



European
Commission

Joint Research Centre

the European Commission's in-house science service



EVS GTR – TF3 JRC's opinion on "30 minute observation period"

V. Ruiz, N. Lebedeva, A. Pfrang, L. Brett

12 November 2015

Region	Regulation	Observation period requirement
China	GB/T 31498-2015	From the impact until 30 minutes ...
Europe	UN ECE R95 & R94:	In the period from the impact until 30 minutes after no electrolyte from the REESS shall spill ...
Japan	Attachment 111	In the period of 30 minutes after the impact test
South Korea	KMVSS Art. 91- [Table 11-3]	from the time the vehicle ceases motion after a barrier impact test until 30 minutes thereafter
USA	FMVSS 305	Spillage is measured from the time the vehicle ceases motion after a barrier impact test until 30 minutes thereafter, and throughout any static rollover after a barrier impact test.

JRC propose to increase the observation period from 30 minutes to 1 hour



- **Current GTR draft already considers 1 hour observation period for component level testing and for fire hazard vehicle post-crash. The same observation time for electrolyte leakage in the vehicle-level crash testing would favour comparability.**
- **Citations from various regulations provided in EVSTF04-12e to support a 30 min. observation time are incomplete. In fact, some of these regulations have a total observation time (significantly) exceeding 30 min.(see Slide 4). Moreover, some of these regulations have been developed based on data from aqueous type technologies (e.g. FMVSS 305, based upon SAE J1766 FEB96). The GTR should cover all REESS types (e.g. aqueous and non-aqueous technologies).**
- **Data on average rescue time indicates that rescue in an automotive accident – potential exposure time – often approaches 60 min. (see slides 6-11). These data became available/known after the development of existing regulations.**

Based on the above, JRC proposes to increase the post-crash observation time for electrolyte leakage to at least 1 hour.

Region	Regulation	Observation period requirement for electrolyte detection/quantification	JRC Comments
China	GB/T 31498-2015	From the impact until 30 minutes ...	<p style="text-align: center;">Regulations applicable to Vehicle level evaluation.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p style="text-align: center;">Developed primarily based on data from lead acid battery systems) (e.g. FMVSS 305, October 13, 1998, September 27, 2000).</p> </div>
Europe	UN ECE R95 & R94:	In the period from the impact until 30 minutes after no electrolyte from the REESS shall spill ...	
Japan	Attachment 111	In the period of 30 minutes after the impact test	
South Korea	KMVSS Art. 91- [Table 11-3]	from the time the vehicle ceases motion after a barrier impact test until 30 minutes thereafter. Proceed to the static rollover test.	
USA	FMVSS 305	Spillage is measured from the time the vehicle ceases motion after a barrier impact test until 30 minutes thereafter, and throughout any static rollover after a barrier impact test. <i>Reference to Static Rollover preparation and procedure from the most current FMVSS 301 Test Procedure (referred to in FMVSS 305)= increment of 90°, 180°, and 270° at a uniform rate, with 90° of rotation taking place in any time interval from 1 to 3 minutes and holding in position up to 5 minutes. (This adds 24-32 additional minutes). The Contractor must conduct a static rollover test <u>within 45 minutes</u> after the vehicle impact. <u>The Contractor must keep the test vehicle under constant observation for electrolyte leakage during the transition between impact and rollover testing.</u></i>	
Global	GTR Draft	<p><i>Within 30 minutes after the impact, there shall be no electrolyte leakage into the passenger compartment. This time period is considered as sufficient to ensure the evacuation of the occupants. The requirements of electrolyte leakage (5.4.1.1) and REESS retention (5.4.1.2) are based on the existing requirements of UN Regulations Nos. 12, 94 and 95 as well as UN Regulation No. 100-02.</i></p> <p><i>The test shall end with an observation period of 1 h at the ambient temperature conditions of the test environment.</i></p> <p><i>Fire hazard (5.4.1.3.: For a period of 1 hour after the crash test there shall be no evidence of fire or explosion of the REESS.)</i></p>	<p style="text-align: center;">Component based test in GTR (applicable to short circuit, overcharge, overdischarge, vibration, thermal shock and mechanical shock test) requires 1 h observation time.</p>

Worldwide standardization: Present situation

Region	Standard	Observation period requirement	Comments
	SAE J2929	Minimum 1 hour post-test observation period, the battery system shall exhibit no evidence of venting outside of battery enclosure or venting system, battery enclosure rupture, fire, or explosion. (applicable to overcharge, overdischarge, vibration, thermal shock, drop, crush/crash, fire and shock test)	<ul style="list-style-type: none"> Both at vehicle and component level evaluation
	SAE J2464	All test articles will be observed for a time period of at least 1 h. (applicable to overcharge, overdischarge, vibration, thermal shock, drop, crush/crash, fire and shock test). In the rollover test observe the DUT for 1 h at each position and for a minimum of 1 h after the test (total 6 hours).	<ul style="list-style-type: none"> component level evaluation
	UL 2580	The tests shall be followed by a 1-h observation time. (applicable to overcharge, overdischarge, vibration, thermal shock, drop, crush, fire and shock test)	<ul style="list-style-type: none"> component level evaluation
	USABC	All test articles will be observed for a time period of at least one hour, (applicable to overcharge, overdischarge, vibration, thermal shock, drop, crush, fire and shock test for short circuit and continue observation for an additional two-hour period)	<ul style="list-style-type: none"> component level evaluation

Observation times of 1 h are generally found in relevant standards

Rescue time



Recently data on average rescue time became available indicating that **'Crash to Accommodation' time in an automotive accident – potential exposure time – often approaches 60 minutes**

Crash



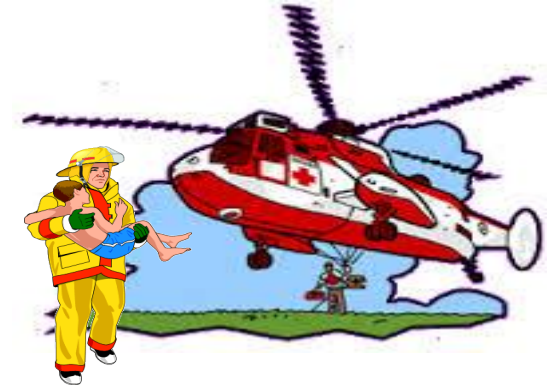
Call



Arrival



Accommodation



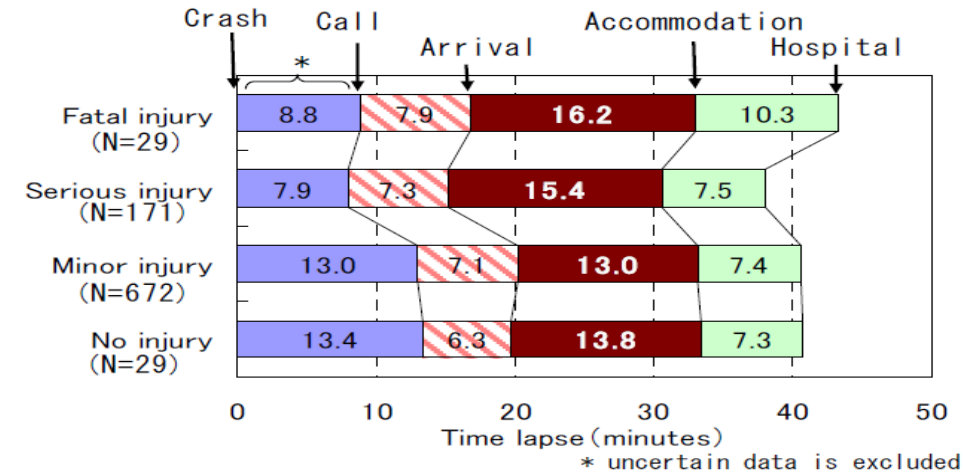
13 min

8 min

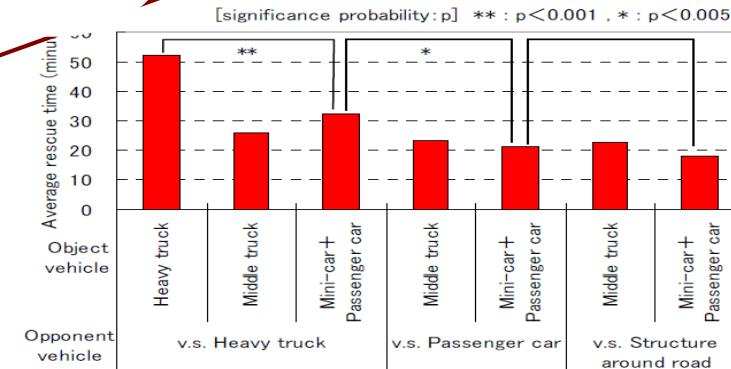
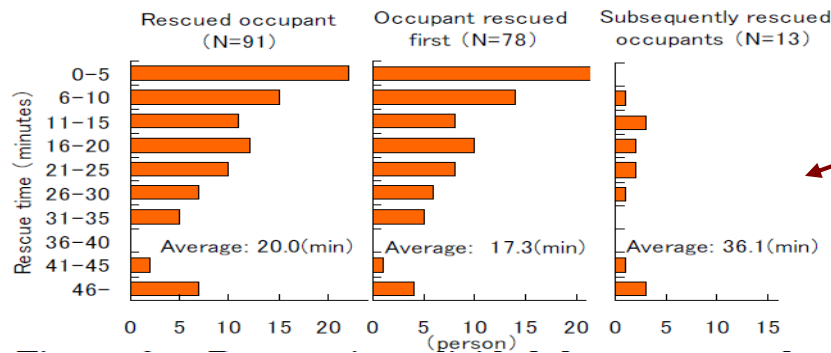
up to 36 min

Study from Japan Automotive Research Institute (JARI) and Japan Automotive Manufacturers Association (JAMA)*:

- Various crash scenarios are considered - among passenger cars as well as involving heavier vehicles (trucks)
- Statistical analysis of the 1996-2006 field data in Japan shows that:
 - the average "Crash" – "Accommodation" time often significantly exceeds 30 minutes
 - especially when more than 1 occupant is to be rescued
 - and/or when a truck is involved



Average time lapse by injury severity *



* Y.Sukegawa, M.Sekino, "Analysis of rescue operations of injured vehicle occupants by fire fighters", paper#11-0101, presented at the 22nd Enhanced Safety of Vehicles Conference (ESV-22), Washington DC, June 2011. www.nrd.nhtsa.dot.gov/departments/esv/22nd/



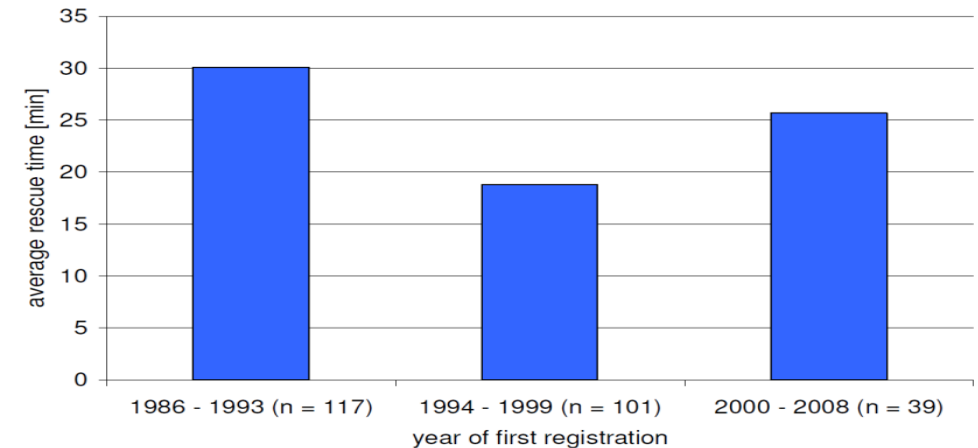
To our knowledge little data is available for Europe.

Rescue approach varies **:

- "Scoop and run" – transport a victim ASAP to a hospital – US
- "Stay and play" – stabilise the patient at the scene - Germany

Results of the German study** show that:

- the average rescue time ("Arrival" to "Accommodation") often exceeds 25 min;
- rescue time does not solely depend on technical issues as a medical treatment to stabilise the patient often occurs in parallel;
- rescue time may depend on the model, i.e. increase for newer cars.



USA data analysis***:

- The available sources of quantified information are limited
- Disaggregation of urban and rural data for response time analysis is consistently identified
- Average "Crash" to "Call" time varies between 4 and 7 to 8 min
- Average "Call" to "Arrival" time varies between 4 and 11 min
- No data available in this study on "Arrival" to "Accommodation" time

Table 2 Summary of Published Response Time Values

Interval	Time (Minutes)	Average or Percentage of Calls Included	Data Description	Source	
Crash to Notification	3.87	Average	Urban, 1996 Fatal, EMS	Champion, 3-4/1999	
	7.36		Rural, 1996 Fatal, EMS		
	4	Average	Urban, 1997 Fatal, EMS	Champion, 5/1999 ¹	
	7		Rural, 1997 Fatal, EMS		
	8.4 minutes	Average	Urban	Mayor's Committee for Urban Renewal, 1970	
3.9 minutes	Urban, Adjusted				
Notification to Arrival	4:19	Average, US cities	First Unit	Phoenix Survey, 2000 ²	
	4:30	80%, US cities			
	0-10	81.7%	Rural Fatal, EMS	Traffic Safety Facts, 2001 ³	
	0-20	94.3%	Rural Fatal, EMS		
	0-10	93.8%	Urban Fatal, EMS		
	0-20	97.7%	Urban Fatal, EMS	Champion, 5/1999 ¹	
	6	Average	Urban, 1997, Fatal, EMS		
	11		Rural, 1997 Fatal, EMS		
	0-10	88.3%	Urban, 1975-1993 Fatal, EMS	Tessmer, 1996 ⁴	
	0-10	57.7%	Rural, 1975-1993 Fatal, EMS		
	0-20	97.8%	Urban, 1975-1993 Fatal, EMS		
	0-20	89%	Rural, 1975-1993 Fatal, EMS		
	CA NFIRS ⁵	5.1	Average	2000, Fire Service	CA NFIRS ⁵
		5.3		2001, Fire Service	
5.4		2002, Fire Service			
5.3		2003, Fire Service			
0-7		80%	2000, Fire Service		
		77%	2001, Fire Service		
		75%	2002, Fire Service		
	77%	2003, Fire Service			

*** L.E. Shields, "Emergency Response Time in Motor Vehicle Crashes: Literature and Resource Search", report prepared for Motor Vehicle Fire Research Institute, January 2004.
http://www.mvfri.org/Contracts/Final%20Reports/Shields_Report-01.pdf

Summary:

- 1) "Crash" to "Accommodation" time needs to be considered. This includes: "Crash" to "Call", "Call" to "Arrival" and "Arrival" to "Accommodation" time slots.
- 2) "Crash" to "Accommodation" time depends on many parameters such as:
 - a) density of population, rural/urban area
 - b) type of an accident, including car model, number of occupants, involvement of heavier vehicles
 - c) availability of the rescue workers (fire fighters, ambulance)
 - d) ...

and may, therefore, vary from country to country;

- 3) Rescue equipment and approach are different in different countries, making statistical data not directly relevant to other areas



We propose:

- To increase the "no leak" time slot to at least 60 minutes.

Area/ average time, min	Crash-Call	Call-Arrival	Arrival-Accommodation	Total
Japan*	13	8	up to 36	up to 57
China				
South Korea				
USA***, Canada	4 to 8	4 to 11		> 8 to 19
Europe		8 (NL)	25** (DE)	> 33

More data for various regions needs to be collected to better define the "no leak" time slot for the present EVS-GTR

* Y.Sukegawa, M.Sekino, "Analysis of rescue operations of injured vehicle occupants by fire fighters", paper#11-0101, presented at the 22nd Enhanced Safety of Vehicles Conference (ESV-22), Washington DC, June 2011. www.nrd.nhtsa.dot.gov/departments/esv/22nd/

** H. Johannsen, G. Muller, C. Pastor, R-D. Erbe, H-G. Schlosser, "Influence of new car body design on emergency rescue", paper presented at the 4th International Conference on ESAR "Expert Symposium on Accident Research", Hannover, September 2010; <http://bast.opus.hbz-nrw.de/volltexte/2012/556/>

*** L.E. Shields, "Emergency Response Time in Motor Vehicle Crashes: Literature and Resource Search", report prepared for Motor Vehicle Fire Research Institute, January 2004. http://www.mvfri.org/Contracts/Final%20Reports/Shields_Report-01.pdf



Data collected in Germany shows that:

a) "Crash to Accommodation" time exceeds 55 minutes in approx. 40-50% of the reviewed rescue operations. The trend is that this time increases for newer vehicles. For vehicles with model year from 2005 to 2007 "Crash to Accommodation" time exceeds 60 minutes in >40% of the rescue operations.

<http://www.imobilitysupport.eu/library/ecall/ecall-implementation-platform/eeip-meetings/2009-4/01-oct-2009/1236-eeip-adac-accident-research-01-oct-2009/file>

b) Targets for "Call to Arrival" time vary from 5-8 minutes to 17 minutes depending on the state.

http://forplan.de/tl_files/downloads/Hilfsfrist%20Bundeslaender.pdf