



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

February 12, 2020

1200 New Jersey Ave., SE  
Washington, D.C. 20590

In Reply Refer To:  
HSST-1/B-328

Mr. Stephen Flapper  
Laura Metaal Road Safety  
Rimburgerweg 40, 6471 XX Kerkrade  
The Netherlands

Dear Mr. Flapper:

This letter is in response to your May 29, 2019 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number B-328 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

### **Decision**

The following device is eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

- SafeZone to SLED

### **Scope of this Letter**

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety-Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

### **Eligibility for Reimbursement**

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the AASHTO's MASH. Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: SafeZone to SLED  
Type of system: Longitudinal Barrier, Transition  
Test Level: MASH Test Level 3 (TL3)  
Testing conducted by: Crashtest-service.com GmbH  
Date of request: May 29, 2019

FHWA concurs with the recommendation of the accredited crash testing laboratory on the attached form

### **Full Description of the Eligible Device**

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

### **Notice**

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter. Any modifications to this device should be submitted to the user (i.e., state DOT) as per their requirements.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of AASHTO's MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

**Standard Provisions**

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-328 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.
- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M".

Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

Enclosures

## Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

<b>Submitter</b>	Date of Request:	29-05-2019	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Stephan Flapper	
	Company:	Laura Metaal Road Safety	
	Address:	Rimburgerweg 40, 6471 XX Kerkrade	
	Country:	The Netherlands	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

**Device & Testing Criterion** - Enter from right to left starting with Test Level

!-!-!

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	SafeZone to SLED	AASHTO MASH	TL3

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

**Individual or Organization responsible for the product:**

Contact Name:	Stephan Flapper	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Laura Metaal Road Safety	Same as Submitter <input checked="" type="checkbox"/>
Address:	Rimburgerweg 40, 6471 XX Kerkrade	Same as Submitter <input checked="" type="checkbox"/>
Country:	The Netherlands	Same as Submitter <input checked="" type="checkbox"/>
Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.		
With respect to Laura Metaal Road Safety, Crashtest-service.com GmbH does not hold any financial interests. Laura Metaal Road Safety contracted Crashtest-service.com GmbH for the services of crash testing our product SafeZone - SLED transition piece according to specifications of AASHTO Manual for Assessing Safety Hardware (MASH) Tests 3-21. Crashtest-service.com GmbH was compensated for the cost of the crash tests. No consulting relationship, research funding or other forms of research support, patents, copyrights, other intellectual property interests, licenses, contractual relationships, business ownership or investments interests are retained for Crashtest-service.com GmbH.		

## PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware	
<p>The SafeZone to SLED system is a modular high containment low deflection steel barrier treated with the SLED water filled crash cushion. The SafeZone barrier and SLED crash cushion are attached to each other by means of the SafeZone to SLED transition. The SafeZone to SLED combines two MASH Eligible proprietary systems reference within Eligibility Letters (SafeZone barrier) B-292, B-293, B-294, and B-295 (SLED crash cushion) CC-131.</p> <p>The SafeZone barrier consist of individual 19 ft (5.8 m) (19') sections that can quickly be connected together to form the desired total length of barrier wall. Joining of the sections is done by linking them together and applying one security bolt per section to keep the sections securely fastened. Anchor bolts are used to secure the Safe Zone barrier to the road surface. Anchor bolts are used at the two outer positions, the second position on section one and the second position and on every second element thereafter. Threaded anchor bolts used are 11.8 in (0.30 m) long and 1.18" (0.030 m) diameter. All anchors were epoxied into the test surface.</p> <p>The SLED consists of three water filled Modules, one empty Module and one Containment Impact Sled (CIS). Water filled modules weigh approx. 2000lbs (907 kg) when filled. Each water filled module contains a fill lid, which incorporates a pop up float water level indicator for identifying that modules are filled to the appropriate level. Permanently moulded within the plastic modules are four corrosion resistant cables. The modules are designed with knuckles at the ends which contains a series of vertically aligned concentric holes that allow a steel t-pin to be inserted to connect adjacent modules together. When modules are pinned together there are a total of eleven knuckles aligned with the steel t-pin inserted. This provides a positive connection between adjacent modules. At the front of the SLED system is the steel CIS that is connected to the empty front module. The empty module is identical in design to the water filled modules. The SafeZone to SLED transition consists of four main components: one Safe Zone SLED transition element, two rear SLED re-directive transition panels, two intermediate/front re-directive transition panels, and two anti-rotation frames.</p> <p>The SafeZone SLED transition element is installed to the end of the barrier by lowering the transition element onto the exposed barrier end. The rearmost SLED Module is connected directly to the transition element by means of a t-pin inserted into a series of concentric holes within the Module that align with mating holes within the transition element. Installed between the two rearmost adjacent modules is a set of anti-rotation frames which contains a series of vertical outboard bolt holes used to attached the two rearmost modules with fitted re-directive panels that are bolted to the anti-rotation frames. In the event of an upstream side impact into the transition the re-directive panels guide the vehicle along the side of the crash cushion. The re-directive panels are bolted to the anti-rotation frames and form a smooth transition between the barrier and the crash cushion.</p>		
<h3>CRASH TESTING</h3>		
<p>By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.</p>		
<b>Engineer Name:</b>	Peter Schimmelpfennig	
<b>Engineer Signature:</b>	<b>Peter Schimmelpfennig</b> <small>Digital unterschrieben von Peter Schimmelpfennig Datum: 2019.06.07 10:57:00 +02'00'</small>	
<b>Address:</b>	Amelunxenstraße 30, 48167 Münster	Same as Submitter <input type="checkbox"/>
<b>Country:</b>	Germany	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)		Non-Relevant Test, not conducted
3-11 (2270P)		Non-Relevant Test, not conducted
3-20 (1100C)	Optional Test 3-20 was not conducted as there was no reasonable uncertainty regarding the occupant risk and postimpact trajectory for small passenger vehicles.	Non-Relevant Test, not conducted
3-21 (2270P)	<p>Test TL3 3-21 (11717-3236/19042-2) downstream.</p> <p>The SafeZone to SLED was positioned at a nominal angle of 25° with the center line of the impacting vehicle directed at the SafeZone to SLED transition element that connects to the rearmost SLED water filled module. The side angled impact test is to evaluate the transition systems ability to redirect the impact vehicle. The CIP was selected as the most probable point on the transition element that had the potential for vehicle wheel snag, pocketing, propensity for underride and override.</p> <p>The test was conducted using a commercially available 201 Ram 1500 4-door pickup truck with a test inertial mass of 5066 lbs (2298 kg). The test vehicle impacted the system at a velocity of 63.9 mph (102.9 km/h) and at an impact angle of 25°. First contact was 316.9" (8.05 m) from the start of the installed system (planned impact point: 324.0" (8.23 m) from start). The impact area extended over 166.5" (4.23 m). Permanent maximum deflection was 0.0" (0.0 m).</p> <p>Test TL3 3-21 (11717-3311/19097-2) upstream.</p> <p>First contact was 1597.2" (40.57 m) from the start of the installed system (planned impact point: 1603.1" (40.72 m) from start). Permanent maximum deflection was 27.6" (0.67 m).</p> <p>The impacting vehicle remained upright, and did not exhibit vaulting throughout the impact event. The test vehicle's occupant compartment was not penetrated and there was no in cab deformation beyond allowable limits. The maximum roll and pitch angles did not exceed 75° and occupant risk values were within limits per MASH specifications for Occupant Impact Velocity (OIV) and Ridedown Acceleration (RA).</p>	PASS

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	Crashtest-service.com GmbH	
Laboratory Signature:	<b>Peter Schimmelpfennig</b>	Digital unterschrieben von Peter Schimmelpfennig Datum: 2019.06.07 10:57:37 +02'00'
Address:	Amelunxenstraße 30, 48167 Münster	Same as Submitter <input type="checkbox"/>
Country:	Germany	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	D-PL-17359-01-00, 02-May-2018	

Submitter Signature\*: Stephan Flapper

Digitaal ondertekend door  
Stephan Flapper  
Datum: 2019.06.14 09:08:38  
+02'00'

Submit Form

## ATTACHMENTS

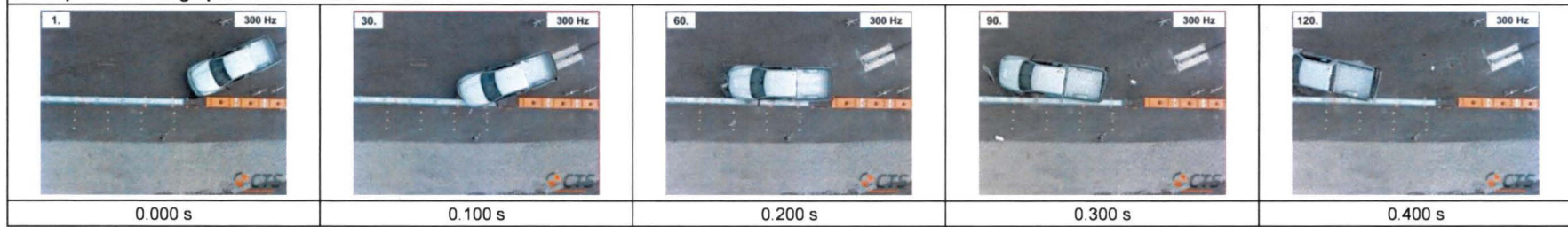
Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

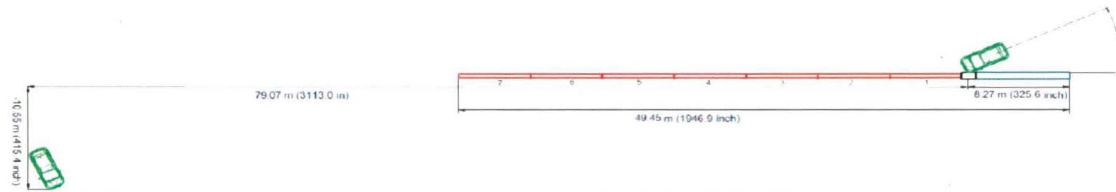
FHWA Official Business Only:

Eligibility Letter		Key Words
Number	Date	

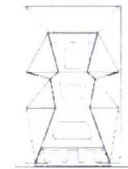
### 1. Sequential Photographs



### 2. Plan View



### 3. Cross-Sectional View



### 4. General Information

Test Agency	crashtest-service.com GmbH (CTS)
Test Standard	MASH Test TL 3-21
CTS-Test No	19042
Date	August 28, 2018

### 5. Test Article

Type	Transition Steel Barrier- Cushion
Name	SafeZone-SLED Transition
Installation Length	49.45 m (1946.9 in)
Key Elements – Barrier (Transition-element)	Length: 1.34 m (52.8 in) Base Width: 0.60 m (23.6 in) Height: 0.96 m (37.8 in)

### 6. Soil Type and Condition

Type of Soil	Asphalt
Soil Strength	/
Condition	Dry, sunny, 28.9° C (84.02° F)

### 7. Test Vehicle

Type/Designation	2270P
Make and Model	2016 Dodge Ram 1500 Pickup
Curb	2250 kg (4960 lb)
Test Inertial	2298 kg (5066 lb)
Dummy	/ kg (lb)
Gross Static	2298 kg (5066 lb)

### 8. Impact Conditions

Speed	102.9	km/h (63.94 mph)
Angle	25	degrees
Location/Orientation	0.76 m (29.9 in) before transition of elements T1 / 1	

### 9. Exit Conditions

Speed	83.3	km/h (51.76 mph)
Angle	10	degrees

### 10. Post-Impact Trajectory

Vehicle Stability	Satisfactory	
Stopping Distance	79.07	m (259.4 ft) downstream
	- 10.55	m (34.6 ft) laterally in front

Vehicle Snagging	None	
Vehicle Pocketing	None	

### 11. Occupant Risk

Impact Velocity		
Longitudinal	4.15	m/s (13.6 ft/s)
Lateral	8.34	m/s (27.4 ft/s)

Ridedown Accelerations (10 msec avg.)		
Longitudinal	- 4.29	g
Lateral	8.61	g

THIV	8.6	m/s (28.2ft/s)
PHD	17.2	g
ASI	1.6	

<b>12. Test Article Damage</b>		
Classification	Moderate	
Particularities	None	

<b>13. Test Article Deflections</b>		
Dynamic Deflection	0.0	m (0.0 in)
Permanent Deflection	0.0	m (0.0in)
Dynamic Working Width	0.69	m (27.2 in)
Permanent Working Width	0.69	m (27.2in)

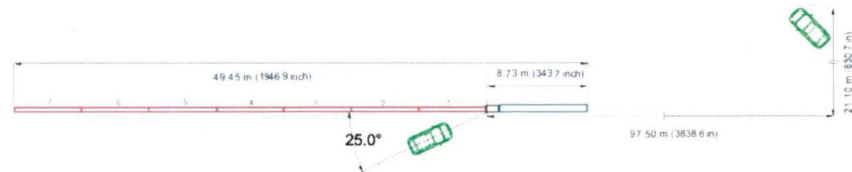
<b>14. Vehicle Damage</b>		
Classification	Moderate	
VDS	11-LFQ-4	
CDC	11LDEW2	
Max. Exterior Deformation	335 mm (13.2 in)	
Max. Interior Deformation	87 mm (3.4 in)	
OCDI	LF0013010	



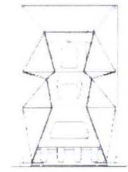
### 1. Sequential Photographs



### 2. Plan View



### 3. Cross-Sectional View



### 4. General Information

Test Agency	crashtest-service.com GmbH (CTS)
Test Standard	MASH Test TL 3-21
CTS-Test No	19097
Date	December 18, 2018

### 5. Test Article

Type	Transition Steel Barrier- Cushion
Name	SafeZone-SLED Transition
Installation Length	49.45 m (1946.9 in)
Key Elements – Barrier (Transition-element)	Length: 1.34 m (52.8 in) Base Width: 0.60 m (23.6 in) Height: 0.96 m (37.8 in)

### 6. Soil Type and Condition

Type of Soil	Asphalt
Soil Strength	/
Condition	Dry, cloudy, 15.1° C (59.18° F)

### 7. Test Vehicle

Type/Designation	2270P	
Make and Model	2012 Dodge Ram 1500 Pickup	
Curb	2290	kg (5049 lb)
Test Inertial	2324	kg (5124 lb)
Dummy	/	kg ( lb)
Gross Static	2324	kg (5124 lb)

### 8. Impact Conditions

Speed	100.9	km/h (62.7 mph)
Angle	25	degrees
Location/Orientation	0.05	m (2.0 in) before transition of elements 1 / T1

### 9. Exit Conditions

Speed	67.5	km/h (41.9 mph)
Angle	7	degrees

### 10. Post-Impact Trajectory

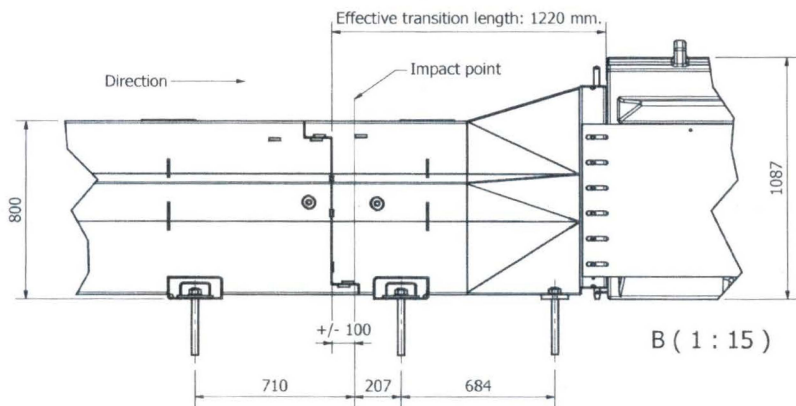
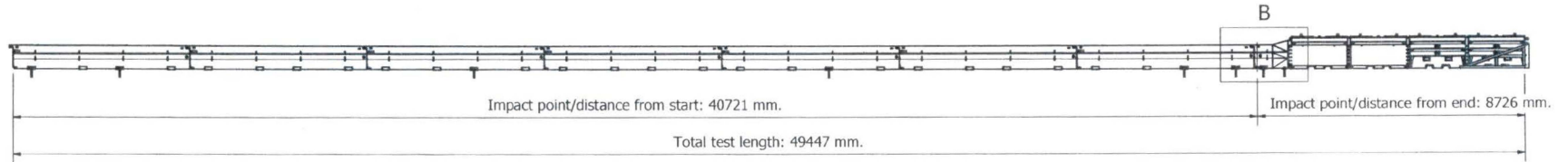
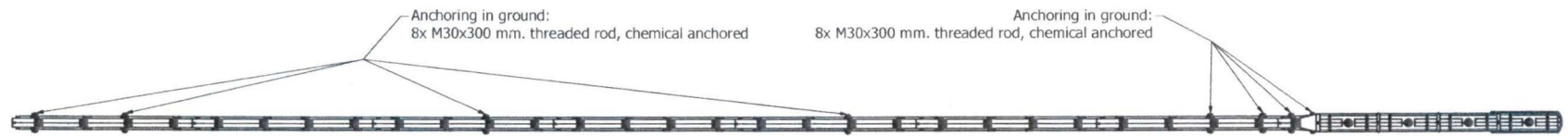
Vehicle Stability	Satisfactory	
Stopping Distance	97.5	m (319.9 ft) downstream
	- 21.1	m (69.2 ft) laterally in front

Vehicle Snagging	None	
Vehicle Pocketing	None	

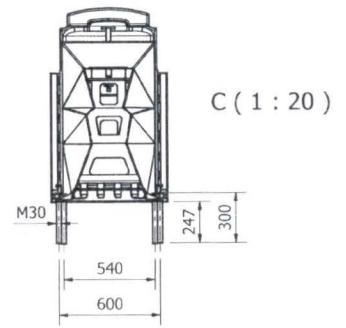
### 11. Occupant Risk

Impact Velocity		
Longitudinal	8.77	m/s (28.8 ft/s)
Lateral	7.04	m/s (23.1 ft/s)
Ridedown Accelerations (10 msec avg.)		
Longitudinal	7.30	g
Lateral	4.24	g

THIV	11.0	m/s (36.1ft/s)
PHD	25.4	g
ASI	1.8	
<b>12. Test Article Damage</b>		
Classification	Moderate	
Particularities	None	
<b>13. Test Article Deflections</b>		
Dynamic Deflection	1.3	m (51.2 in)
Permanent Deflection	0.7	m (27.6 in)
Dynamic Working Width	2.2	m (86.6 in)
Permanent Working Width	2.1	m (82.7 in)
<b>14. Vehicle Damage</b>		
Classification	Moderate	
VDS	11-LFQ-4	
CDC	11FDEW4	
Max. Exterior Deformation	417 mm (16.4 in)	
Max. Interior Deformation	228 mm (9.0 in)	
OCDI	LF0112121	



ITT test; SafeZone - SLED transition  
 Test level; MASH TL3-37 LDS  
 Test vehicle: 2270P (pick-up)  
 Speed: 62 mph (100 km/uur)  
 Impact angle: 25°



Pos.	Aant.	Artikelnummer	Titel	Omschrijving	Material
5	1		SLED Crash Cushion	TL3 configuration	
4	16	KE31840030	SafeZone, M30 verankering	Verankering M30x300 mm	
3	7	AS31840020	Safezone, standard insert	Assembly	
2	7	AS31840000	SafeZone, standard barrier complete		
1	1	AS31841003	SafeZone, SLED overgang	Lassamenstelling female	

Pos.	Aant.	Artikelnummer	Titel	Omschrijving	Material

<b>LAURA METAAL</b>	Massa	N/A
<b>ROAD SAFETY</b>	Amerikaanse projectie	

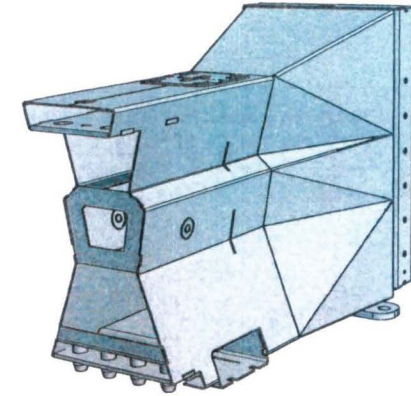
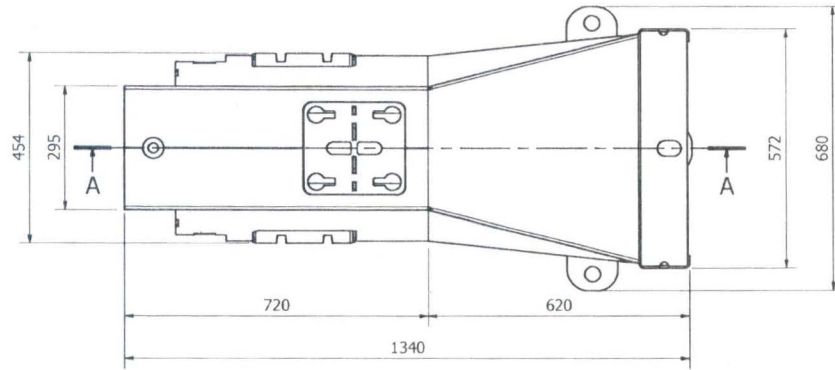
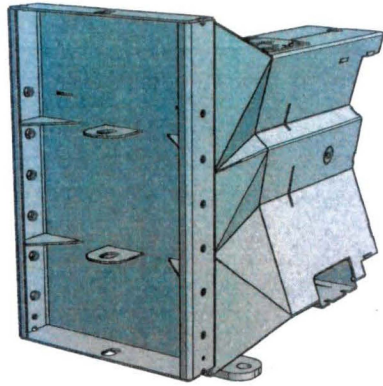
  

Tekenaar	ramaekers	Geleend	16-8-2018	Maatverhoud	Titel	Schaal
Controle	Gacontroleerd			mm	ITT test SafeZone - SLED transition	
Opmerking					MASH test TL3 LDS (7 elements)	Formaat
						A2

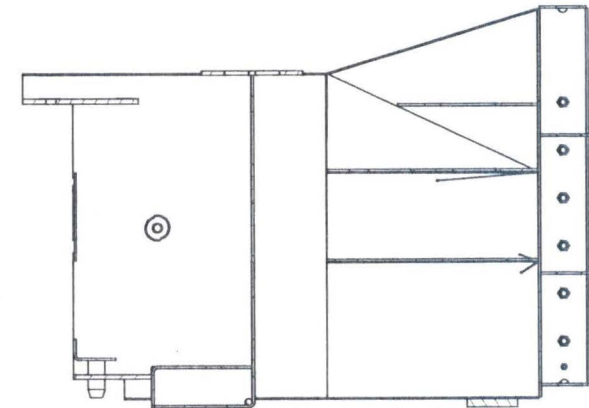
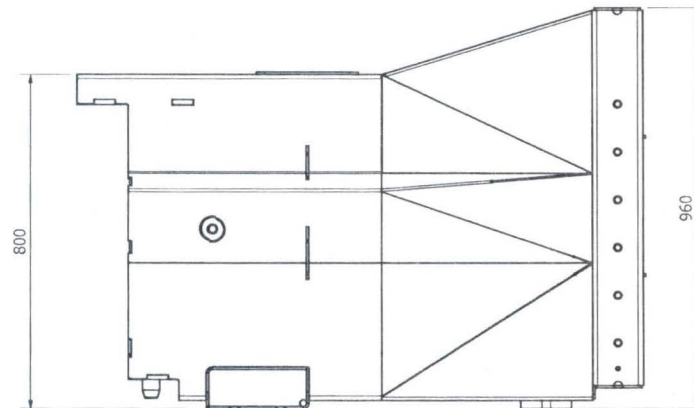
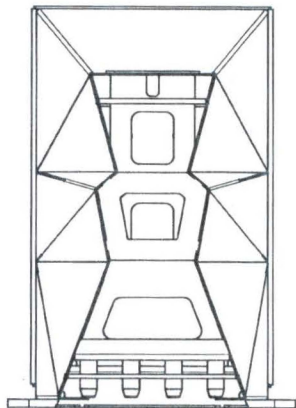
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LAURA METAAL EYGELSHOVEN BV, Rimburchweg 40, NL-5471 XX Kerkrade, tel. +31 (0)45 - 546 88 88, www.laurametaal.nl

*[Handwritten signature]*  
 7-2-19

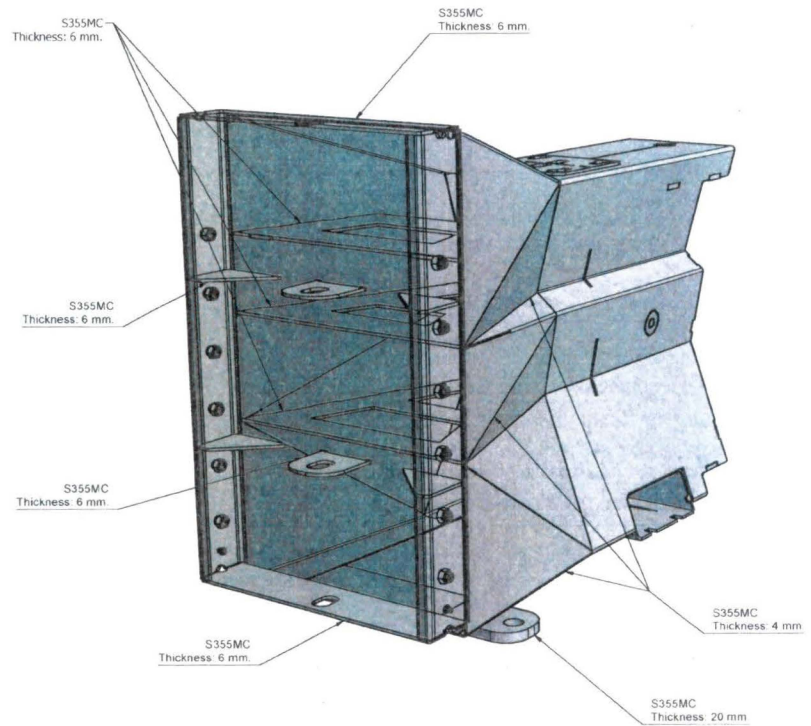
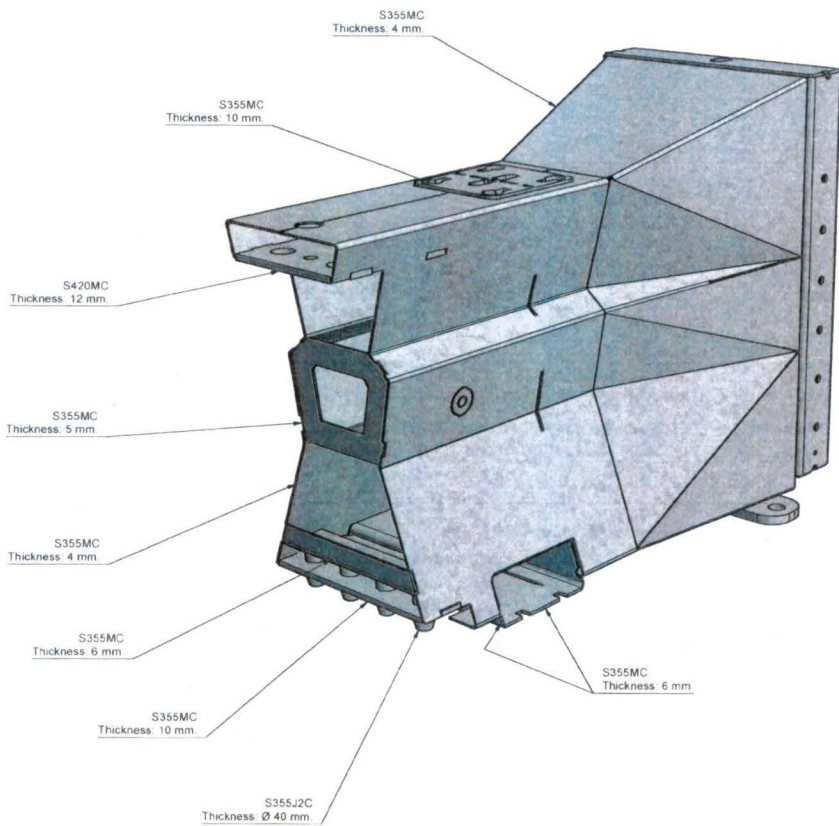


A-A ( 1:8 )



*[Handwritten signature]*  
5-2-2019

<b>Laura Metaal</b> ROAD SAFETY		Materiaal	188.34 kg	Afgevoerd	NEALISO 3/8x6	Verbindings	NEALISO 100x6	Laster	NEALISO 3/8x6	Thermisch vreten	NEALISO 3/8x6
Tekenaar		ramaeckers	Getekend	5-2-2019	Maateenheid	mm	Artikeelnummer	AS31841004		Revisie	
Controle		Gecontroleerd					Titel		SafeZone, SLED overgang		Schaal
Opmerking		Thermisch verzinken vigs_NEN1461				Omschrijving		Lassamenstelling female		Formaat	A2
<small>Het auteursrecht van deze tekening wordt door ons voorbehouden. De afprinten en verspreiden van deze tekening is strafbaar. Het is niet toegestaan deze tekening te kopiëren of te verspreiden. Het is niet toegestaan deze tekening te kopiëren of te verspreiden. Het is niet toegestaan deze tekening te kopiëren of te verspreiden.</small> LAURA METAAL EYSELHOVEN BV, Rimburchweg 40, NL-6471 XX Kerkrade, tel +31 (0)45 - 546 38 88 , www.laurametaal.nl											



*[Handwritten Signature]*  
2-2-19

<b>Laura Metaal</b> ROAD SAFETY	Materiaal	Agglomerat massakunsten	Soort afwerk opbouw	Laastr type	Thermisch verzink type
	Massa	188,34 kg	NEN 450 2/64	NEN EN ISO 12001	NEN EN ISO 9010
Amenkaanso projectie		Ankernummer <b>AS31841004</b>		Revisie	
Tekenaar	ramakers	Geleend	16-11-2018	Maatvoet	Schaal
Controle	Gecontroleerd	mm		Titel SafeZone, SLED overgang	
Opmerking		Thermisch verzinken vlg. NEN 1461		Omschrijving	
Het auteursrecht van deze tekening wordt door ons voorthouden. Zij blijft ons eigendom en mag zonder toestemming niet gepubliceerd of anderszins openbaar verspreid worden.		Lassamenstelling		Formaat <b>A2</b>	
LAURA METAAL EYGLSHOVEN BV, Rimburchweg 40, NL 6471 XX Kerkrade, tel: +31 (0)45-546 88 88, www.laurametaal.nl					