

Transmitted by the expert from Hungary

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FRONTAL COLLISION OF BUSES

Information learned from the ECBOS Summary Report

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GENERAL INFORMATION

The accident analysis (statistics) of ECBOS project covers

5 years period: 1994-1998

8 EU countries: France Germany Netherlands
Austria Italy Spain
UK Sweden

Bus categories: M2, M2(above 16 passengers), M3
but not similarly in the 8 countries

GENERAL INFORMATION

Types of accident:

Frontal collision

Frontal accident

Rollover

Overturning

Bus runs out of road / turns off the road

Side impact

Rear impact

Other accident

Non collision accident

Unknown type of accident

GENERAL INFORMATION

The statistics are based on

8 EU countries

The whole community

25 EU countries

Whole Europe

43 countries

Contracting parties of 1958 Geneva Agreement

43 countries

Contracting parties of R107 bus regulation

35 countries

Contracting parties of R.66 roof strength regulation 32 countries

GENERAL INFORMATION

Definitions used for casualties

Fatal

in the accident / at the scene
in 1 day
in 6 days
in 7 days
in 30 days

Serious injury

hospitalized patient
more than 1 day in hospital
more than 3 days in hospital
more than 6 days in hospital

Slight injury

everyone who needs medical treatment, but
no need for hospitalization *

Injury without specification

used in 3 countries

* *note*: the number of slight injuries is generally underreported in police reports, says ECBOS report

INJURY RATIOS IN FRONTAL COLLISIONS

	Frontal accident casualties compared to all bus accident casualties	Fatalities related to all casualties in frontal accidents	Frontal accidents fatalities compared to all fatalities in bus accidents
Austria ⁽¹⁾	4,1 %		12,7 %
France	71,2 %	9,2 %	62,7 %
UK	60,0 % ⁽²⁾	7,2 %	34,0 %
Netherlands	56,7 % ⁽³⁾		83,3 %
Spain	9,6 % ⁽⁴⁾		24,5 %
Sweden	14,0 % ⁽⁵⁾		
Germany		No detailed data	
Italy		No detailed data	

- Remarks:*
- (1) The ratio of unknown / not specified accidents is high, 30%
 - (2) The „frontal impact” is emphasized instead of „frontal accident”
 - (3) On city roads; on rural roads this figure is 46,7%
 - (4) Without frontal collisions against fixed obstacles (only against vehicles)
 - (5) Only collisions with other vehicles are counted. „Single vehicle accidents” (e.g. frontal collision with rigid objects, rollover) cover 31,4% of the total casualties.

DRIVER/PASSENGER (D/P) INJURY RATE

Assumptions:

a) D/P injury probability (IP) in different accident situations:

- in frontal impact the **driver has higher** IP than the passenger
- in side impact the **driver has lower** IP
- in rear impact the **driver has lower** IP
- in rollover **they have equal** IP
- in non impact type accidents the **driver has lower** IP

Only the frontal impact is more dangerous for the driver than for the passengers

DRIVER/PASSENGER (D/P) INJURY RATE

Assumptions (cont.):

- b) The average passenger capacity of a bus is 50
- c) The buses are fully loaded in the accident
- d) The IP is equal for all passengers in frontal collisions

These assumptions contain simplifications, but they help to recognise general tendencies

DRIVER/PASSENGER (D/P) INJURY RATE

From the ECBOS statistics

	D/P fatality rate			D/P injury rate	
Austria	(3/29)	0,10	5:1	0,08	4:1
France	(16/98)	0,16	8:1	0,13	7:1
Germany	(20/75)	0,27	13:1	0,11	6:1
UK	(6/93)	0,06	3:1	0,09	5:1
Italy	(30/74)	0,41	20:1	0,16	8:1
Netherlands	(1/8)	0,12	6:1	0,18	9:1
Spain	(24/176)	0,14	7:1	0,09	5:1
Sweden	(4/10)	0,40	20:1	0,40	20:1
Average	104/563	0,18	9:1	0,16	8:1

DRIVER/PASSENGER (D/P) INJURY RATE

Comparison between ECBOS data and earlier estimations

	D/P fatality rate	D/P serious injury rate	D/P injury rate
ECBOS min. value	3:1		4:1
ECBOS max. value	20:1		20:1
ECBOS average	9:1		8:1
Japanese data (1992-94)	80:1	13:1	
German data (1979)	8:1	10:1	
UK data (1971-92)	5:1	4:1	
Spanish data (1984-88)	6:1		2:1

All types of bus accidents are considered

DRIVER/PASSENGER (D/P) INJURY RATE

Japanese data (1992-94) for D/P casualty rates

Casualties	In all bus accidents	In frontal collisions
fatality	80 : 1	120 : 1
serious injury	13 : 1	18 : 1
slight injury	7 : 1	4 : 1

In frontal collisions the estimated ranges for D/P casualty rates

fatality (10 ~ 100) : 1

serious injury (6 ~ 20) : 1

slight injury (3 ~ 6) : 1

CONCLUSIONS, PROPOSALS OF THE ECBOS REPORT

- Use 3pt seat belt in (correct restraining of children)
- Develop seat regulations (R14, R80)
- Specify deceleration pulse for M2 vehicles
- Protect driver / co-driver in frontal impact
- Improve compatibility between buses and other vehicles

PROPOSAL OF AN EXPERT GROUP (MADRID MEETING)

This table was presented in the inform.doc. GRSG-87-31

	Object of regulatory work	Related ECE regulation	Related EU directive	Responsible WG	Proposed priority	Estimation of needed work
1.	Strength of bus seats and their anchorages	R.80/01 R.17/04	91/676-03/20EC	GRSP	A	M
2.	General safety of buses (all kind)	R.10,07/Rev.1.	2001/85/EC	GRSG	B	M
3.	External projection	R.61/00				
4.	Safety belt anchorage	R.14/05 R.16/04	76/115-96/38EC 77/541-00/3EC	GRSG GRSP	B B	S S
5.	Structural integrity	R.107/Rev.1*	2001/85/EC	GRSG	A	M
6.	Underrun protection	R.93/00	92/114/EC	GRSG	B	M
7.	Limit of deceleration	-	-	GRSG	B	L
8.	Compatibility and agressivity	-	-	GRSP	B	M

Symbols:

- A = first priority
- B = second step priority
- * = it could be an independent new regulation, too
- S = short work, less than 2 years, it does not need further study and analysis
- M = medium size work, 2-4 years, it needs certain study
- L = Long term work, more then 4 years, further study, analysis, international discussion is nee