



SAFETY-PRODUCT

ZIP *pole*

OFFICES:

Boudewijnlaan 5
2243 Pulle
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PRODUCTION:

Hoogbuul 18
2250 Olen
Belgium

CRASH SITE:

Hoogbuul 18
2250 Olen
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CONTENT

Dear reader,

This document is written to share experiences on using EN12767, the European standard to qualify passive safe road infrastructure, on the use of products and types qualified by EN12767 and on the evaluation of real impacts into passive safe products.

The EN12767 describes test methods and evaluation procedures to classify passive safe products. In 2019, the EN12767 was revised. All products CE marked according EN12767 should be re- evaluated by this new edition of the standard.

There is a mix of the explanation on the changes of the new edition of 2019 in this document, linked to experiences in real life by Safety Product and accidents into our ZIPpoles.

If you have comments, corrections or things to add to this document, don't hesitate to contact us.
We hope you enjoy reading this !

Kind regards,
Carolien Willems
Managing director and co-owner Safety Product
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v02 30/04/2020

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ZIPpole and experiences

CE certificate



Rue Ravensteinstraat 4 B-1000 BRUSSELS

Certificate of constancy of performance

1148-CPR-20080603

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR), this certificate applies to the construction product:

Lighting columns (Scope in enclosed table)
placed on the market under the name or trademark of

SAFETY-PRODUCT nv

Beverloosesteenweg 100

B-3580 BERINGEN

and produced in the manufacturing plants
OLEN

This certificate attests that all provisions concerning the assessment and verification of constancy of performance and the performances described in Annex ZA of the standard(s)

EN 40-5:2002

under system 1 for the performance set out in this certificate are applied and that the factory production control conducted by the manufacturer is assessed to ensure the constancy of performance of the construction product.

This certificate was first issued on 20080603 and will remain valid as long as neither the harmonised standard, the construction product, the system of assessment and verification of constancy of performance nor the manufacturing conditions in the plant are modified significantly, unless suspended or withdrawn by the notified product certification body.

Brussels, 20200430

Jacques DEFOURNEY, Chairman of the Board

The validity of the present certificate is confirmed if visible on the OCAB-OCBS website



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CE Certificate: List of approved Steel Lighting Columns according to EN 40-5:2002

Product family 0:

- Columns with nominal height up to 12 m (columns with brackets up to 2.5 m), diameter 85 mm to 260 mm, nominal wall thickness 2 mm
- Trade name: ZIPpole
- Passive safety according to EN 12767:2019, Performance class:
 - Class 0

Product family 1:

- Columns with nominal height up to 12 m (columns with brackets up to 2.5 m), diameter 85 mm to 260 mm, nominal wall thickness 2 mm
- Trade name: ZIPpole
- For poles simply laid down in a concrete foundation
- Passive safety according to EN 12767:2019, Performance class:
 - 100-NE-C-S-SE-MD-1

Product family 2:

- Columns with nominal height from 6 m to 12 m (columns with brackets up to 2.5 m), diameter 85 mm to 260 mm, nominal wall thickness 2 mm
- Trade name: ZIPpole
- For poles with a concrete foundation below ground level
- For poles with flange plate and concrete foundation below ground level
- For poles with screw firmly tied in the ground
- Passive safety according to EN 12767:2019, Performance class:
 - 100-HE-C-S-NS-MD-1

Product family 3:

- Columns with nominal height up to 18 m (columns with brackets up to 1.5 m), diameter 85 mm to 351 mm, nominal wall thickness 2 mm
- Trade name: ZIPpole3XL
- Passive safety according to EN 12767:2019, Performance class:
 - Class 0

Product family 4:

- Columns with nominal height from 6 m to 18 m (columns with brackets up to 1.5 m), diameter 85 mm to 351 mm, nominal wall thickness 2 mm
- Trade name: ZIPpole3XL
- For poles with a concrete foundation below ground level and a planting depth of 2m
- Passive safety according to EN 12767:2019, Performance class:
 - 100-HE-E-S-NS-MD-1



Further characteristics and performances

- ✓ Following Evaluation of Performance Reports by OCAB-OCBS 2008 to 2020 and Quality handbook of Safety Product.
- ✓ The corrosion protection MAGNELIS® or ZnAlMg coating according to EN 10268 and EN 10346 is covered by the present CE certificate.
- ✓ Passive safety in accordance with EN 12767 tested by accredited laboratory

IMPORTANT STATEMENT over EN 12767

These lighting columns were evaluated according to previous versions of the standard and are requalified according to the prescriptions of Annex L of EN 12767:2019 completed by the methodology described in (*). The performance regarding roof indentation is as such as reported from the results of the tests performed in accordance to EN 12767, taking into that the uncertainty admitted by this standard on roof deformation can in no way guarantee the same performance in actual crash situations.

Therefore and quite obviously, neither OCAB-OCBS nor the manufacturer can assume that in real conditions, the same performance as such recorded in the tests can be reproduced in all cases.

^{*} <https://www.ocab-ocbs.com/NMR/EN127672019.pdf>



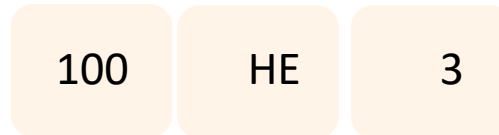
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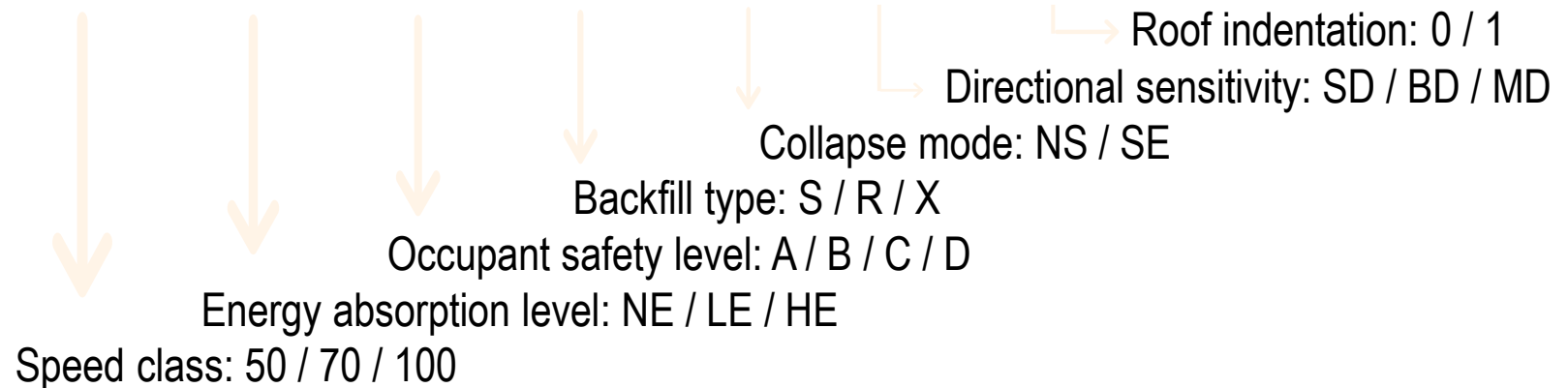
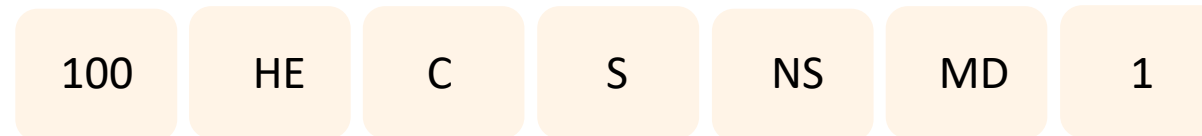
New edition EN12767:2019

The new edition of EN12767 has more sub- categories, compared to the previous edition, which gives a more detailed indication of the performance of passive safe products. This allows the market to specify products more in detail. If a category is of no importance to be evaluated, the market can require "NR" or No Requirement for that particular categorie.

EN12767:2007



EN12767:2019



Energy absorption level: NE / LE / HE

EN12767:2019 describes NE- LE and HE as energy absorption categories.
NE= Non Energy absorbing, LE= Low Energy absorbing and HE= High Energy absorbing.

The energy absorption level is determined by measuring the exit speed of the car after the crash.
The exit speed of the NE is higher so very little energy is absorbed by the passive safe product, the exit speed of the HE is lower so a lot of energy is absorbed by the passive safe product.
In reality this means a car driving into a NE product will be slowed down less than a car driving into a HE product.

Table A.3 — Energy absorption categories

Speed class	50	70	100
Energy absorption category	Vehicle exit speed, v_e km/h		
HE	$v_e = 0$	$0 \leq v_e \leq 5$	$0 \leq v_e \leq 50$
LE	$0 < v_e \leq 5$	$5 < v_e \leq 30$	$50 < v_e \leq 70$
NE	$5 < v_e \leq 50$	$30 < v_e \leq 70$	$70 < v_e \leq 100$

Source: EN12767:2019

A first crash test is done at an obligated speed of 35km/h. As a second test, the manufacturer decides at which impact speed the product is crash tested: 50-70 or 100 km/h, which defines the speed class.
Depending on the impact speed, classes are defined to determine the energy absorption categorie by measuring the exit speed.

100

HE

C

S

NS

MD

1

How to select the energy absorption level ?

Non Energy absorbing | 100NE

- » in case of no other road users
- » in case of stable / flat roadside
- » in case of no secondary risk
- » in case of a large clear zone, > 40-40m



High Energy absorbing | 100HE

- » in case of other road users
- » in case of unstable roadside, ditches
- » in case of secondary risk
- » in case of a limited clear zone
 - » < 40-40m



Question here is: is it important to slow down the speed of the colliding car?

Occupant safety class: A / B / C / D / E

EN12767:2019 describes the occupant safety classes A-B-C-D-E where “A” scores the lowest impact on the occupants. Requirements for class A are: the car shall remain upright during the crash test and the difference between measured impact speed and exit speed shall not be greater than 3 km/h.

The best NE products on the market today score “B” and the best HE products score “C” as occupant safety class, where 100-NE-B and 100-HE-C products usually have particular designs be passive safe. We advise road designers and road authorities to prescribe those 2 types to encourage the industry to develop safer products.

Table A.4 — Impact severity indexes

Energy absorption categories	Occupant safety class	Speeds			
		Low speed test 35 km/h		High speed test 50 km/h, 70 km/h, 100 km/h	
		Maximum values		Maximum values	
		ASI	THIV km/h	ASI	THIV km/h
HE / LE / NE	E	1	27	1,4	44
HE / LE / NE	D	1	27	1,2	33
HE / LE / NE	C	1	27	1	27
HE / LE / NE	B	0,6	11	0,6	11
NE	A	No test required	No test required	No ASI and THIV measurements	

Source: EN12767:2019

100

HE

C

S

NS

MD

1

Backfill type: S / X / R

All products crashtested according EN12767 are installed in a backfill, to be chosen by the manufacturer. The choices are: S-X or R.

“S” is standard soil which is mostly used for crash tests according EN12767. The composition of it is determined in the standard so this means it is the same composition for all testhouses accredited for EN12767. By using standard soil, all crash tests should give the same result in different crash test laboratories.

“X” is a particular foundation chosen by the manufacturer which should be described in detail and should be checked by the crash test laboratory. The manufacturer should mention the details about it in detail in the installation instructions.

“R” is an installation considered as rigid if the displacement measured at ground level after the impact test is not more than 0,01m.

Safety Product crashtested the ZIPpole and ZIPpole3XL, evaluated as being HE or high energy absorbing products, in standard soil “S”, with the concrete foundation or screw as mentioned in the installation instructions. To obtain the HE it's important to fix the ZIPpole well below groundlevel to keep it in the ground during the crash so the ZIPpole is pushed down and not pulled out of the ground. While being pushed down, the energy of the impact is absorbed and the speed is being slowed down.

The ZIPpole is also crash tested in a non- fixed foundation so a foundation to just keep the pole standing up right. This ZIPpole released from the foundation and reached NE level. This crash test was also done in standard soil “S”.

Backfill type and installation of the ZIPpole as HE

ZIPpole

EN12767 (2019): 100-HE-C-**S**-NS-MD-1

6m-12m

3 installation methods: buried, on screw, on footplate

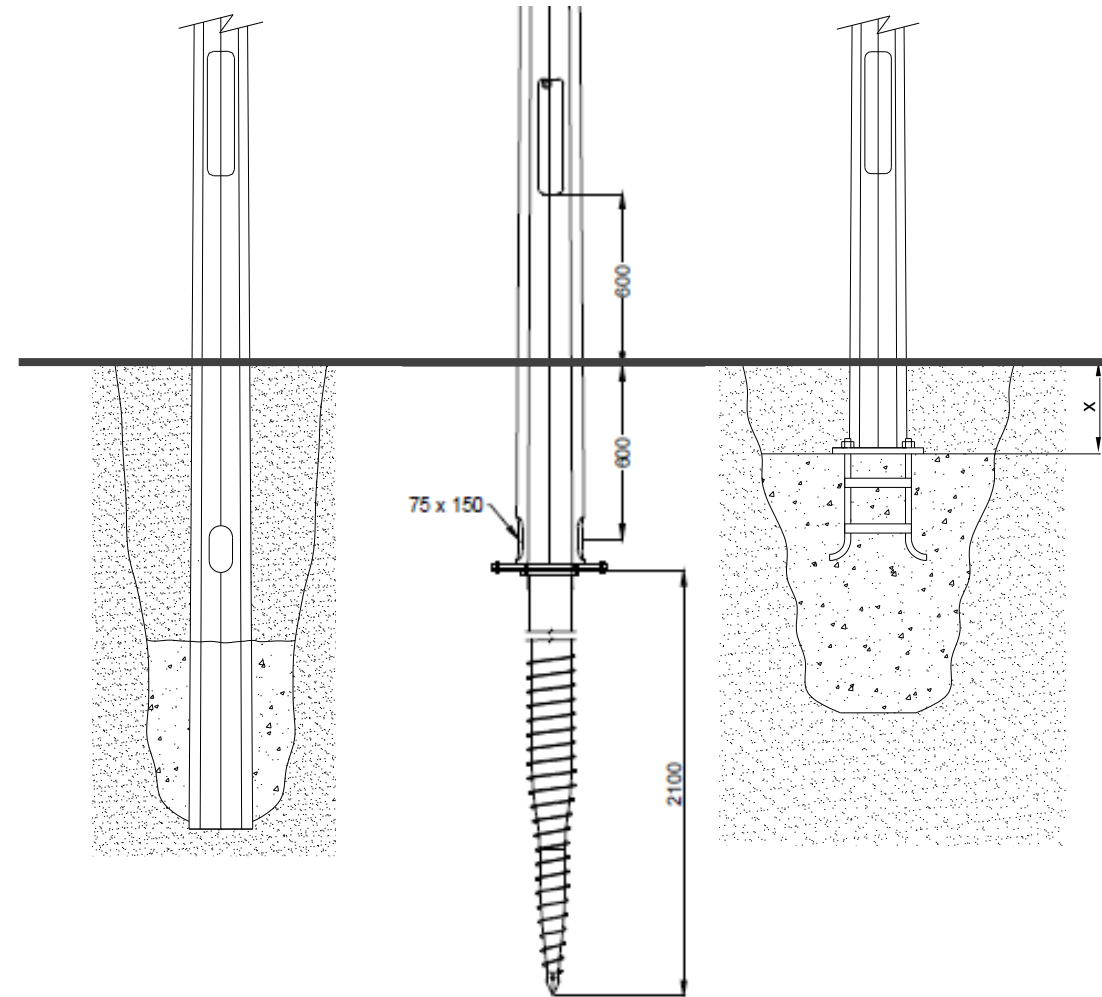
ZIPpole3XL

EN12767 (2019): 100-HE-E-**S**-NS-MD-1

6m-18m

1 installation method: buried

Always ask for installation instructions from the manufacturer.



Installation makes part of the passive safety performance

Collapse mode: SE / NS

In the separation collapse mode (SE) the structure detaches from the ground or its foundation. In the no separation collapse mode (NS), the structure does not detach from the ground or its foundation.

The declared collapse mode shall be determined by the support structure behaviour in the high speed test.

The collapse mode gives the customer the opportunity to define the product for the usage: if you don't want the pole to detach from its foundation, you can prescribe it by using "NS".

Also, we are used to say that NE, non energy absorbing, is a break away system but not all NE systems are break away! Look at the pictures below: short devices can be evaluated as being NE and being NS collapse mode or No Separation.



100

HE

C

S

NS

MD

1

Collapse mode: SE / NS

EN12767:2019 allows to declare intermediate speed classes, depending on the observed collapse modes in test at high and low speed as specified in the table here below. If an intermediate speed class is declared, all further criteria of the performance class (occupant safety class, energy absorption categories,...) from the tested speed class are also valid for the intermediate speed class.

The ZIPpole and ZIPpole3XL, both speedclass 100, are also valid for 70 and 50 km/h.

Table A.2 — Declaration of speed classes

	Impact speed used for a successful test km/h				Speed class to declare
	35	50	70	100	
Observed collapse mode	NS	NS SE			Declare speed class 50
	NS		NS		Declare speed classes 50 and 70
	NS		SE		Declare speed class 70
	NS			NS	Declare speed classes 50, 70 and 100
	NS			SE	Declare speed class 100
	SE	SE			Declare speed class 50
	SE		SE		Declare speed classes 50 and 70
	SE			SE	Declare speed classes 50, 70 and 100
	NS	NS		SE	Declare speed classes 50 and 100
	NS	SE		SE	Declare speed classes 50, 70 and 100

100

HE

C

S

NS

MD

1

Directional sensitivity: SD / BD / MD

Question here is: is the product safe from different impact angles?
Products are evaluated as being single directional, bi- directional or multi directional or how is the product designed, can it be impacted from 1 direction, 2 directions or more directions?

The ZIPpole and ZIPpole3XL are "MD". The picture here on the right shows a real impact into the ZIPpole where the driver came from the other direction of the road.
"MD" products can be hit from all directions.



Roof indentation: 0 / 1

The risk for a roof dent is determined by the roof indentation class. The roof indentation is measured in the crash tests and shall be declared as:

- class 0: roof deformation < 102mm or 4 inches
- class 1: roof deformation > 102mm or 4 inches

OCBS, the Belgian notified body for CE marking EN12767 crash tested products, doubts the value of measuring the roof deformation and claims on their CE certificates the following:

IMPORTANT STATEMENT over EN 12767

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Therefore and quite obviously, neither OCAB-OCBS nor the manufacturer can assume that in real conditions, the same performance as such recorded in the tests can be reproduced in all cases.



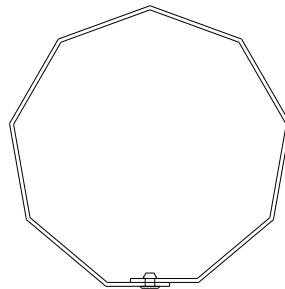
Picture left: picture of an official crash tested car according EN12767 where the impact point on the test vehicle shall be centered to be within $\pm 0,1m$.

Picture right: real accident into the ZIPpole

Summary for ZIPpole and ZIPpole3XL

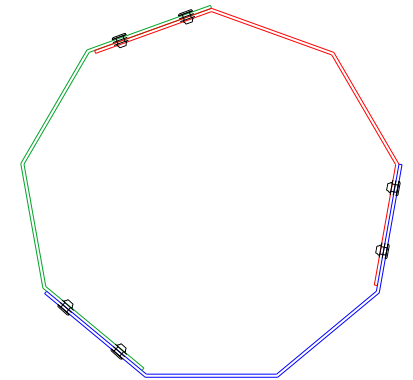
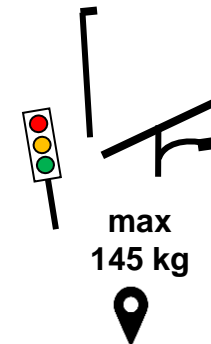
ZIPpole

Ø 260mm at the bottom
BMC= 17.000- 20.385 Nm
6-12m
100-HE-C-S-NS-MD-1
70-HE-C-S-NS-MD-1
50-HE-C-S-NS-MD-1



ZIPpole 3XL

Ø 350mm at the bottom
BMC= 40.000 Nm
6- 18m
100-HE-E-S-NS-MD-1
70-HE-E-S-NS-MD-1
50-HE-E-S-NS-MD-1



Installation

The EN12767: 2019 edition requires the installation instruction from the manufacturer to be added to the crash test information.

Always make sure the installation instructions are required from the manufacturer and always make sure the real installation of a passive safe product is done according the installation instructions of the manufacturer.

Also, require the right product for the right road and roadside.

The zone of impact of this break away device was installed at the wrong height. If the product has a specific zone to be hit in a car crash, the installation should be done accordingly.

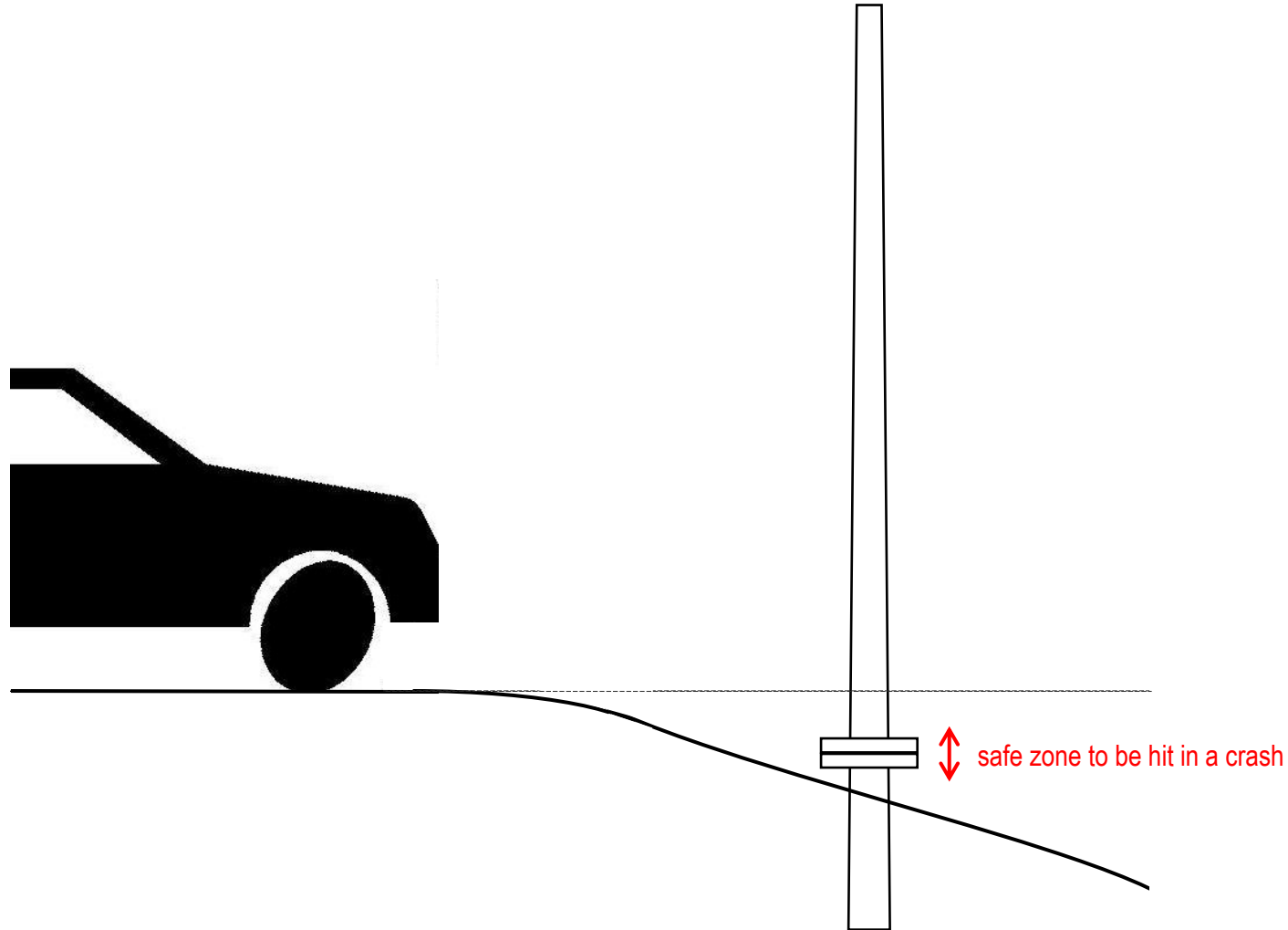
If the pole itself is a rigid pole, like this design, the system as such becomes rigid and not passive safe.



Because of no fixation into the ground, this break away device didn't break but was released from the ground.

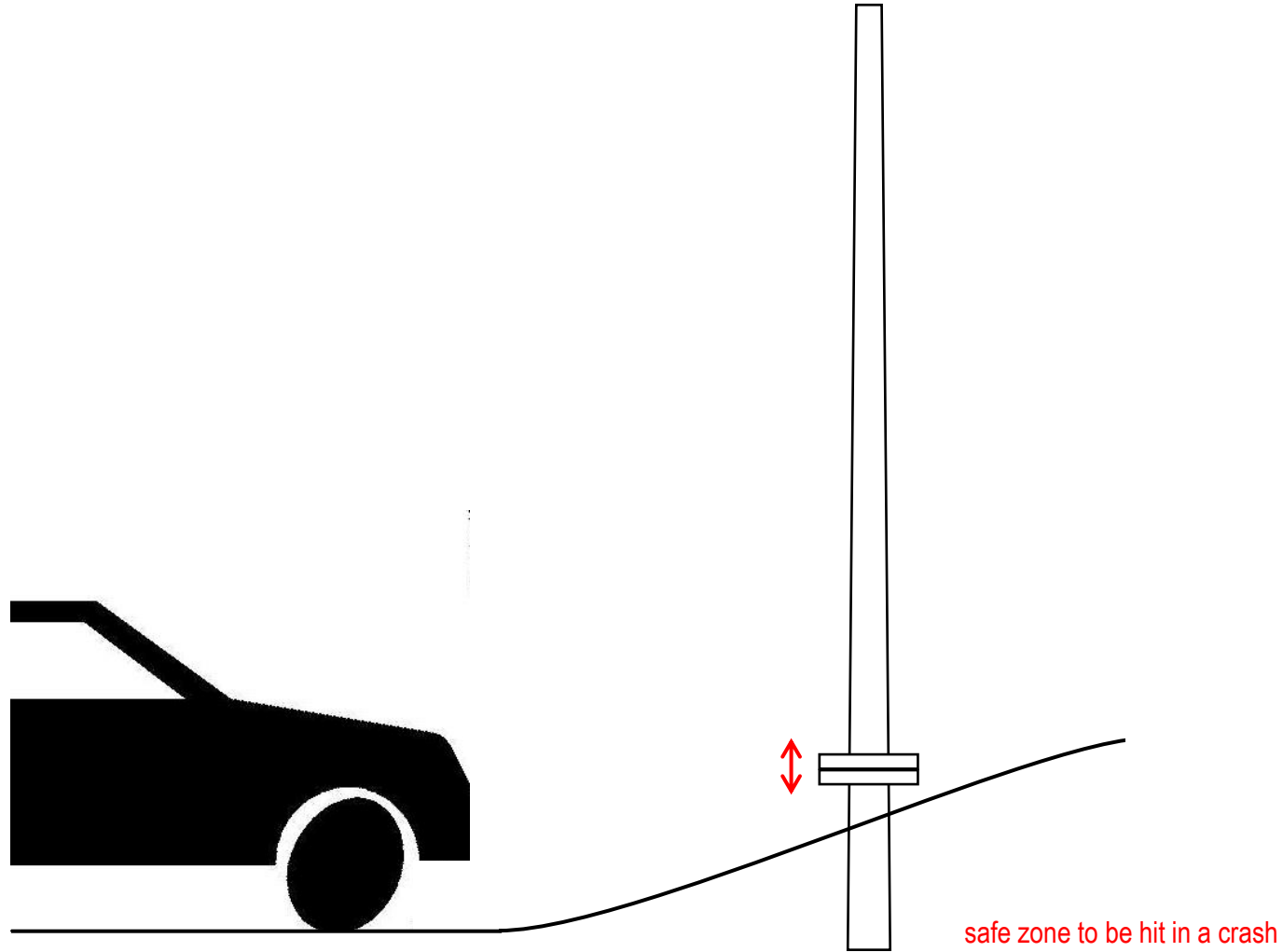
If the pole itself is a rigid pole, like this design, the system as such becomes rigid and not passive safe.

Installation



Product didn't function as it is designed to do

Installation



Product didn't function as it is designed to do

ZIPpole and experiences

How does the ZIPpole work?

- Bended plate(s) in elastic steel, riveted together

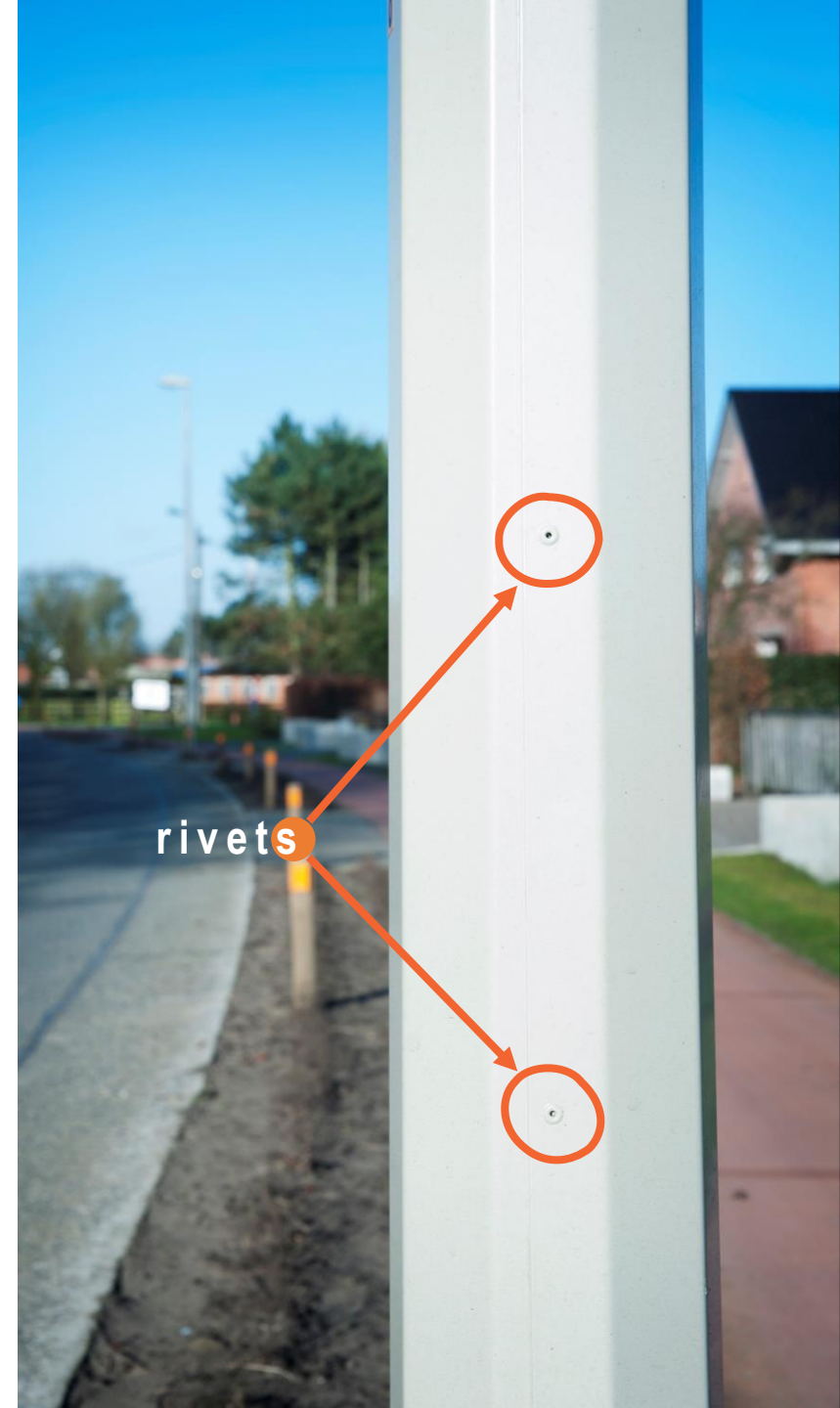
- » strong in vertical direction
- » weak in horizontal direction when hit in an impact

- The rivets collapse one by one like a ZIP

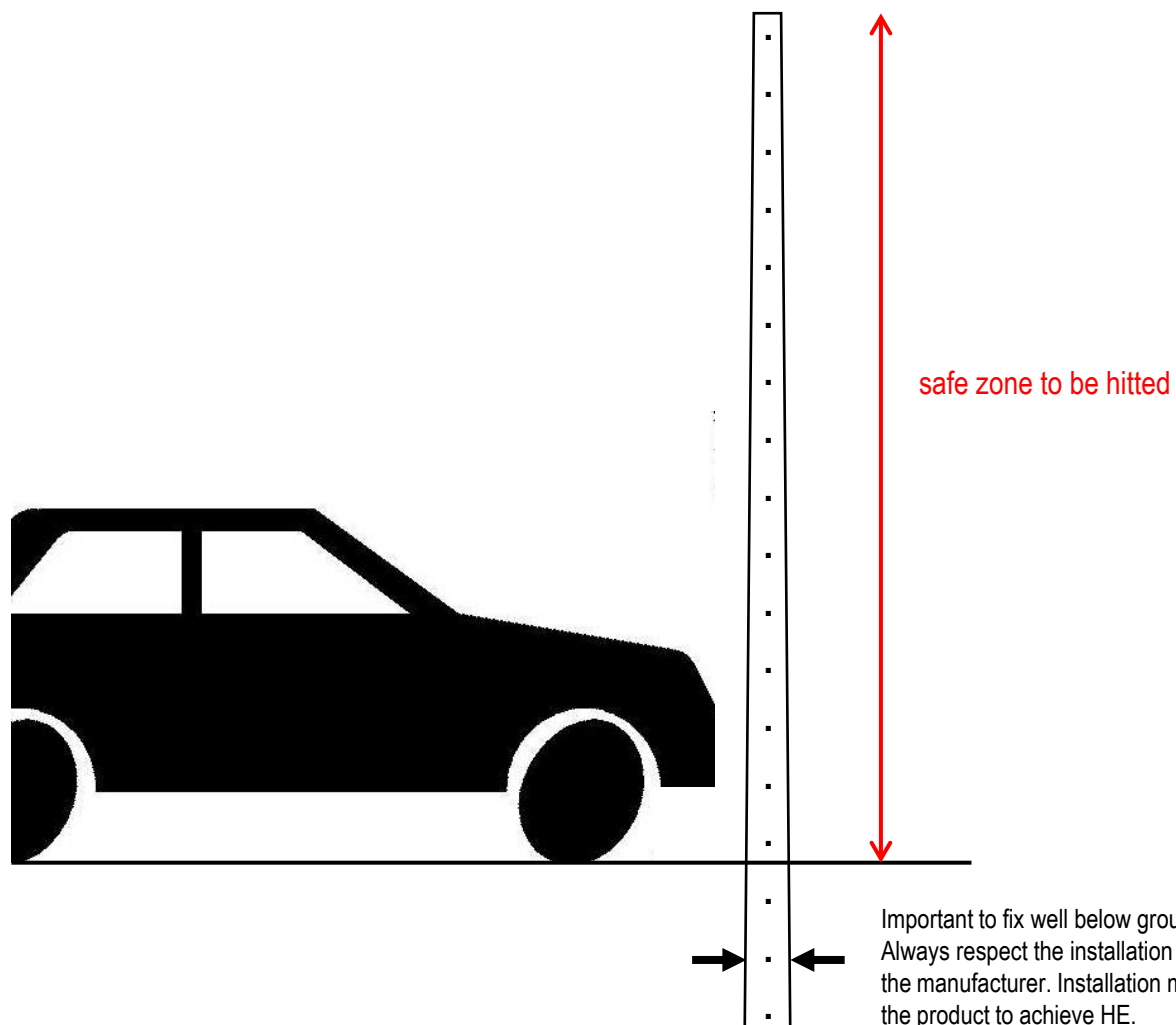
- The strong shape loses its strength and the plate bends

- The energy is absorbed by the steel resisting in bending

- The car is slowed down if fixed below groundlevel



ZIPpole



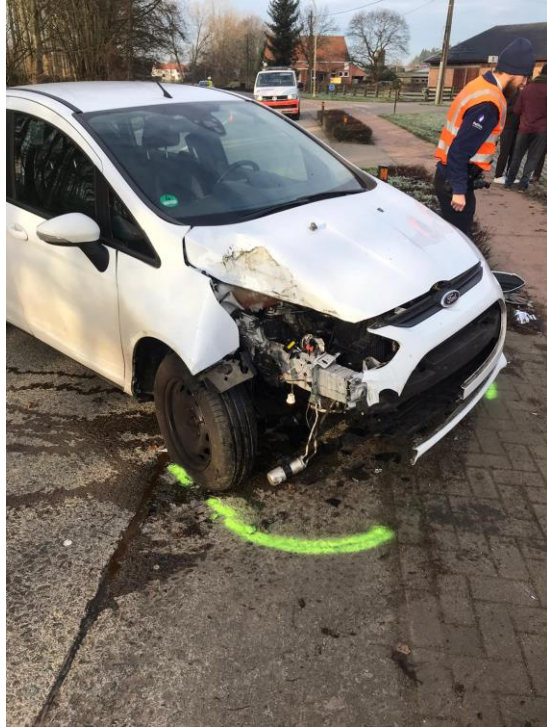
Sideways impact into the ZIPpole.

Accident into ZIPpole with a car coming
from the other direction of the road



**Accidents into the ZIPpole
check**
www.zippole.com/experiences





December 2019 : Dirk drove into a ZIPpole and thanked us on social media

<https://www.linkedin.com/feed/update/urn:li:activity:6623182296260329472/>

<https://www.facebook.com/zippolebelgium/videos/593321574569463/>

ZIPpole

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LET'S STAY
IN TOUCH...

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