiss Federal Roads Office).	ASTRA Ventilation	2004	Guidelines by the federal roads office		

4.7 U.S.A.

4.7.1 Legislation

Date of last update of the table: 24/01/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in force
-	-	-	-	-	-

4.7.2 Recognised recommendations

Date of last update of the table: 24/01/2008

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
<p>Title: NFPA 502 Fire Protection. Standards for Road Tunnels, Bridges, and Other Limited Access Highways. Issued by: National Fire Protection Association Links: www.nfpa.org</p>	NFPA 502	2008	Issued by National Fire Protection Association Standards Council and Approved as an American National Standard.	Adoption as a legal regulation, in whole or in part, is at the discretion of the local jurisdictional authority wherein the road tunnel exists .	Yes
<p>Title: ASHRAE Handbook HVAC Applications, Ch.13, Enclosed Vehicular Facilities. Issued by: American Society of Heating, Refrigeration and Air Conditioning Engineers – Technical Committee 5.9 Links: www.ashrae.org</p>	ASHRAE TC 5.9	2007	Handbook of HVAC Standards for enclosed vehicular facility applications	As referenced in NFPA 502.	Yes
<p>Title: ITA Guidelines for Structural Fire Resistance for Road Tunnels Issued by: International Tunneling Association Links: www.ita-aitec.org</p>	ITA	2004	Guideline	As referenced in NFPA 502.	Yes
<p>Title: Fire and Smoke Control in Road Tunnels Issued by: World Road Association Links: www.piarc.org</p>	PIARC	1999	Guideline	As referenced in NFPA 502. New edition pending.	Yes

5 LIST OF COLLECTED GUIDELINES (International organizations)

5.1 PIARC

5.1.1 Legislation

- PIARC is not in charge of legislation –

5.1.2 Recognised recommendations

15 reports as well as a number of articles have been published the PIARC Committee on Road Tunnel Operations since 1995 (older documents are also available). They can be downloaded in English and French from the PIARC website: <http://www.piarc.org/en/> see the item “virtual library” (all except one are free of charge). 9 new reports will be published in 2008 on the same website. Below is a selection of the recommendations most relevant for road tunnel safety.

Date of last update of the table: 5/09/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Guide for organizing recruiting and training road tunnel operating staff	2007R04	2007	Recommendation		yes
Integrated approach to road tunnel safety This report proposes an integrated approach to road tunnel safety, which has been developed in co-operation with the European research projects SafeT and UPTUN. General principles and current perspectives on road tunnel safety are summarised, including practical tunnel project experience. An international survey through PIARC C3.3 members was carried out. An overview is given of current best practice in various countries.	2007R07	2007	Technical report		yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
<p>Systems and equipment for fire and smoke control in road tunnels. This report complements the PIARC report published in 1999 "Fire and Smoke Control in Road Tunnels". After a presentation of the basic principles of smoke and heat progress at the beginning of a fire, the report presents the safety concepts for tunnel fires.</p>	05.16.B	2007	Technical report		yes
<p>Effects of pavement on fires in road tunnels</p>	RR334-054	2007	Article		
<p>Quantitative risk assessment model for dangerous goods transport through road tunnels Applications of the OECD/PIARC quantitative risk assessment model for dangerous goods transport in France, Austria and the UK.</p>	RR39-086	2006	Article		yes
<p>Good practice for the operation and maintenance of road tunnels. Report dealing with : continuity of management of safety, components and value of a Tunnel Management System (TMS) for the operation and maintenance, way in which the equipment is operated by the tunnel staff, good practices with regard to the engagement and training of the staff involved in these activities.</p>	05.13.B	2004	Recommendation		yes
<p>Cross Section Design of Bidirectional Road Tunnels Work on this report started in September 2001 as a continuation of the work carried out between the years 1998 and 2001, which concluded with the report entitled CROSS SECTION GEOMETRY IN UNIDIRECTIONAL ROAD TUNNELS, published by PIARC in March 2001. This report shares the terminology and general approach of the previous document but adapts and extends it to cover tunnels with a single gallery and two directions of travel. The drafting of this report has involved examination of appropriate national standards and recommendations, as well as various documents of the PIARC and other international organisations that have recently come into being in response to the tragic accidents that have occurred in tunnels since 1999. The conclusions and recommendations of the report are based on common practice in various countries, as well as on the opinions of the experts on the PIARC Committee.</p>	05.12.B	2004	Technical report		yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
<p>Road Tunnels: Vehicle Emissions and Air Demand for Ventilation In 1990 and 1995 PIARC published the calculation methodology and the emission factors for road tunnel ventilation design. An update of the existing PIARC methodology was necessary, as the emission standards of the vehicles were becoming more stringent and hence the vehicles cleaner. The old version described the emission situation up to the year 1995. This document has been produced by working group 2 of the PIARC Technical Committee on Road Tunnel Operations in the framework of its activities between 2001 and 2003. Due to a steady tightening of emission laws for vehicles and changes in the risk assessment of a tunnel fire, some design data need constant updating. In this publication new design information and some references are given for sizing longitudinal and transverse ventilation systems.</p>	05.14.B	2004	Technical report		yes
<p>PIARC design criteria for resistance to fire for road tunnel structures</p>	RR324-064	2004	Article		yes
<p>Traffic incident management systems used in road tunnels This report mainly identifies incident detection and verification devices being used in tunnels to provide operators with the information required to implement response scenarios, devices and systems being used by operating agencies to respond to incidents, and communicate with motorists within the tunnel</p>	05.15.B	2003	Technical report		yes
<p>Cross section geometry in uni-directional tunnels Work on this report started in 1998 after studying literature on accidents in tunnels and national design guides. The goal was to develop the principles for a safe and cost effective tunnel cross section taking into consideration signalling and traffic management requirements. This report mainly describes the arguments considered in various countries concerning the dimensions of the cross section that are essential for traffic in terms of capacity, congestion level and safety. Conclusions are drawn and recommendations are given.</p>	05.11.B	2002	Technical report		yes

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
<p>Fire and smoke control in road tunnels Among the possible risks, vehicle fires give rise to particular concern because they are not very rare events and their consequences might be far larger underground than in the open if no appropriate measures were taken. Also the important and continuous decrease in vehicle pollutant emissions has led to determine ventilation equipment by smoke control considerations in case of fire. This report provides the complete state-of-the-art prepared by the working group on "Fire and Smoke Control" of the PIARC Committee on Road Tunnels (C5). It is intended for all those who are interested in road tunnels design, construction, operation or safety. It gives them an overview, recommendations, as well as the background on the way to provide a reasonably efficient and cost-effective protection against fire and smoke in road tunnels and numerous literature references.</p>	05.05.B	1999	Technical report		yes
<p>Road safety in tunnels World-wide survey in order to update the data on road tunnel safety (studies on various structures, to allow the detailed analysis of problems related to breakdowns, accidents and fires and to draw more valuable information on design and operation of tunnels to be built).</p>	05.04.B	1996	Technical report		yes
<p>Risk analysis for road tunnels</p>	2008R02	2008	Technical report		
<p>Management of the operator - emergency teams interface in road tunnels</p>	2008R03	2008	Technical report		
<p>Road Tunnels: An assessment of fixed fire fighting systems</p>	2008R07	2008	Technical report		
<p>Recommendations to owners and operators of urban road tunnels</p>			Technical report	To be published in 2008	
<p>Tools for road tunnel safety management</p>			Technical report	To be published in 2008	
<p>Human factors and road tunnels safety regarding users</p>			Technical report	To be published in 2008	
<p>Direction Signing on a Route incorporating Tunnels</p>			Technical report	To be published in 2008	
<p>Road Tunnels: Operational strategies for ventilation</p>			Technical report	To be published in 2008	



5.2 ITA

5.2.1 Legislation

- ITA is not in charge of legislation –

5.2.2 Recognised recommendations

Date of last update of the table: 8/1/08

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Guidelines for structural fire resistance of road tunnels		2004	Guidelines		Yes

5.3 NVF Nordic Road Association

5.3.1 Legislation

- NVF is not in charge of legislation –

5.3.2 Recognised recommendations

Date of last update of the table: 10/10/07

Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Ventilation av vägtunnlar (Ventilation of Road Tunnels)	NVF Sub Committee 61: Tunnels	Rep. No 6: 1993	Handbook describing best practices within the Nordic countries	In Swedish and English translation published in 1995	Mainly yes.
Belysning af vejtunneler (Road Tunnel Lighting)	NVF Sub Committee 61: Tunnels	Rep. No 4: 1995	Handbook describing best practices within the Nordic countries	In Danish and in English	Yes
Drift og vedlikehold av tunneler (Operation and Maintenance of Road Tunnels)	NVF Sub Committee 61: Tunnels	Rep. No 7: 1996	Handbook describing best practices within the Nordic countries	In Danish/Norwegian/ Swedish	Yes



Title / Issued by / Links	Reference	Date	Administrative status	Comments	Still in use
Sikkerhetskonsept 2000 (Safety Concept 2000)	NVF Sub Committee 32: Tunnels	Rep. No 11: 2000	Handbook describing best practices within the Nordic countries	In Danish/Norwegian/ Swedish	Yes
Sikkerhetskonsept 2004 for vegtunneler (Safety Concept 2004 for Road Tunnels)	NVF Sub Committee 32: Tunnels	Rep. No 3: 2004	Handbook describing best practices within the Nordic countries	In Danish/Norwegian/ Swedish	Yes