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CENTRO PROVE AISICO

LABORATORIO ACCREDITATO AI SENSI DELLA NORMA UNI CEI EN ISO / IEC 17025:2005
ACCREDITED LABORATORY ACCORDING TO NORM UNI CEI EN ISO / IEC 17025:2005

RAPPORTO DI PROVA n° 1190
CRASH TEST REPORT # 1190

Tipologia prova: (Test type)
Veicolo leggero – TB11
Light vehicle – TB11

Tipologia barriera: (Test item)
Barriera di sicurezza bordo laterale cl. H2 mod. SafeStar 231
H2 Safety barrier for side edge mod. SafeStar 231

Committente: (Client)
SAFEROAD RRS GmbH

Data della prova: (Date of Test)
2014/12/16

Normativa di riferimento – Reference Standard:
EN 1317-1 :2010 del 07/2010
EN 1317-2:2010 del 07/2010

Lingua ufficiale di riferimento
(Official test report language)
Italiano / Italian

Numero pagine allegati compresi
(Number of pages including annexes)
121

Data Rapporto di Prova
(Date of report)
2015/03/03

Responsabile Scientifico della prova
(Test Scientific Responsible)
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(Test House Director)
Ing. Stefano Calamani

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All. F – Certificato di accreditamento ACCREDIA del Centro Prove AISICO – *ACCREDIA accreditation certificate of AISICO Test Centre*

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Gli allegati formano parte integrante del Rapporto di prova. / *The Annexes are an integral part of the Test Report.*

1 Laboratorio di prova – *Test Laboratory*

LABORATORIO DI PROVA – *TEST LABORATORY*	
NOME – *BUSINESS NAME*	**AISICO S.r.l.**
INDIRIZZO – *ADDRESS*	Viale Bruno Buozzi 47, 00197 Roma, Italia
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SITO WEB – *WEB SITE*	**www.aisico.it**

CENTRO PROVE AISICO – *TEST HOUSE*	
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FAX – *FAX NUMBER*	+39 06 32502282

Il Centro Prove è posizionato all'interno di uno stabilimento di superficie pari a 16 ettari, situato nel comune di Pereto, in provincia dell'Aquila, circa 40 km a est di Roma, nei pressi del casello dell'Autostrada Roma – Teramo.

Il campo è dotato di tre binari di lancio, posizionati rispettivamente a 15°, 20° e 25° rispetto all'asse del dispositivo da testare, che consentono ai veicoli di raggiungere la velocità richiesta per la prova oltre a mantenere perfettamente la traiettoria impostata.

È altresì presente un binario con angolo di inclinazione di 30° per crash su dispositivi di sicurezza riguardanti motociclisti.

AISICO Test Centre is located inside a 16 hectare facility in Pereto, in the province of Aquila, within about 40 km north of Rome, served by the Rome – Teramo motorway.

The site features three launching tracks – set at angles of 15°, 20° and 25° respectively to the axis of the device to be tested – allowing vehicles to reach the necessary test speed and to perfectly keep on the set trajectory.

There is also a launching track set at an angle of 30° for the crash testing of motorcycle safety devices.

ACCREDITAMENTO DEL CENTRO PROVE AISICO – *AISICO'S TEST CENTRE ACCREDITATION*	
ENTE DI ACCREDITAMENTO *ACCREDITATION BODY*	**ACCREDIA** L'Ente Italiano di Accreditamento
NUMERO DI ACCREDITAMENTO *ACCREDITATION NUMBER*	**0424**
NORME DI RIFERIMENTO *REFERENCE STANDARDS*	UNI EN CEI ISO / IEC 17025 : 2005 "Requisiti generali per la competenza dei laboratori di prova e taratura"
NORME DI ACCREDITAMENTO *ACCREDITATION STANDARDS*	UNI EN 1317-1/2/3 : 2010; UNI ENV 1317-4 : 2003; UNI CEN/TS 1317-8 : 2012; UNI EN 12767 : 2008; UNE 135900-1/2 : 008; UNI CEN/TS 1793-4 : 2004; UNI CEN/TS 1793-5 : 2006; UNI EN 14726 : 2005; ASTM E415 :2008; UNI EN ISO 6508-1 : 2006; UNI EN ISO 6892-1 : 2009; AASHTO _ Manual for Assessing Safety Hardware :2009; NCHRP Report 350:1993; PrEN16272-6:2012; PrEN16272-3-2:2012; PrEN/TS16272-5:2012; PAS 68/69:2013; ASTM F2656-07; ISO-IWA14-1/2:2014.
NOTE:	- si dichiara che alla data di emissione del presente rapporto di prova, nonché alla data di esecuzione della relativa prova, il Centro Prove AISICO non aveva in corso procedure di sospensione o revoca dell'accreditamento. - *AISICO declares that neither pending suspension proceedings or accreditation revocation were ongoing when the present test report was issued and the relevant crash test was performed.*
* Copia della certificazione di accreditamento è presente nel rapporto come Allegato F * *A copy of accreditation certification is in the Annex F*	

2 Cliente – *Customer*

GENERALITÀ – *PARTICULARS*	
NOME – *NAME*	**SAFEROAD RRS GmbH**
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SITO WEB – *WEB SITE*	**www.saferoad.com**

3 Dispositivo di prova – *Test item*

BARRIERA DI SICUREZZA – *SAFETY BARRIER*	
TIPO DI DISPOSITIVO *INSTALLED TEST DEVICE*	**Barriera di sicurezza bordo ponte classe H2 mod. SafeStar 231** *H2 Safety barrier for side edge mod. SafeStar 231*
DATA DI RICEVIMENTO MATERIALE *TEST DEVICE RECEIPT DATE*	**2014/12/15**
DATA DELLA PROVA *TEST DATE*	**2014/12/16**
NUMERO DELLA PROVA *TEST NUMBER*	**1190**

4 Procedura di prova – *Test procedure*

4.1 Descrizione della prova – *Test description*

NORMA DI RIFERIMENTO *REFERENCE STANDARD*	**UNI EN 1317-1: 2010 / 1317- 2: 2010**
TIPO DI PROVA *IMPACT TEST TYPE*	**TB11**
VELOCITÀ TEORICA DEL MEZZO *THEORETICAL VEHICLE SPEED*	**100 km/h** $^{+7\% / -0\%}$
ANGOLO TEORICO D'IMPATTO *THEORETICAL IMPACT ANGLE*	**20°** $^{+1.5° / -1°}$
MASSA TEORICA DEL MEZZO *THEORETICAL VEHICLE MASS*	**900** $^{\pm 40}$ **kg**
ENERGIA TEORICA D'IMPATTO *THEORETICAL IMPACT ENERGY*	**40,6 kJ**

4.2 Area di prova – *Test area*

L'area di prova comprende una zona pavimentata di lunghezza 100 m e larghezza 20 m, un cordolo in cemento armato per il posizionamento di dispositivi per opere d'arte ed una zona di terreno retrostante per il posizionamento di dispositivi su terra.

The test site consists of an asphalted area which is 100 m long and 20 m wide, a reinforced concrete curb for the installation of bridge side test devices and an unpaved area beyond the curb to install edge side test devices.

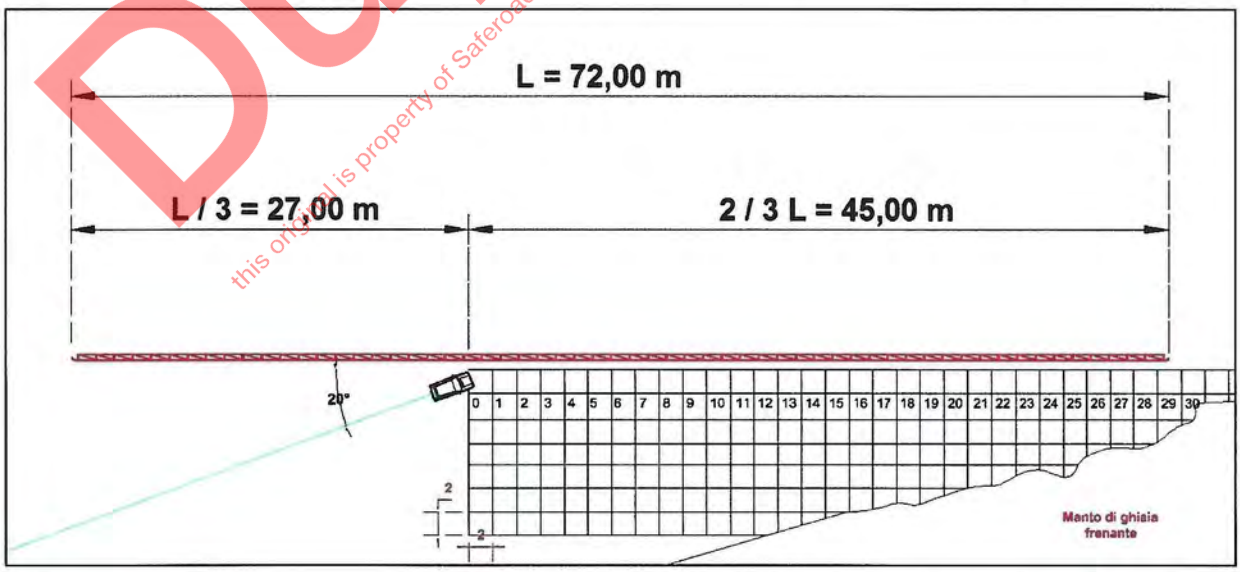


Figura 1 – *Figure 1* Rappresentazione della traiettoria d'impatto – *Vehicle's impact trajectory*

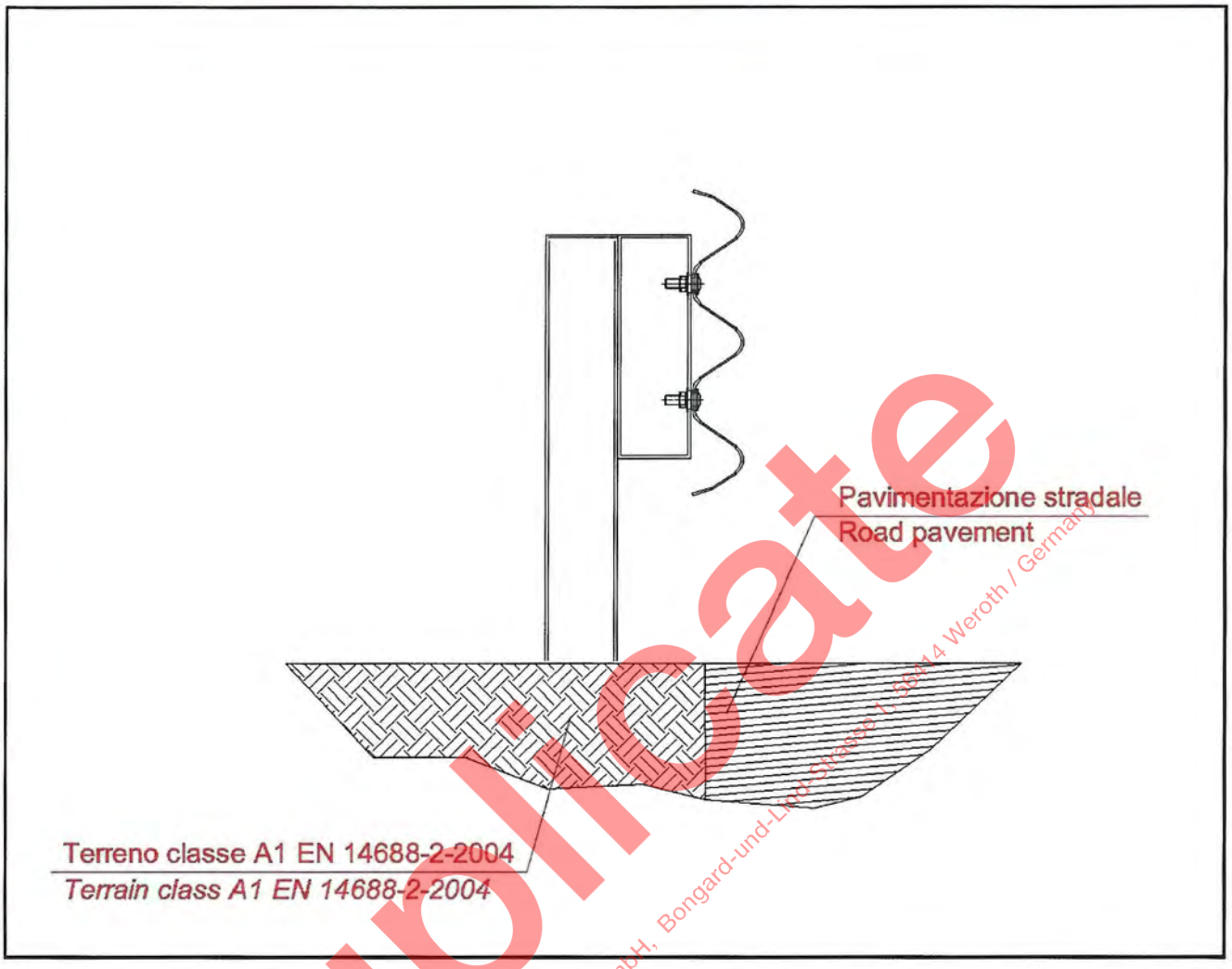


Figura 2 – *Figure 2* Sezione dell'installazione – *The installation section*

Il dispositivo testato è stato infisso in terreno costituito da ghiaia calcarea in matrice sabbioso limosa di classificazione A-1-a secondo le norme EN 14688-2:2004. In allegato E sono riportati i certificati dell'analisi granulometrica e della caratterizzazione geotecnica del terreno, nonché i risultati di prova di carico su piastra secondo la norma CNR 146/92.

The tested device has been driven into A-1-a limestone gravel soil in sandy muddy matrix, in accordance with EN 14688-2:2004 standards. Annex E contains granulometric and geotechnical analysis certificates as well as the results of plate loading tests carried out in accordance with CNR 146/92 standards.

4.3 Descrizione dell'installazione e dei particolari del dispositivo – *Test device installation description and technical specifications*

	SI/*YES*	NO/*NOT*	NOTE/*NOTES*
CONFORMITÀ TRA DISPOSITIVO RAPPRESENTATO NEI DISEGNI E DISPOSITIVO TESTATO *DRAWINGS ARE IN ACCORDANCE WITH TEST DEVICE*	X		
CONFORMITÀ TRA INSTALLAZIONE TEORICA DEL DISPOSITIVO ED INSTALLAZIONE REALIZZATA *THEORETICAL BARRIER INSTALLATION IS IN ACCORDANCE WITH TEST DEVICE INSTALLATION*	X		

Il dispositivo testato è una barriera stradale metallica realizzata con nastri longitudinali e paletti (All. A).

La barriera è costituita da:

- Paletti C 125x62,5x25 mm, spessore 5,0 mm, di lunghezza 1,60 m, disposti con un interasse pari a 1,50 m, infissi nel terreno per 0,81 m;
- Nastro a tripla onda di lunghezza 4,820 m, altezza 0,508 m e spessore 2,5 mm, con bordo superiore posizionato a 0,90 m dal piano stradale;
- Distanziatore C 125x62,5x25 mm, spessore 5,0 mm, di lunghezza 275 mm.
- Piastrine, copriasole morsetti e bulloni come indicato nei disegni di cui all'allegato A.

Il dispositivo è stato fornito a cura e responsabilità del Cliente; l'istallazione è stata effettuata e controllata dall'AISICO.

Tutte le misure indicate sono al netto della zincatura e sono state rilevate dall'AISICO prima dell'esecuzione della prova.

Gli elementi principali del dispositivo sono stati sottoposti a prove di caratterizzazione eseguite su 3 campioni per ogni elemento, ricavati da elementi non disturbati.

Gli elementi principali e le zone dei manufatti dove effettuare i prelievi sono stati individuati di concerto tra il progettista del sistema e l'AISICO.

Le prove eseguite hanno fornito i seguenti risultati (All. G):

The tested device was a road safety metal barrier made up of beams and posts (Annex A).

The barrier consisted of:

- *C 125x62,5x25 mm, 5,0 mm thick, 1,60 m length steel posts, 1,50 m length axis distance, driven into the ground to 0,81m;*
- *4,820 m length, 0,508 m high and 2,5 mm thick triple wave beam, the top of which was positioned to 0,90 m from road surface;*
- *C steel spacer 125x62,5x25 mm, 275 mm length 5,0 mm thick.*
- *Washers, nuts and bolts as shown the attached drawings (Annex A).*

The test device was sampled, delivered installed by the customer; the installation of device has been carried out and controlled by AISICO.

All measures indicated in the attached drawings did not include zinc-coating and were verified by AISICO before the test was performed.

Three unchanged samples of the most important test item elements were analyzed and characterized for each element of the barrier.

The most important elements as well as portions of the barrier to be sampled were identified as agreed by the barrier manufacturer and AISICO.

The results were the following (Annex G):

ELEMENTO *Element*	MATERIALE* *Material**	RISULTATI *Results*		
		R_m (N/mm²)	R_{eH} (N/mm²)	A (%)
Palo C 125X62,5X25 mm – *125X62,5x25 mm Post*	S 235JR	376,59	306,71	39,46
Nastro a tripla onda – *Triple wave beam*	S 275JR	551,06	471,39	68,69

* Caratteristiche del materiale dichiarate dal produttore / *Characteristic of material declared by the manufacturer*

I bulloni utilizzati per il montaggio del dispositivo e le relative forze di serraggio sono indicati nella seguente tabella.

The bolts used for the test device installation and the related clamping couples are shown in the following table.

BULLONE *Bolt*	DIMENSIONI *Dimensions*	CLASSE *Class*	COPPIA DI SERRAGGIO *Clamping couple*
Unione Nastro – Nastro *Beam - Beam joint*	T.T.D.E. M16x30	8.8	90 Nm
Unione Distanziatore – Nastro *Spacer - Beam joint*	T.T.D.E. M16x45	8.8	90 Nm
Unione Distanziatore – Palo *Spacer - Post joint*	T.E. M10x30	8.8	17 Nm

4.4 Descrizione del veicolo – *Vehicle description*

CARATTERISTICHE DEL VEICOLO – *VEHICLE TECHNICAL SPECIFICATIONS*	
TIPO VEICOLO *VEHICLE TYPE*	**Autovettura** - *Car*
NUMERO ASSOCIATO AL VEICOLO *VEHICLE NUMBER*	**868**
MODELLO *MODEL*	**Opel Corsa**
ANNO DI PRODUZIONE *PRODUCTION YEAR*	**1998**
NUMERO TELAIO *VEHICLE IDENTIFICATION NUMBER*	**WOLOSBF0W6109712**
MASSA A VUOTO *WEIGHT WITHOUT BALLAST*	**783,7 kg**
BARICENTRO PER LA PROVA *VEHICLE CENTRE OF GRAVITY*	X_g = 924 mm Y_g = -19 mm Z_g = 531 mm
POSIZIONE STRUMENTAZIONE *EQUIPMENT LAYOUT*	X_I = 0 mm; Y_I = 0 mm; Z_I = 0 mm; X_{II} = - 40 mm; Y_{II} = 0 mm; Z_{II} = 0 mm; X_Ω = + 40 mm; Y_Ω = 0 mm; Z_Ω = 0 mm;
TIPO ZAVORRA *BALLAST TYPE*	*II*
TIPO MANICHINO *DUMMY MODEL*	**Hybrid III 50° percentile**
POSIZIONE MANICHINO *DUMMY POSITION*	**Lato passeggero** *Passenger side*
MASSA MANICHINO *DUMMY WEIGHT*	**78 kg**
MASSA TOTALE *TOTAL WEIGHT*	**913,6 kg**

DIMENSIONI DEL VEICOLO – *VEHICLE DIMENSIONS*		
WB	**PASSO SINISTRO** *LEFT WHEEL BASE*	**2450 mm**
WB	**PASSO DESTRO** *RIGHT WHEEL BASE*	**2450 mm**
F	**SBALZO ANTERIORE** *FRONT OVERHANG*	**710 mm**
R	**SBALZO POSTERIORE** *REAR OVERHANG*	**500 mm**
L	**LUNGHEZZA VEICOLO** *VEHICLE LENGHT*	**3660 mm**
W	**LARGHEZZA VEICOLO** *VEHICLE WIDTH*	**1610 mm**
H	**ALTEZZA VEICOLO** *VEHICLE HEIGHT*	**1400 mm**
T_{ant}	**CARREGGIATA ANTERIORE** *FRONT TRACK*	**1400 mm**
T_{post}	**CARREGGIATA POSTERIORE** *REAR TRACK*	**1390 mm**

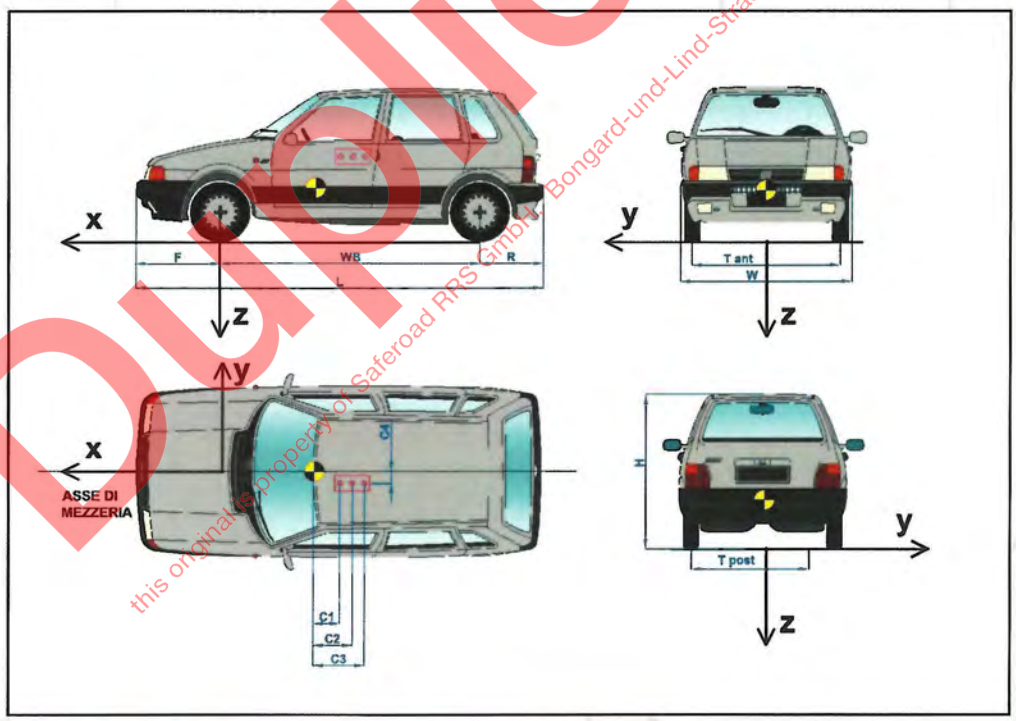


Figura 3 – *Figure 3* Dimensioni del veicolo – *Vehicle dimensions*

4.4.1 Valutazione dello stato del veicolo in data 2014/12/15 – *Vehicle roadworthiness assessment on 2014 December 15*

I pneumatici sono stati gonfiati alla pressione raccomandata dal produttore.

Le condizioni del veicolo soddisfano i requisiti per il rilascio del certificato di idoneità alla circolazione riguardo pneumatici, sospensioni, allineamento delle ruote e carrozzeria.

Non sono state apportate riparazioni, modifiche o rinforzi che possano alterare le caratteristiche generali del veicolo o possano invalidare la presente certificazione.

Il veicolo risulta pulito; eventuali presenze di fango e depositi che potrebbero causare polvere durante l'urto sono stati rimossi prima della prova.

Sulla superficie esterna del veicolo sono stati posizionati segni di riferimento per facilitare le analisi.

Il veicolo non è stato bloccato dal controllo del volante o da altri dispositivi durante l'urto e all'interno dell'area di uscita.

Tyres were inflated up to the pressure recommended by the manufacturer.

The vehicle met all the requirements for the granting of a roadworthiness certificate, with respect to tyres, suspensions, wheel alignment and body.

No repairs, modifications or strengthening work had been carried out, capable of altering the vehicle general characteristics or of invalidating this certification.

The vehicle was clean, any mud or other deposits capable of causing dust during the collision had been removed before the test.

Marks had been made on the exterior of the vehicle body to assist in the analysis.

The vehicle was not blocked by the steering wheel control or other devices during the collision and inside the exit area.

4.4.2 Metodologia utilizzata per il calcolo del baricentro del veicolo – *Methodology applied to the vehicle centre of gravity calculation*

Per il calcolo del baricentro dei veicoli a due assi è stata applicata la norma ISO 10392 – Veicoli stradali con due assi – Determinazione del centro di gravità – che prevede:

In order to determine the centre of gravity of vehicles with two axles ISO 10392 standards – Road vehicles with two axles – Determination of centre of gravity – were applied so as to:

- la determinazione di una serie di parametri geometrici caratteristici del veicolo e dei pesi che si scaricano sulle quattro ruote con il veicolo posizionato su superficie piana:

- *define a range of typical geometric parameters and the vehicle weights which are distributed to all four wheels when the vehicle is positioned on a flat surface:*

Parametro n.	Denominazione
1	Passo asse lato SX
2	Passo asse lato DX
3	Carreggiata Ant.
4	Carreggiata Post.
5	Peso in piano ruota Ant SX
6	Peso in piano ruota Ant DX
7	Peso in piano ruota Post SX
8	Peso in piano ruota Post DX

Parameter no.	*Definition*
1	*Left wheel base*
2	*Right wheel base*
3	*Front track*
4	*Rear track*
5	*Left front wheel weight*
6	*Right front wheel weight*
7	*Left rear wheel weight*
8	*Right rear wheel weight*

- la determinazione dei raggi statici dei quattro pneumatici:

- *to determine the static radii of the four wheels:*

Parametro n.	Denominazione
9	Raggio statico ruota Ant SX
10	Raggio statico ruota Ant DX
12	Raggio statico ruota Post SX
11	Raggio statico ruota Post DX

Parameter no.	*Definition*
9	*Left front static wheel radius*
10	*Right front static wheel radius*
12	*Left rear static wheel radius*
11	*Right rear static wheel radius*

- il sollevamento in successione, prima di un asse e poi dell'altro, a tre diverse altezze (200 – 400 – 500 mm) con misura, a ciascuna altezza di sollevamento, dei pesi (M'i) che si scaricano sulle due ruote rimaste a terra; le misure di peso verranno effettuate anche nella fase di abbassamento (altezze di 400 – 200 mm) per un totale di cinque misure per ciascun asse sollevato (per le misure di peso viene utilizzata un'apposita bilancia);

- *to perform the uplifting in turn of the two axles (front and rear) at three different heights (200 – 400 – 500 mm) and the related wheel weight measurement at each different height. Weight measurements have to be performed also when bringing down the axles (400 -200 mm) for a total of five measurements for each axle lifted up (a specific weighing machine is needed in this case);*

- il calcolo delle seguenti grandezze:

- *to determine the following quantities:*

Parametro n.	Denominazione
12	Altezza del Baricentro dal suolo
13	Distanza del Baricentro dall'asse longitudinale del veicolo
14	Distanza del Baricentro dall'asse trasversale del veicolo

Parameter no.	*Definition*
12	*Centre of gravity height from the ground*
13	*Centre of gravity distance from vehicle longitudinal axle*
14	*Centre of gravity distance from vehicle transversal axle*

5 Strumentazione – *Equipment*

Per misurare le caratteristiche del moto e dell'urto del veicolo, viene installato a bordo del mezzo un Sistema di Acquisizione Dati, formato da:

- Centralina di acquisizione dati (Centralina DAS 3200L della EME Co.) fissata all'interno del veicolo formata da due moduli di 8 canali ciascuno, per un totale di 16 canali;
- Un contenitore di protezione in alluminio al cui interno sono installate due terne di accelerometri unidirezionali disposti secondo i tre assi del veicolo (longitudinale, trasversale e verticale).

  La prima terna **(terna n. 1)** è formata da tre accelerometri aventi un fondo scala a 100 g; una seconda terna **(terna n. 2)** è installata a circa 4.0 cm dalla prima, lungo l'asse longitudinale del veicolo in direzione posteriore, ed è formata da tre accelerometri con fondo scala a 50 g. Tale terna viene installata allo scopo di garantire comunque il rilevamento dei dati accelerometrici durante la prova in caso di malfunzionamento della prima.

To measure the characteristics of the vehicle motion and collision a Data Acquisition System was installed on board, comprising:

- *A central data acquisition unit (DAS 3200L central unit manufactured by EME Co.) installed in the interior of the vehicle and consisting of two modules with 8 channels each, totalling 16 channels;*
- *An aluminium case containing two sets of three unidirectional accelerometers arranged according to the three axes of the vehicle (longitudinal, transverse and vertical).*

  The first set ***(set 1)*** *consisted of three accelerometers with a 100 g measuring range; a second set* ***(set 2)*** *was installed at a distance of about 4.0 cm from the first one, along the longitudinal axis of the vehicle at the rear, consisting of three accelerometers with a 50 g measuring range. This was installed to ensure the acquisition of accelerometric test data in the event the first set was faulty.*

6 Copertura fotografica – *Photographic coverage*

DESCRIZIONE DELLA COPERTURA – *LAYOUT OF CAMERAS*	
POSTAZIONE 1 *POSITION 1*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s) - videocamera HD (25 fot/s) – HD video camera (25 fot/s)
POSTAZIONE 2 *POSITION 2*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s) - videocamera HD (25 fot/s) – HD video camera (25 fot/s)
POSTAZIONE 3 *POSITION 3*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s) - videocamera HD (25 fot/s) – HD video camera (25 fot/s)
POSTAZIONE 4 *POSITION 4*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s) - videocamera HD (25 fot/s) – HD video camera (25 fot/s)
POSTAZIONE 5 *POSITION 5*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s)
POSTAZIONE 6 *POSITION 6*	- videocamera OLYMPUS(250 fot/s) – OLYMPUS video camera (250 fot/s) - videocamera HD (25 fot/s) – HD video camera (25 fot/s)

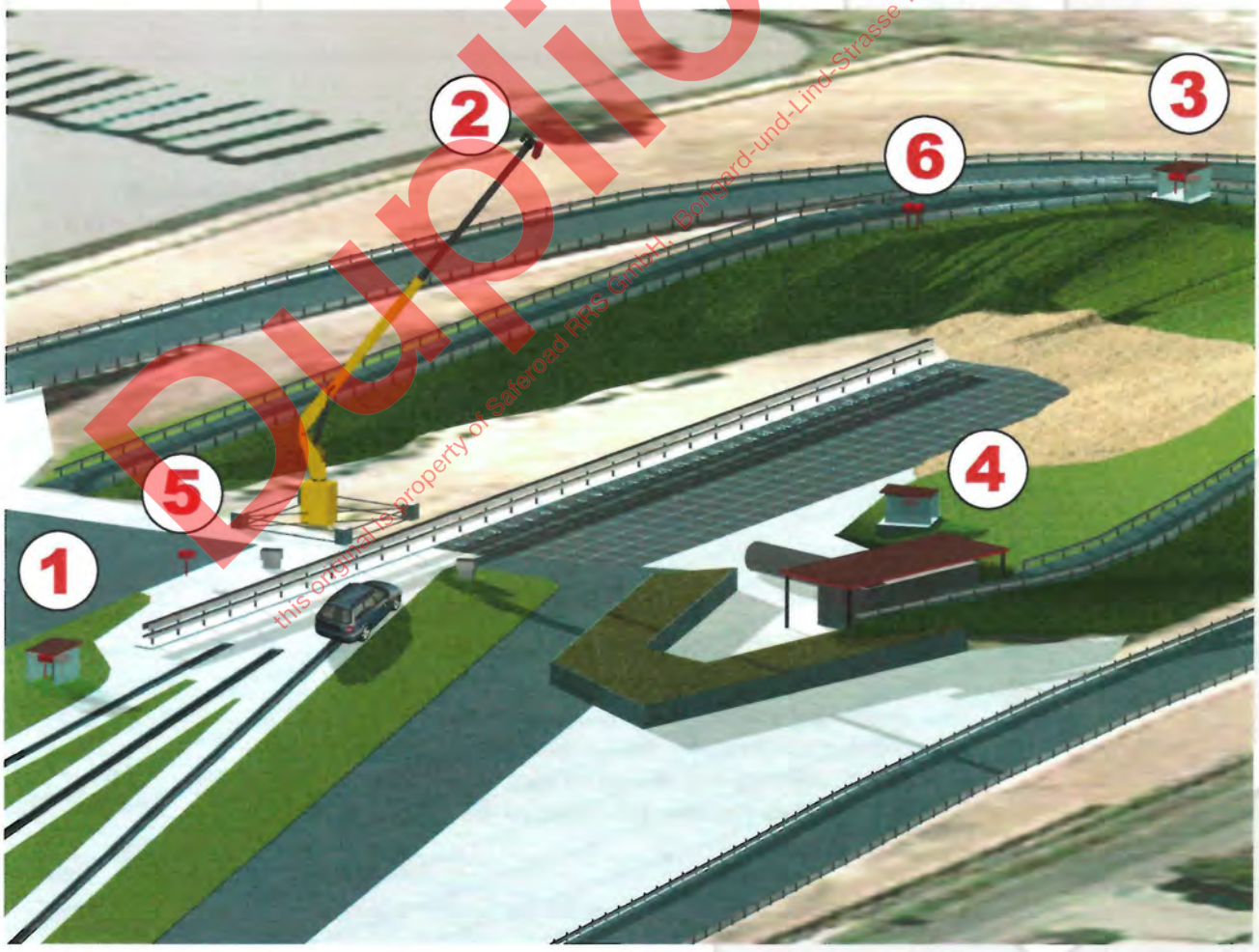


Figura 4 – *Figure 4* Campo prove – *Crash test area*

7 Risultati – *Results*

7.1 Condizioni di prova – *Weather conditions*

TEMPO *WEATHER*	**Poco nuvoloso** *Lightly cloudy*
TEMPERATURA *TEMPERATURE*	**11°C**

7.2 Esito lancio – *Test conditions*

VELOCITÀ DI IMPATTO *IMPACT SPEED*	**100,5 km/h**
DIFFERENZA DA VELOCITÀ TEORICA *DIFFERENCE FROM NOMINAL SPEED*	**+ 0,5 km/h (+ 0,5 %)**
ANGOLO DI IMPATTO *IMPACT ANGLE*	**20°**
DIFFERENZA DA ANGOLO TEORICO *DIFFERENCE FROM NOMINAL ANGLE*	**0°**

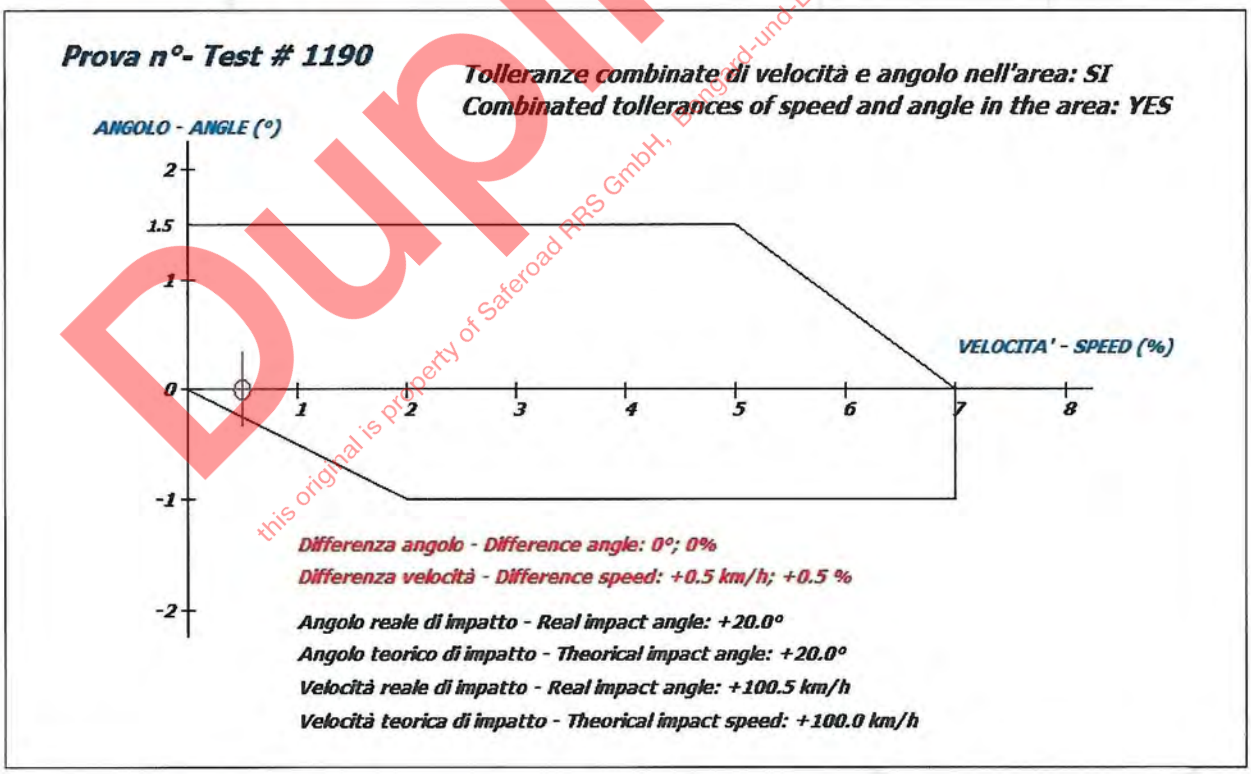


Figura 5 – *Figure 5* Area delle tolleranze combinate – *Combined limit area*

7.3 Dispositivo di prova – *Test device*

COMPORTAMENTO DEL DISPOSITIVO – *GENERAL*	
DEFLESSIONE DINAMICA MASSIMA (D_m) *MAXIMUM DYNAMIC DEFLECTION*	**0,4 m**
DEFLESSIONE DINAMICA MASSIMA NORMALIZZATA (D_N) *NORMALISED MAXIMUM DYNAMIC DEFLECTION*	**0,4 m**
LARGHEZZA DI LAVORO DISPOSITIVO (W_m) *BARRIER WORKING WIDTH*	**0,5 m**
LARGHEZZA DI LAVORO DISPOSITIVO NORMALIZZATA (W_N) *NORMALISED BARRIER WORKING WIDTH*	**0,5 m**
CLASSE DELLA LARGHEZZA DI LAVORO NORMALIZZATA *CLASS OF NORMALISED WORKING WIDTH*	**W1**
DEFORMAZIONE PERMANENTE MASSIMA *MAXIMUM PERMANENT DEFLECTION*	**0,2 m**
LUNGHEZZA DEL CONTATTO *CONTACT LENGTH*	**3,6 m**
PUNTO DI IMPATTO ACTUAL IMPACT POINT	**17,3 m**

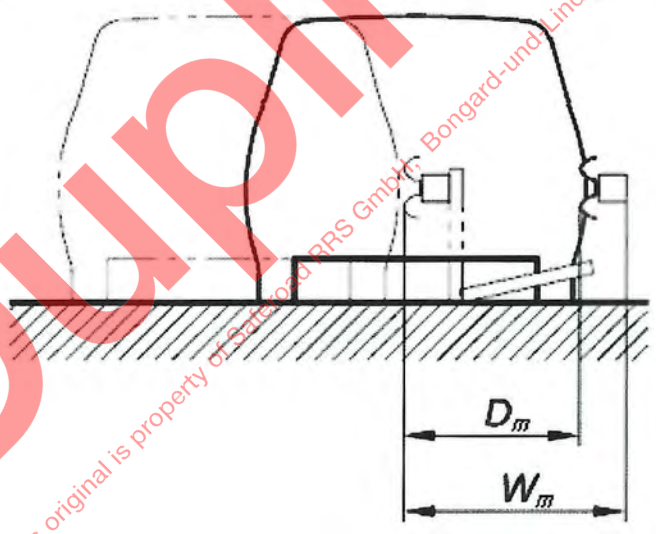
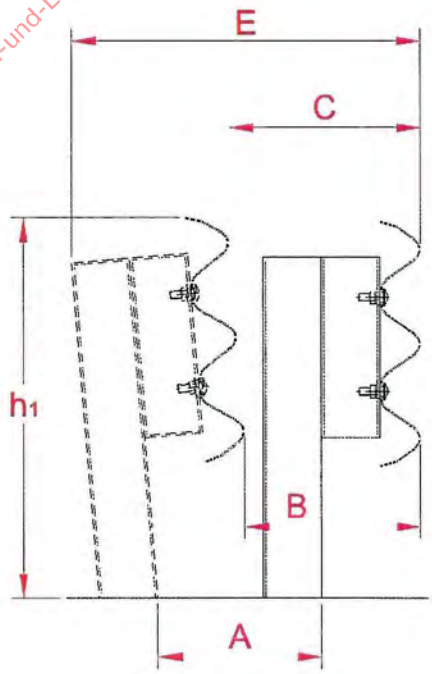


Figura 6 – *Figure 6* Comportamento del dispositivo – *Device behaviour*

RILEVAMENTO DANNI / MISURE – *DAMAGE ASSESSMENT/MEASUREMENTS*

PALO *POST*	SPOSTAMENTO TRASVERSALE *CROSS DISPLACEMENT (cm)*				SPOSTAMENTO VERTICALE *VERTICAL DISPLACEMENT (cm)*	MISURE SUL DISPOSITIVO *DEVICE MEASUREMENTS*
	A	B	C	E	h1	
-10	0	0	0	34	90	A = SPOSTAMENTO PARTE INFERIORE PALO *LOWER POST DISPLACEMENT*
-9	0	0	0	34	90	
-8	0	0	0	34	90	B = SPOSTAMENTO PARTE INFERIORE LAMA *BEAM DISPLACEMENT*
-7	0	0	0	34	90	
-6	0	0	0	34	90	C = SPOSTAMENTO PARTE SUPERIORE LAMA *BEAM DISPLACEMENT*
-5	0	0	0	34	90	
-4	0	0	0	34	90	E = LARGHEZZA DI LAVORO STATICA *STATIC WORKING WIDTH*
-3	0	0	0	34	90	
-2	1	0	1	34	90	h1 = ALTEZZA PARTE SUPERIORE LAMA *UPPER BEAM HEIGHT*
-1	1	3	5	37	91	
0	3	14	14	46	94	
1	7	20	18	48	94	
2	2	8	10	42	91	
3	1	3	4	36	90	
4	0	1	1	34	90	
5	0	0	0	34	90	
6	0	0	0	34	90	
7	0	0	0	34	90	
8	0	0	0	34	90	
9	0	0	0	34	90	
10	0	0	0	34	90	
11	0	0	0	34	90	
12	0	0	0	34	90	
13	0	0	0	34	90	
14	0	0	0	34	90	
15	0	0	0	34	90	
16	0	0	0	34	90	
17	0	0	0	34	90	
18	0	0	0	34	90	



PALO *POST*	LAMA DEFORMATA *DEFORMED BEAM*	DISTANZIATORE PIEGATO *DEFORMED SPACER*	PALO PIEGATO *DEFORMED POST*	PALO DIVELTO *UPROOTED POST*	NOTE *NOTES* Descrizione dei danni prodotti *Damage description)*
-10					
-9					
-8					
-7					
-6					
-5					
-4					
-3					
-2					
-1	X		X		
0	X	X	X		
1	X	X	X		
2	X	X	X		
3	X		X		
4	X				
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

CRITERI DI ACCETTAZIONE DELLA PROVA – *IMPACT TEST ACCEPTANCE CRITERIA*			
	SI*/YES*	**NO***/NOT*	**NOTE***/NOTES*
IL DISPOSITIVO CONTIENE IL VEICOLO *THE TEST DEVICE HOLDS THE TEST VEHICLE*	X		
IL DISPOSITIVO PRESENTA DEGLI ELEMENTI PRINCIPALI LONGITUDINALI COMPLETAMENTE ROTTI O STACCATI DOPO L'URTO *COMPLETE BREAKAGE OR COMING OFF OF MAIN LONGITUDINAL ELEMENTS OF THE TEST DEVICE*		X	
ELEMENTI DEL DISPOSITIVO DEL PESO SUPERIORE DI 2 kg COMPLETAMENTE STACCATI *TEST ITEMS PARTS OVER THE MASS OF 2 kg TOTALLY DETACHED*		X	
ELEMENTI DEL DISPOSITIVO SONO PENETRATI ALL'INTERNO DELL' ABITACOLO DEL VEICOLO *TEST ITEM ELEMENTS PENETRATED THE PASSENGER COMPARTMENT OF THE VEHICLE*		X	
L'ABITACOLO DEL VEICOLO PRESENTA DEFORMAZIONI CHE POSSONO CAUSARE LESIONI GRAVI AI PASSEGGERI *THE PASSENGER COMPARTEMENT HAS DEFORMATIONS THAT CAN CAUSE SERIOUS DAMAGE TO PASSENGERS*		X	

7.4 Veicolo di prova – *Test vehicle*

Il veicolo descrive correttamente la traiettoria di avvicinamento preimpostata ed impatta il dispositivo nel punto prefissato con un angolo di 20,0°.

Dopo l'impatto il veicolo viene contenuto dal dispositivo deformandolo per 9,0 m. Il veicolo si distacca dalla barriera ad una distanza di 3,6 m dal punto di impatto restando all'interno dell'area di uscita e si arresta dopo aver percorso circa 56 m dal punto d'impatto.

Nessun elemento del dispositivo in prova è penetrato nell'abitacolo del veicolo e nessuna parte importante del veicolo o della barriera si è distaccata.

The vehicle correctly describes the previewed trajectory and, after the uncoupling, hit the barrier in the prefixed point with a 20,0° impact angle.

After impact, the vehicle was correctly redirected by the test device which was deformed for 9,0 m. The vehicle got detached from the barrier at 3,6 m from the impact point remaining inside CEN box and it arrested itself after having covered more than 56 m from the impact point.

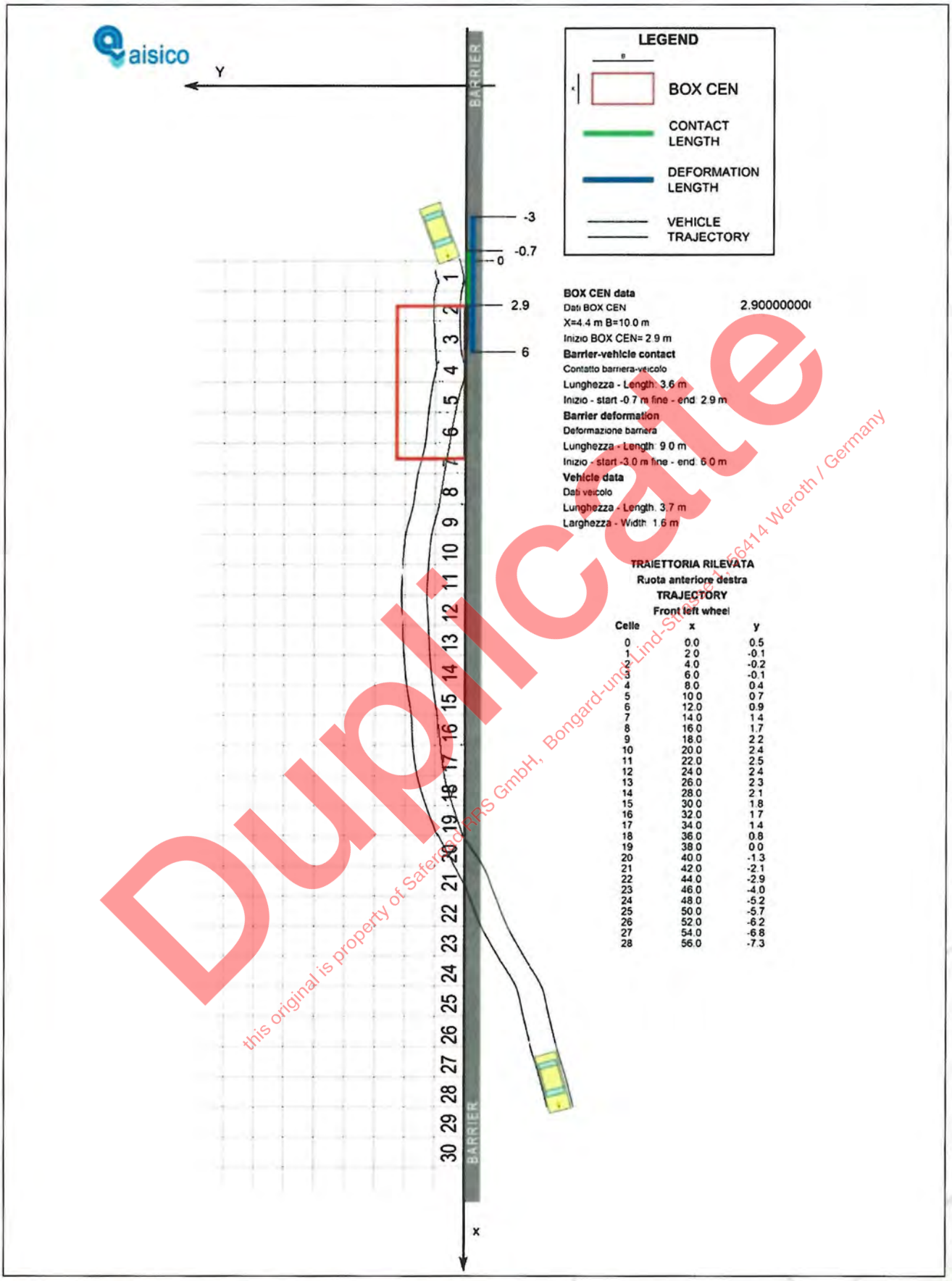
No element of the test device penetrated the vehicle and no significant portion of the vehicle or of the barrier came completely off.

Ai = ANGOLO DI IMPATTO
Vi = VELOCITA' DI IMPATTO

Ai = 20,0°
Vi = 100,5 km/h

Figura 7 – *Figure 7* Angolo di impatto - *Actual impact angle*

Figura 8 – *Figure 8* Foto dell'angolo di impatto – *Actual impact angle photo*



BOX CEN data
Dati BOX CEN 2.90000000
X=4.4 m B=10.0 m
Inizio BOX CEN= 2.9 m
Barrier-vehicle contact
Contatto barriera-veicolo
Lunghezza - Length: 3.6 m
Inizio - start -0.7 m fine - end: 2.9 m
Barrier deformation
Deformazione barriera
Lunghezza - Length: 9.0 m
Inizio - start -3.0 m fine - end: 6.0 m
Vehicle data
Dati veicolo
Lunghezza - Length: 3.7 m
Larghezza - Width: 1.6 m

TRAIETTORIA RILEVATA
Ruota anteriore destra
TRAJECTORY
Front left wheel

Celle	x	y
0	0.0	0.5
1	2.0	-0.1
2	4.0	-0.2
3	6.0	-0.1
4	8.0	0.4
5	10.0	0.7
6	12.0	0.9
7	14.0	1.4
8	16.0	1.7
9	18.0	2.2
10	20.0	2.4
11	22.0	2.5
12	24.0	2.4
13	26.0	2.3
14	28.0	2.1
15	30.0	1.8
16	32.0	1.7
17	34.0	1.4
18	36.0	0.8
19	38.0	0.0
20	40.0	-1.3
21	42.0	-2.1
22	44.0	-2.9
23	46.0	-4.0
24	48.0	-5.2
25	50.0	-5.7
26	52.0	-6.2
27	54.0	-6.8
28	56.0	-7.3

Figura 9 – *Figure 9* Traiettoria del veicolo – *Vehicle trajectory*

7.4.1 Descrizione dei danni subiti dal veicolo – *Description of the damage and deformation suffered by the test vehicle*

Spigolo anteriore destro deformato, semiasse anteriore destro arretrato con ruota divelta, sportello destro piegato, fanale anteriore destro divelto, cofano anteriore molto deformato.

Right front edge deformed, front right axle pulled back and wheel pulled off, front right door folded, front right headlight pulled off, front bonnet very deformed.

INDICE DI DEFORMAZIONE DELL'ABITACOLO DEL VEICOLO *VEHICLE COCKPIT DEFORMATION INDEX*	
VCDI	RF 0120000

CRITERI DI ACCETTAZIONE DELLA PROVA – *IMPACT TEST ACCEPTANCE CRITERIA*			
	SI*/YES*	**NO***/NOT*	**NOTE***/NOTES*
L'ANGOLO DI IMPATTO E LA VELOCITÀ DEL VEICOLO SONO ALL'INTERNO DEI LIMITI DI TOLLERANZA *ACTUAL IMPACT SPEED AND ANGLE ARE WITHIN TOLERANCE LIMITS*	X		
LA COMBINAZIONE DELLA VELOCITÀ DEL VEICOLO E DELL'ANGOLO DI IMPATTO È ALL'INTERNO DELL'AREA DELLE TOLLERANZE COMBINATE *ACTUAL IMPACT SPEED AND ANGLE ARE WITHIN TOLERANCE ENVELOPE*	X		
DURANTE E DOPO L'IMPATTO NON PIÙ DI UNA RUOTA DEL VEICOLO OLTREPASSA LA PARTE PIÙ ARRETRATA DEL SISTEMA DEFORMATO *DURING AND AFTER THE IMPACT, NO MORE THAN ONE OF THE WHEEL OF THE VEHICLE PASSES OVER THE REARMOST PART OF DEFORMED SISTEM*	X		
IL VEICOLO SI RIBALTA NELL'AREA DI PROVA *VEHICLE ROLLS OVER DURING THE TEST*		X	
DOPO L'URTO, IL VEICOLO RIMANE ALL'INTERNO DEL BOX CEN *VEHICLE WHITIN "EXIT BOX"*	X		

7.5 Valutazione della severità dell'impatto – *Impact severity assessment*

L'elaborazione dei dati viene effettuata in conformità a quanto previsto dalla norma UNI EN 1317.

Data were processed in accordance with UNI EN 1317 standards.

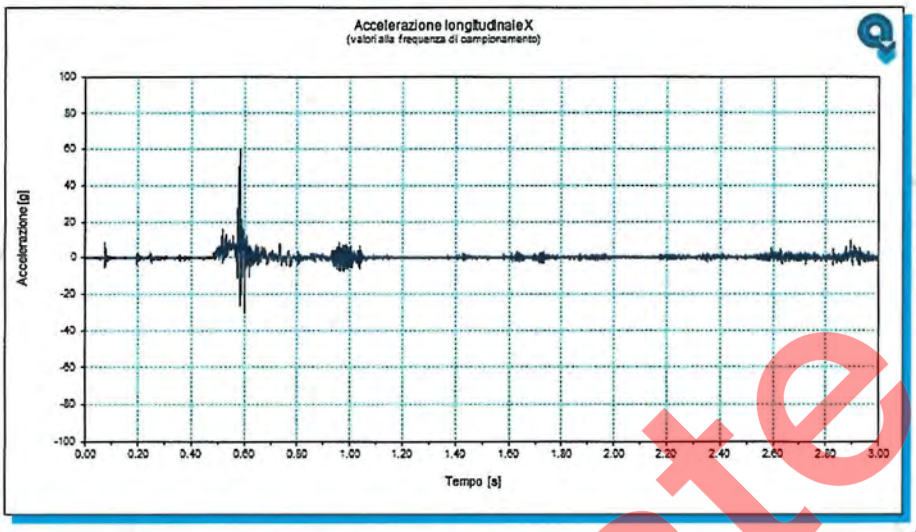
I dati relativi alle componenti di accelerazione longitudinale, trasversale e verticale acquisiti dalla terna n. 1 sita in corrispondenza del baricentro del veicolo ed i dati acquisiti dal sensore di velocità angolare vengono bilanciati via software rimuovendo l'offset che si registra nei primi 0.8 secondi (fase in cui il veicolo è sotto tiro e non è ancora avvenuto lo sgancio del carrello di traino).

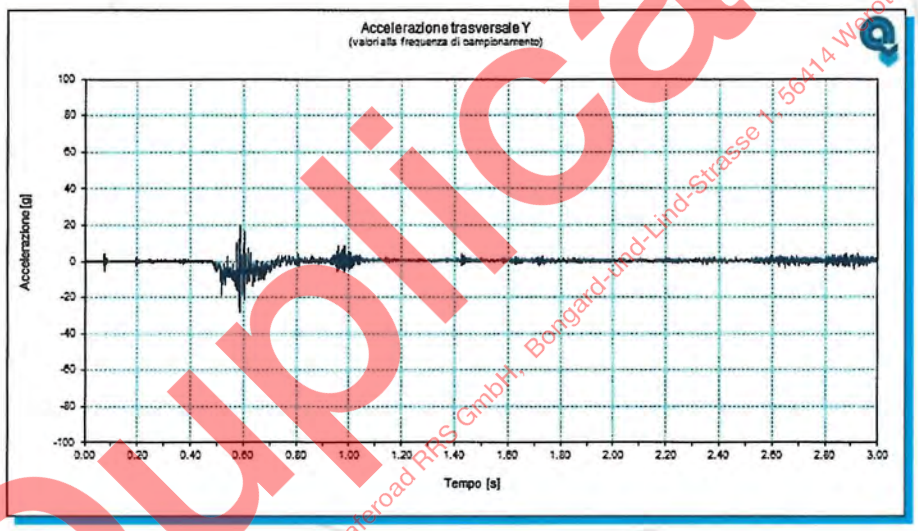
Data on longitudinal, transverse and vertical acceleration components acquired by the "set 1", located at the vehicle centre of gravity and the data acquired by the angular velocity sensor are balanced by software by removing the offset recorded in the first 0.8 seconds (i.e. the phase in which the vehicle was under tension and the tow trolley has not yet been released).

Tali dati vengono poi filtrati in classe di frequenza CFC 180 attraverso il filtro BUTTERWORTH 4 poli conforme alla norma ISO 6487.

This piece of data was then filtered in frequency class CFC 180 through BUTTERWORTH 4-pole filter conforming to ISO 6487 standards.

7.5.1 Diagrammi delle accelerazioni – *Graphs of linear accelerations*





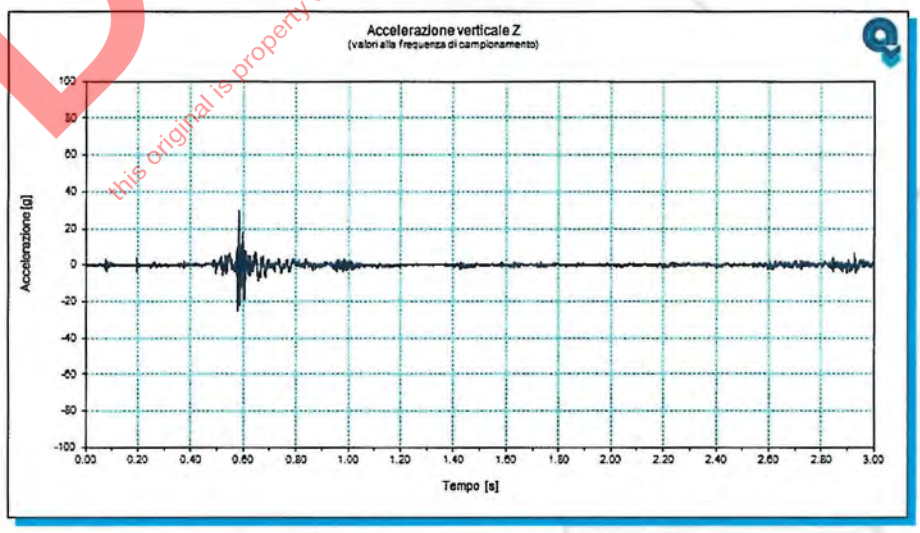
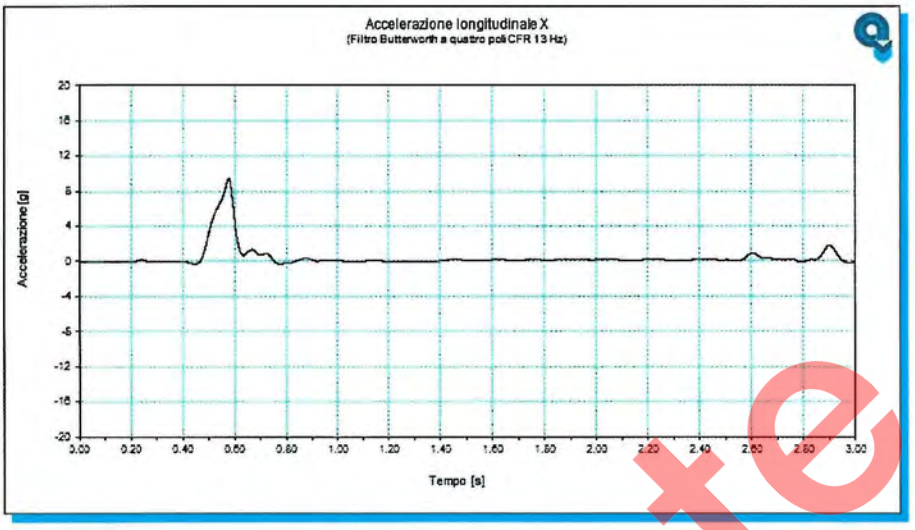
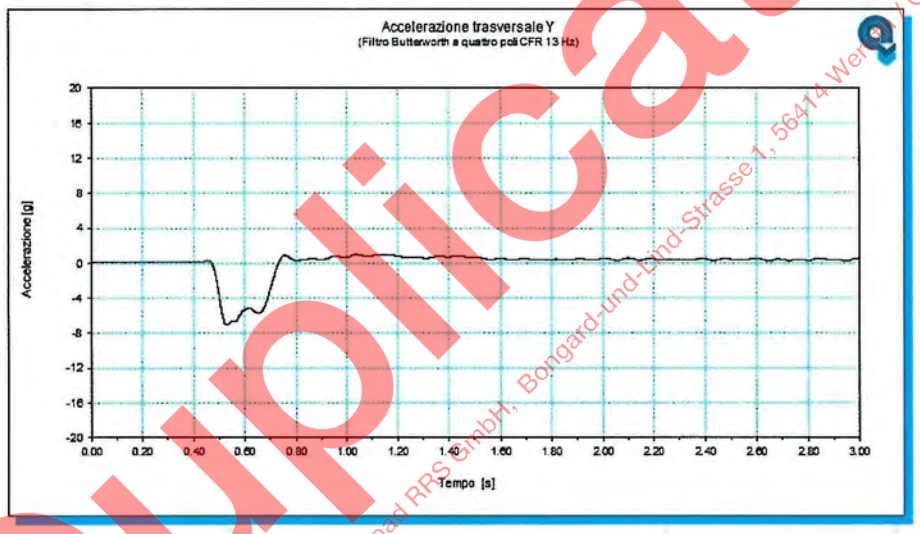


Figura 10 – *Figure 10* Diagrammi delle accelerazioni – *Graphs of linear accelerations*

7.5.2 Diagrammi delle accelerazioni – *Graphs of linear accelerations*





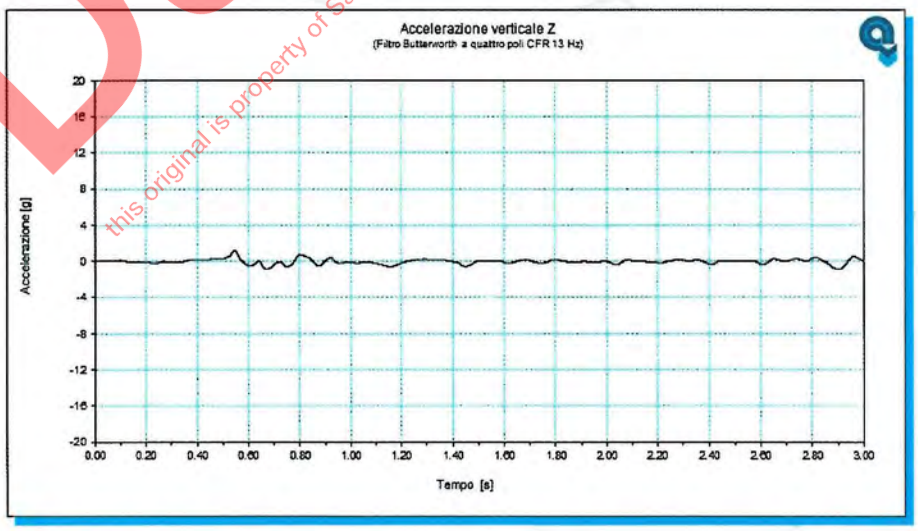


Figura 11 – *Figure 11* Diagrammi delle accelerazioni – *Graphs of linear accelerations*

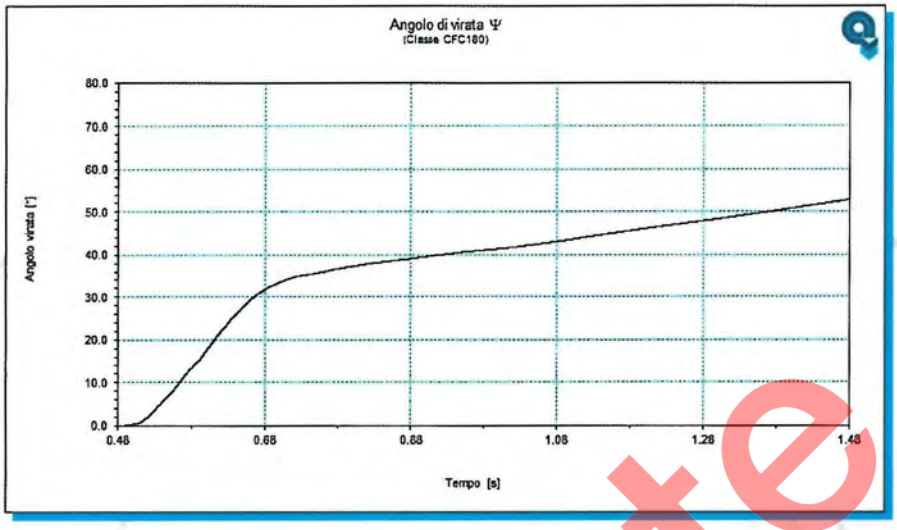
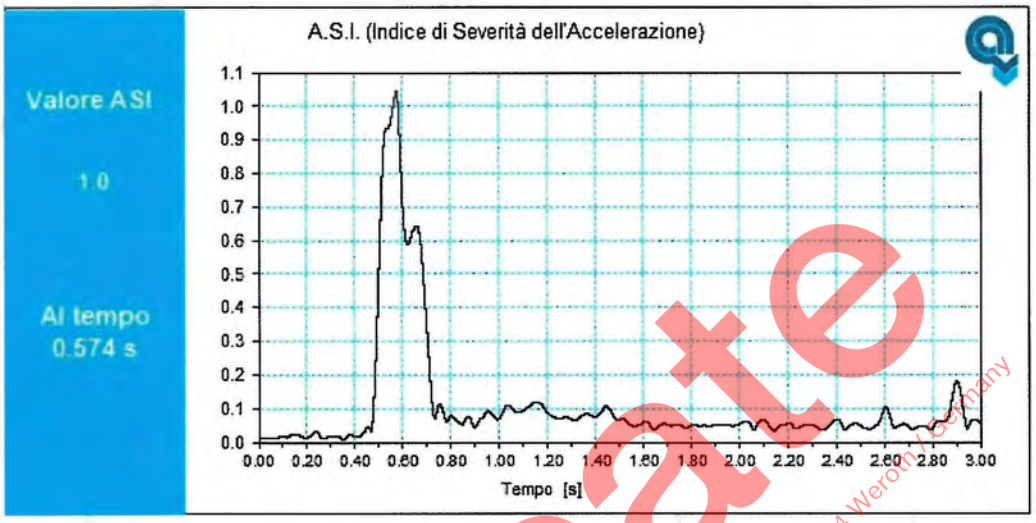
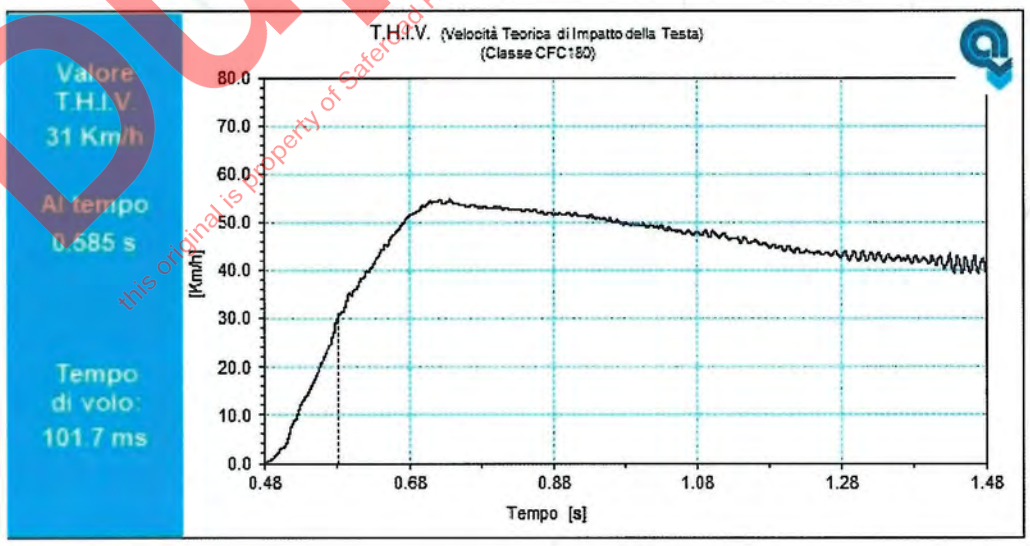


Figura 12 – *Figure 12* Velocità angolare – *Angular velocity*

7.5.3 Severità dell'impatto – *Impact severity*

INDICI DI SEVERITÀ – *SEVERITY INDEX*		
ASI	**INDICE DI SEVERITÀ DELL'ACCELERAZIONE** *ACCELERATION SEVERITY INDEX*	1,0
THIV	**VELOCITÀ TEORICA D'URTO DELLA TESTA** *THEORETICAL HEAD IMPACT VELOCITY*	31 km/h
T	**TEMPO DI VOLO** *TIME OF FLIGHT (TOF)*	101,7 ms
Dx	**DISTANZA LIBERA DI VOLO (UNI EN 1317-1)** *FREE FLIGHT DISTANCE*	0,6 m
Dy	**DISTANZA LIBERA DI VOLO (UNI EN 1317-1)** *FREE FLIGHT DISTANCE*	0,3 m





8 Valutazioni finali – *Final assessments*

SOMMARIO DEI RISULTATI – *SUMMARY RESULTS*			
DATI GENERALI		***GENERAL***	
TIPO DI PROVA	**TB11**	*TEST TYPE*	**TB11**
NUMERO DI PROVA	**1190**	*TEST NUMBER*	**1190**
DISPOSITIVO TESTATO	BARRIERA DI SICUREZZA BORDO LATERALE CLASSE H2 MOD. **SafeStar 231**	*TEST DEVICE*	*H2 SAFETY BARRIER FOR SIDE EDGE MOD.* ***SafeStar 231***
DATA DELLA PROVA	**2014/10/15**	*TEST DATE*	**2014/10/15**
PARAMETRI DELLA PROVA		***TEST PARAMETERS***	
MASSA DEL VEICOLO	**913,6 kg**	*VEHICLE MASS*	**913,6 kg**
VELOCITÀ VEICOLO	**100,5 km/h**	*VEHICLE VELOCITY*	**100,5 km/h**
ANGOLO DI IMPATTO	**20°**	*IMPACT ANGLE*	**20°**
RISULTATI DELLA PROVA		***TEST RESULTS***	
MAX DEFLESSIONE DINAMICA	**0,4 m**	*DYNAMIC DEFLECTION*	**0,4 m**
MAX DEFLESSIONE DINAMICA NORMALIZZATA	**0,4 m**	*NORMALISED DYNAMIC DEFLECTION*	**0,4 m**
LARGHEZZA DI LAVORO DISPOSITIVO	**0,5 m**	*TEST DEVICE WORKING WIDTH*	**0,5 m**
LARGHEZZA DI LAVORO DISPOSITIVO NORMALIZZATA	**0,5 m – W1**	*TEST DEVICE NORMALISED WORKING WIDTH*	**0,5 m – W1**
MAX DEFORMAZIONE PERMANENTE	**0,2 m**	*PERMANENT DEFLECTION*	**0,2 m**
ASI	**1,0**	*ASI*	**1,0**
THIV	**31 km/h**	*THIV*	**31 km/h**
COMPORTAMENTO DEL DISPOSITIVO		***TEST DEVICE BEHAVIOUR***	
IL DISPOSITIVO CONTIENE IL VEICOLO	**SI**	*THE BARRIER CONTAINED THE TEST VEHICLE*	**YES**
PARTI PRINCIPALI LONGITUDINALI DEL DISPOSITIVO ROTTE O DIVELTE	**NO**	*COMPLETE BREAKAGE OF ANY PRINCIPAL LONGITUDINAL ELEMENTS OF THE TEST ITEM*	**NOT**
ELEMENTI SUPERIORI A 2 Kg COMPLETAMENTE STACCATI	**NO**	*TEST ITEMS PARTS OVER THE MASS OF 2 Kg TOTALLY DETACHED*	**NOT**
COMPORTAMENTO DEL VEICOLO		***VEHICLE BEHAVIOUR***	
NON PIÙ DI UNA RUOTA DEL VEICOLO OLTREPASSA LA PARTE PIÙ ARRETRATA DEL SISTEMA DEFORMATO	**SI**	*NOT MORE THAN ONE WHEEL OF THE VEHICLE PASSES OVER THE REARMOST PART OF DEFORMED SYSTEM*	**YES**
IL VEICOLO SI RIBALTA NELL'AREA DI PROVA	**NO**	*THE VEHICLE ROLLS OVER INSIDE THE TEST AREA*	**NOT**
LA TRAIETTORIA DEL VEICOLO SI TROVA ALL'INTERNO DEL BOX CEN	**SI**	*VEHICLE TRAJECTORY WHITIN EXIT BOX*	**YES**

9 Dichiarazioni generali – *General statements*

I risultati delle prove nel presente rapporto si riferiscono solo agli oggetti sottoposti a prova.

Il presente rapporto non può essere riprodotto, se non integralmente, tranne dietro autorizzazione scritta da parte del laboratorio che l'ha stilato.

Correzioni al presente rapporto di prova possono essere effettuate soltanto mediante la redazione di un nuovo documento che viene designato come "revisione" al rapporto di prova cui fa riferimento.

Aggiunte al presente rapporto di prova possono essere effettuate soltanto mediante un nuovo documento che viene designato come "supplemento" al rapporto di prova cui fa riferimento.

Il seguente rapporto di prova è corredato di materiale video-fotografico.

La lingua ufficiale di riferimento di questo rapporto è l'Italiano.

The test results set out in this report only refer to tested objects.

No part of this report may be reproduced, without the prior written permission of the drafting laboratory.

Corrections to this test report may be made only by drafting a new document, which is then designated as a "revision" of the original report.

Additions to this test report may be made only in a new document, which is then designated a "supplement" to the test report to which it refers.

The following test report is complete with photo and video material.

Italian is the official language of the report.

10 Approvazione del rapporto di prova – *Test report approval*

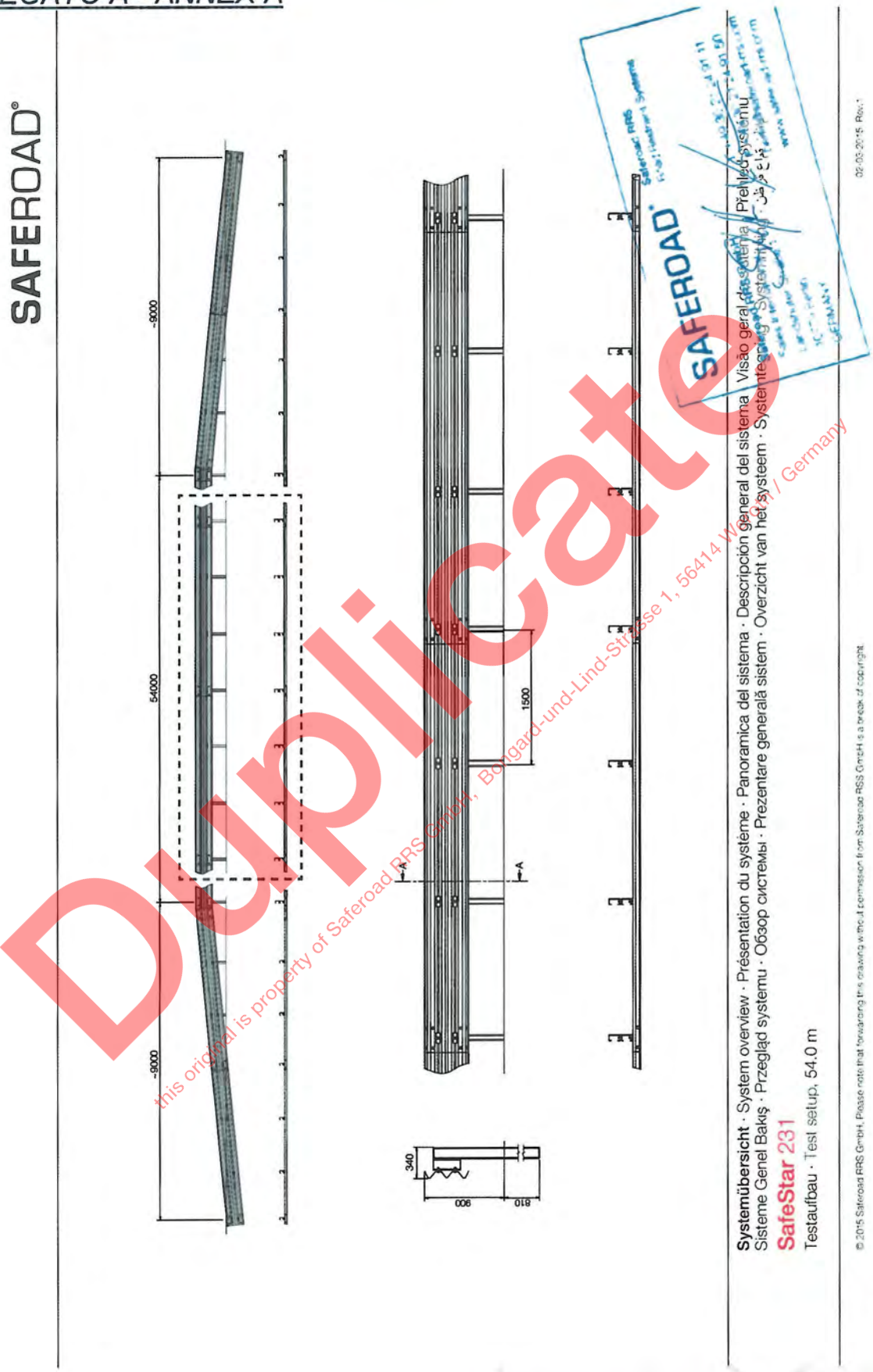
TECNICI CHE HANNO ESEGUITO LA PROVA – *TESTING RESPONSIBLE ENGINEERS*		
NOME - NAME	***COMPETENZA - COMPETENCE***	***FIRMA - SIGNATURE***
Ing. Andrea Bianchi	Responsabile scientifico delle prove, elaborazione dati e redazione del rapporto di prova – *Test scientific data processing and report editing responsible.*	.....

IL DIRETTORE DEL CENTRO – *TEST HOUSE DIRECTOR*
Ing. Stefano Calamani
.....

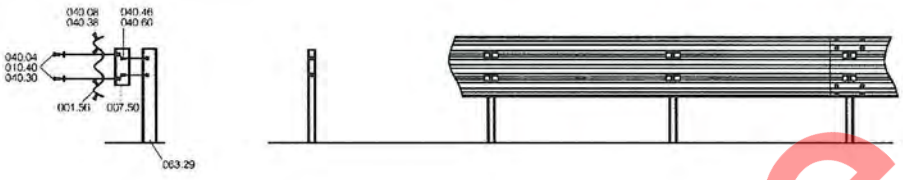
Pereto, 2015/03/03

Fine Rapporto di prova n.1190 del 2015/03/03 / *End of Test Report n. 1190 of 2015/03/03*

ALLEGATO A - ANNEX A



SAFEROAD®



Artikelbeschreibung Description	Artikel-Nr. Part No.	Material Material	Norm Norm	Gewicht Weight	Anzahl/m Number/m	Anzahl/4.5 m Number/4.5 m
SP-Holm, 3W, 4.820 mm, 2.5 Beam, 3W, 4.820 mm, 2.5	001.56	S275JR	EN 10025 EN 1461	73.12	0.22	1.00
Abstandhalter, C125, 275 mm, 5.0 Spacer, C125, 275 mm, 5.0	007.50	S235JR	EN 10025 EN 1461	2.85	0.66	3.00
Pfosten, C125, 1.600 mm, 5.0 Post, C125, 1.600 mm, 5.0	063.29	S235JR	EN 10025 EN 1461	16.90	0.66	3.00

Artikelbeschreibung Description	Artikel-Nr. Part No.	Material Material	Norm Norm	Gewicht Weight	Anzahl/m Number/m	Anzahl/4.5 m Number/4.5 m
Decklasche M16, RL Plate M16, RL	010.40	S235JR	EN 10025 EN 1461	0.21	1.33	6.00
HRK-Schraube m. 6kt., M16x45, 8.8 Panhead bolt w. hexagon, M16x45, 8.8	040.04		- ISO 4032-5	0.13	1.33	6.00
HRK-Schraube m. oval, M16x30, 8.8 Panhead bolt w. oval, M16x30, 8.8	040.08		- ISO 4032-8	0.11	1.77	8.00
Scheibe Ø 18 Washer Ø 18	040.30		ISO 7091	0.01	1.33	6.00
Scheibe Ø 18x38 Washer Ø 18x38	040.38			0.02	1.77	8.00
Sechskantschraube, M10x30, 8.8 Hexagonal bolt, M10x30, 8.8	040.46		ISO 4017 ISO 4032-8	0.07	1.33	6.00
Scheibe Ø 11 Washer Ø 11	040.60		ISO 7091	0.01	1.33	6.00

Stückliste · Components list

SafeStar 231

H2 · W3 · A

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Saferoad RRS GmbH

02-03-2015, Rev.1

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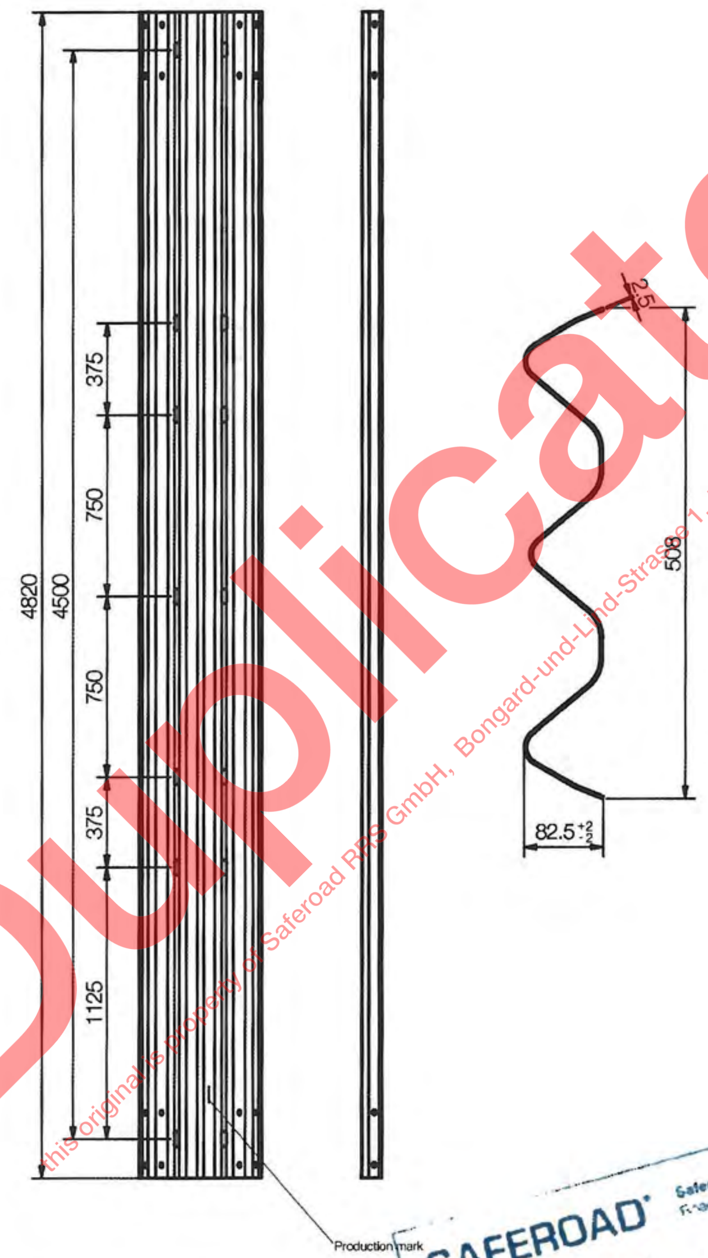

Bauteilzeichnung · Part drawing

001.56

SP-Holm, 3W, 4.820 mm, 2.5 · Beam, 3W, 4.820 mm, 2.5

L 001.56 · S275JR
02-03-2015, Rev. 1

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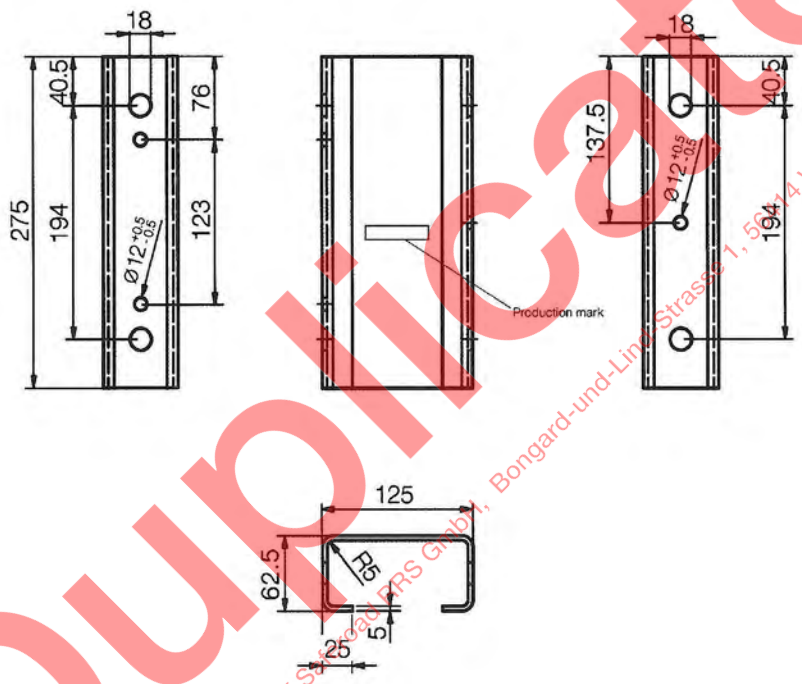

Bauteilzeichnung · Part drawing

007.50

Abstandhalter, C125, 275 mm, 5.0 · Spacer, C125, 275 mm, 5.0

S.007.50 - S235JR
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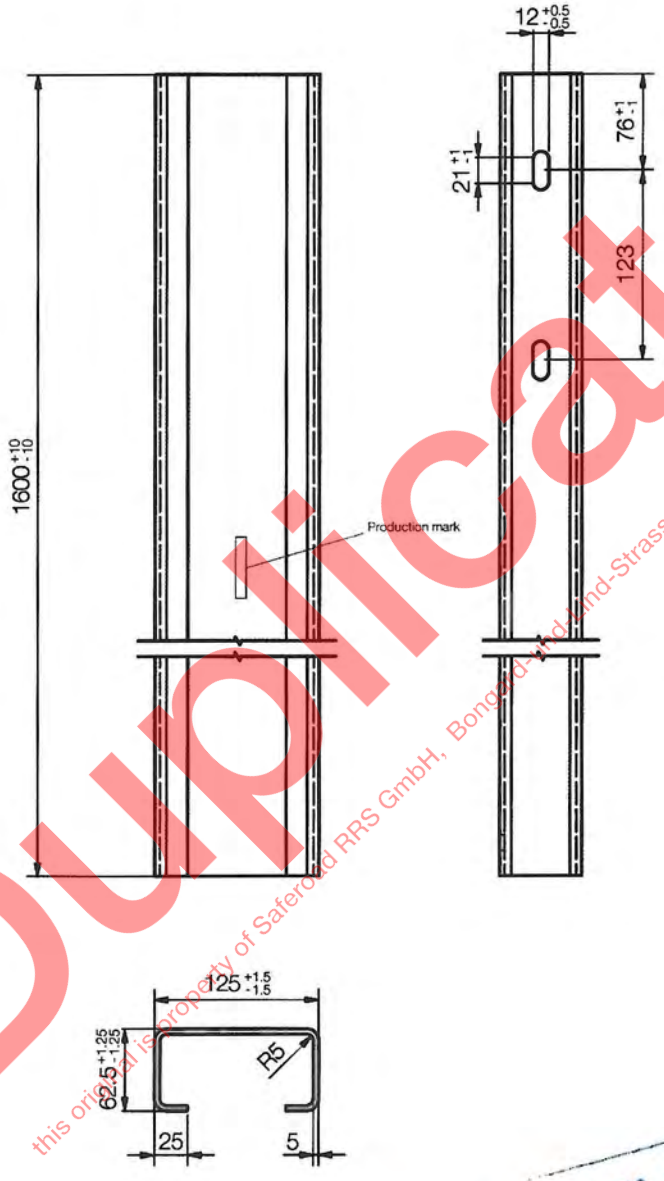
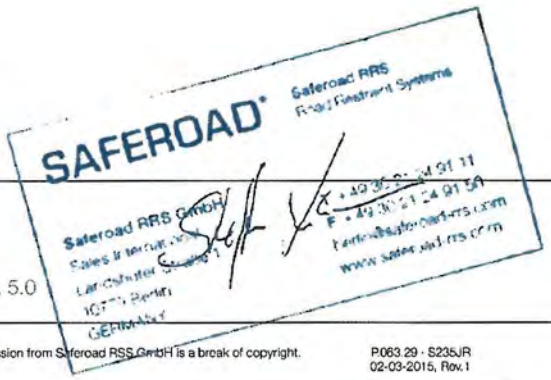


Bauteilzeichnung · Part drawing

063.29

Pfosten, C125, 1.600 mm, 5.0 · Post, C125, 1.600 mm, 5.0



P.063.29 · S235JR
02-03-2015, Rev. 1

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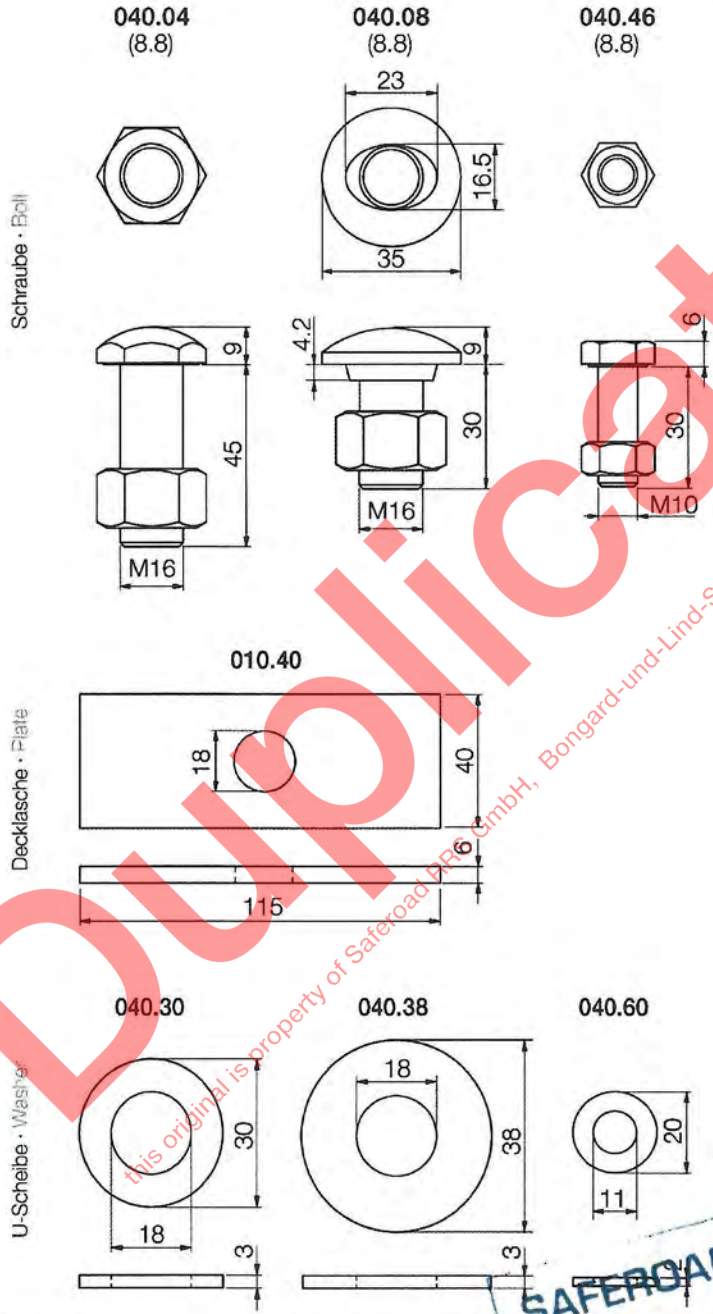

Bauteilzeichnung · Part drawing

SafeStar 231

Befestigungsmaterial · Fasteners

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ALLEGATO B - ANNEX B

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Saf3Star 231
H2 · W3 · A

EINBAUANLEITUNG · INSTALLATION INSTRUCTION

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Bedarfsanforderung und Anpassung an örtliche Bedingungen
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Montagetafel
Stückliste

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PART 2
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Installation conditions
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Components list

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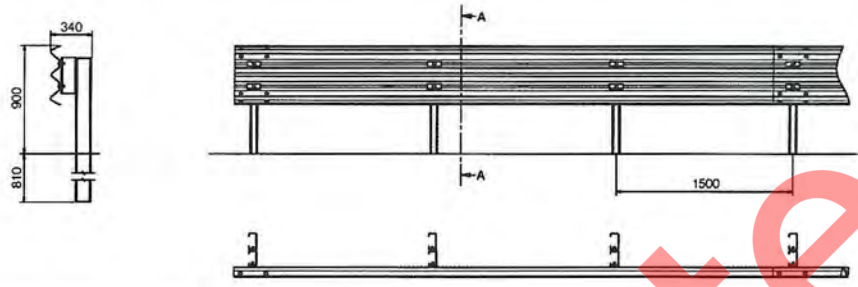


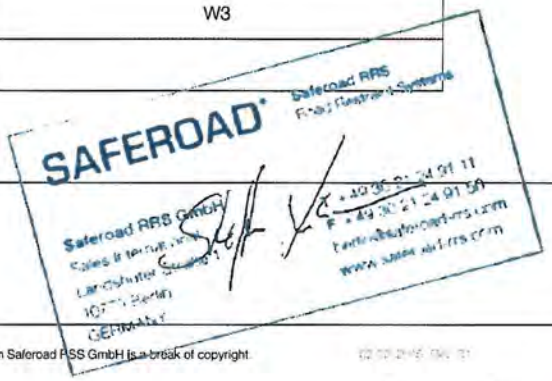
Erstprüfung Initial type test (ITT)	TB11: AISICO No. 1190 TB51: AISICO No. 1200
EG-Konformitätszertifikat / Hersteller EU Certificate of Conformity / Manufacturer	siehe gesonderte Übersicht see separate overview
Charakteristisches Material des Systems Characteristic material of the system	S235JR S275JR
Breite des Systems [m] Construction width	0.34
Höhe des Systems ab Fahrbahnoberkante [m] Construction height from roadway surface level	0.90
Länge der Systemelemente / -baugruppen [m] Length of system elements	4.50
Maximale seitliche Position des Systems [m] Maximum lateral position of the system	
Maximale seitliche Position des Fahrzeugs [m] Maximum lateral position of the vehicle	
Maximale dynamische Durchbiegung [m] Dynamic deflection	
Testlänge [m] Test length	54.00
Geprüfte Systemgründung / -aufstellung Tested system foundation / installation	gerammt driven
Bemerkungen Remarks	

Ergänzende Angaben nach DIN EN 1317-2: 2011-0 Additional information acc. to DIN EN 1317-2:2011-0	
Normalisierter Wirkungsbereich [m] Normalised working width	
Normalisierte Wirkungsbereichsklasse Wn Class of normalised working width	W3
Normalisierte dyn. Durchbiegung [m] Normalised dynamic deflection	

Datenblatt · Data sheet

SafeStar 231

H2 · W3 · A



Allgemeine Informationen

Symbolbedeutung

Tipp: Hinweise für Arbeitserleichterungen und effiziente Abläufe.

Anforderungen an das Montagepersonal

Die Montage darf nur durch geschultes und qualifiziertes Fachpersonal durchgeführt werden. Montagefirmen erhalten bedarfsgerecht eine projektbegleitende technische Betreuung durch den Hersteller.

Bestimmungsgemäßer Gebrauch

Das Rückhaltesystem ist zum Einbau in den Straßenverkehrsraum entsprechend den nationalen Bestimmungen vorgesehen. Es dient dem Schutz von Fahrzeuginsassen beim Abkommen eines Fahrzeuges von der Fahrbahn, dem Schutz Dritter und dem Schutz von Objekten und ist in Mittel- und Seitentrennstreifenbereichen sowie am Fahrbahnrand einsetzbar.

Transport

Beim Transport ist Persönliche Schutzausrüstung entsprechend den nationalen Bestimmungen zu tragen. Transportieren Sie die Systemkomponenten mit einem LKW – gegen Verrutschen der Ladung gesichert – auf die Baustelle.

Arbeitsschutz

Beim Einbau ist Persönliche Schutzausrüstung entsprechend den nationalen Bestimmungen zu tragen.

General Information

Symbol Descriptions

Tip: Information on facilitating work processes and efficient operations.

Requirements of the Assembly Personnel

The installation must only be undertaken by trained and qualified personnel. Installation firms obtain a special technical advisor from the manufacturer to support the project.

Usage Compliance

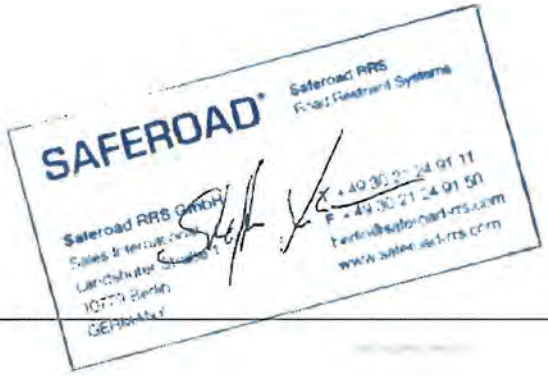
The Restraint System is designed for installation on road traffic areas according to national regulations. It is intended to protect occupants of errant vehicles on the roadway, to protect third parties and objective and can be installed in central reserves and side lanes as well as on verges.

Transport

During transport, personal protective clothing must be used. When transporting the systems to the site by truck, secure the load to prevent slippage.

Work Protection

Personal Protective Clothing must be used according to national regulations.



Technische Informationen

Schraubverbindungen

Muttern handfest anziehen und dann mit dem Drehmomentschlüssel festziehen. Sämtliches Verschraubungsmaterial wird senkrecht zu den zu verbindenden Teilen angeordnet.

Technical Information

Bolt Connections

Fit nuts manually and then tighten with torque wrench. All fixtures to be fitted vertically to the connecting parts.

Schraube · Bolt	Mmin	Mmax
M 10	10 Nm	17 Nm
M 16	70 Nm	90 Nm

Dauerhaftigkeit

Die Mindestschichtdicke für Schrauben und Muttern beträgt gemäß EN ISO 10684 an den jeweiligen Messstellen 40 µm. Verzinkung der Schrauben und des Stahls nach EN ISO 1461 und EN 1179.

Durability

The minimum coat thickness for screws and nuts shall be in accordance with EN ISO 10684 at the respective measuring points 40 µm. Galvanising of bolts and steel per EN ISO 1461 und EN 1179.

Erwartete Dauerhaftigkeit

Ca. 20 Jahre, in Abhängigkeit von der atmosphärischen Korrosionsbelastung, z.B. Meeresluft, Industrieluft u.s.w

Expected Durability

Approx. 20 years, depending on atmospheric corrosion e.g. maritime air, industrial air, etc.

Vorbereitende Maßnahmen

Schutzausrüstung bereitstellen und anlegen

Stellen Sie folgende Persönliche Schutzausrüstung bereit und verwenden Sie sie bei den Einbau-Arbeiten:

- Warnkleidung
- Kopf-, Gehör-, Hand- und Fußschutz

Werkzeug bereitstellen

Die hier genannten Werkzeuge sind erforderlich:

- Pfosten-Ramm-Maschine
- Handramme mit Schlauch + Bügel für Kettenaufnahme
- Pfostenzieher
- Bohrmaschine bis 23 mm mit Bohrern
- Wasserwaage/ Vorschlaghammer
- Drehmomentschlüssel bis 140 Nm mit Stecknüssen

Sie können sich jedoch die Arbeit durch den Einsatz von alternativen und/oder zusätzlichen Werkzeugen, Geräten und Maschinen gegebenenfalls komfortabler gestalten.

Verkehr sichern, Baustelle vorbereiten/einrichten

Führen Sie die an Baustellen üblichen Verkehrssicherungs-Maßnahmen nach den nationalen Bestimmungen durch. Die Baustelle muss Platz bieten für:

- ausgelegte Systemkomponenten
- Pfosten-Ramm-Maschine (-Gerät, z. B. Handramme)
- LKWs mit Teleskop-Kran
- Bewegungsfreiheit der Monteure

Liefern, transportieren, auspacken, kontrollieren

Bringen Sie die Systemkomponenten mit dem LKW an die Einbaustrecke. Packen Sie sie aus und kontrollieren Sie an Hand der Lieferscheine den Lieferumfang. Bei Transportschäden und/oder Mangel oder Fehllieferungen verständigen Sie unverzüglich den Spediteur/ Lieferanten.

Entsorgen Sie das Verpackungsmaterial entsprechend den örtlich geltenden Abfallentsorgungs-Bestimmungen. Laden Sie die benötigten Elemente mit dem Teleskop-Kran neben der Einbaulinie ab.

Preparatory Measures

Allocate and wear protective clothing

Provide the following personal protective clothing and use during installation works:

- reflective clothing
- head, ear, hand and foot protection

Allocate tools

The following tools are required:

- Post rammer
- manual rammer w. hose and bracket for chain fixture
- Post pully
- drill until 23 mm with drill bits
- level / sledgehammer
- torque key to 140 Nm with sockets

However, you can facilitate the work by using alternative tools, equipment and machinery as necessary.

Traffic Management, prepare site and set-up

Set up the traffic management measures usually required by the national regulations. The construction site must have sufficient space for:

- laid-out system components
- post rammer (or equipment e.g. manual rammer)
- truck with telescope crane
- ample space for the assembly crew

Supply, transport, off loading and delivery check

Bring the system components by truck to the installation section. Off-load and check that the delivery is as per the delivery docket. The carrier or supplier has to be notified immediately if there is any transport damage or discrepancies with the delivery.

Dispose of the packaging material according to the applicable local refuse disposals regulations. Lift the required guardrails with the telescope crane along the Container with bolts, washers and nuts.

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Gründung

Der Bereich vor und unter System ist so zu befestigen, dass er ausreichend tragfähig (für Pkw) ist. Die Pfosten werden mit einem pneumatischen oder einem hydraulischen Rammgerät und einem Schlagstück für den entsprechenden Pfostenquerschnitt in den Boden eingebracht.

Vor dem Beginn der Rammarbeiten müssen Erkundigungen über Versorgungsleitungen (Kabel, Rohre, Leitungen usw.) eingeholt werden. Die Kabelschutzanweisungen der Versorger sind zu beachten.

Für das Rammen von Pfosten werden Böden in folgende Bodenklassen eingeteilt:

Foundation

The ground in front of and under the safety barriers must be compacted so that it is sufficiently strong (to bear the load of passenger cars). Posts are rammed into the ground with a pneumatic or hydraulic ram and a hammer for corresponding post cross section.

Before beginning the ramming works information must be acquired regarding any utility lines (cables, pipelines, etc.). The instructions regarding protection of cables as issued by the utility companies must be adhered to.

For the ramming of posts the soils are subdivided into the following soil classes:

Bodenbedingungen, geeignete Gründungen · Soil conditions, suitable foundations

Bodenklassen Soil Class	Bezeichnung Description	Eigenschaften Characteristics	Rammen Post driving
A	Oberboden, auch fließend Surface soil also fluid (Humus)	Humus, Mutterboden, flüssig bis zäh flüssig top soil, fluid to hardly fluid	nicht möglich; Fundament erstellen Not possible
B	Boden leicht lösbar, mittelschwer, schwer Ground easily soluble heavy	Sand- und Kiesböden mit Steinanteil bis 63 mm Korngröße moderately heavy Sand and gravel soil with stone content up to 63 mm grain size	geeignet possible
C	Fels Rock	Felsige Böden (und ab 63 mm Korngröße) Rocky ground (and from 63 mm grain size)	nicht möglich; also bohren, einsetzen, verfüllen, verdichten Not possible; therefore bore, fit, fill, pack

Das Rammen der Pfosten in den Bodenklasse A ist nicht zulässig. In diesen Fällen sind Sondermaßnahmen mit dem Auftraggeber abzustimmen. Dabei kann es sich um den Austausch des Bodens oder um die Errichtung eines Streifenfundamentes handeln.

In den Bodenklasse B sind die Pfosten mit einer Einspannlänge von 0,81 m zu rammen.

Das Kürzen von Pfosten bedarf grundsätzlich der schriftlichen Genehmigung des Auftraggebers. Wird für das Kürzen von Pfosten keine schriftliche Genehmigung erteilt, sind mit dem Auftraggeber Sondermaßnahmen (Eingrab- bzw. Plattenpfosten, Streifenfundament o.ä.) zu vereinbaren.

Ramming posts in soils of class A is not permitted. In these cases special measures must be agreed with the client. The soil may have to be substituted or strip foundations may have to be erected.

In soil class B posts must be rammed to a depth of 0.81 m.

Any reduction of the length of posts requires the written approval of the client. In case the client does not grant written approval for reducing the length of posts special measures (single dug-in posts or posts with footplate, strip foundations, etc.) must be agreed with the client.

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In Bodenklasse C und bei eingelagerter Schlacke ist grundsätzlich zu bohren. Das System kann nur dann bei Bodenklasse C eingesetzt werden, wenn die Überdeckung mit Bankettmaterial mindestens 20 cm beträgt. Die Bohrlöcher sind mit Sand zu verfüllen und im Anschluss daran die Pfosten einzurammen. Der min. Durchmesser für das Bohrloch beträgt 17,0 cm.

Einzelne Hindernisse, die bis zu einer Tiefe von 50 cm angetroffen werden, sind zu entfernen.

In soil class C and if the soil contains slag the posts must always be inserted in drilled holes. The system can be erected on soil of class C only if the thickness of the cover with verge material is at least 20 cm. Drilled holes must be filled with sand and then the posts must be rammed in. The minimum diameter for the boreholes is 17.0 cm.

Single obstacles that are found at a depth of up to 50 cm must be removed

Kontrolle

1. Überprüfen der Konstruktion

Nach dem Einbau des Rückhaltesystems prüfen Sie den festen Sitz aller Schraubverbindungen. Richten Sie das System ggf. nach. Überzeugen Sie sich, dass die Strecke der Systemzeichnung entspricht.

2. Einhaltung der Montagetoleranzen

Grundsätzlich ist das System nach Pfosten-Ramm-Plan und Montagetafel zu installieren. Die in der nachfolgenden Tabelle aufgeführten Toleranzen sollten nur in Ausnahmefällen angewendet werden.

3. Baustelle räumen, System freigeben

- Räumen Sie alles Baumaterial und jeden Abfall weg.
- Führen Sie eine Sichtkontrolle durch, ob die Einbaustrecke vollkommen frei von Objekten ist.
- Räumen Sie die Absperrungen ab und nach Abnahme melden Sie dem Betreiber die Fertigstellung des Systems.

Inspection

1. Checking the assembly

After the installation of the road restrain system, check that all bolt fittings are tight. Align the system where appropriate. Ensure that the section corresponds with the system drawing.

2. Maintaining the installation tolerances

Basically, the system has to be installed in accordance to the technical documentation (post foundation and assembly drawing). The tolerances listed in the following table should be used only in exceptional cases.

3. Clear building site, approve system

- Remove all building material and every piece of refuse.
- Carry out a visible inspection even if the installation roadway is perfectly free of objects.
- Remove mobile safety barriers and after inspection, report completion of the system to the Client.

Einhaltung der Montagetoleranzen · Maintaining the installation tolerances		
Bezugsmaß Reference Measure	Toleranz in cm Tolerance in cm	Anmerkung Comment
Abstand der Pfosten in Längsrichtung Post spacing in longitudinal direction	(+/-) 10 cm	
OK Planke Top of Beam	(+/-) 10 cm	Bezogen auf Geländehöhe With reference to height from road surface
Abweichung Pfosten aus der Flucht Post deviation from alignment	3 cm	auf 13.5 m Länge on 13.5 m section
Abweichung der Planke aus der Flucht Beam deviation from alignment	3 cm	auf 13.5 m Länge on 13.5 m section

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Anbringung von Zusatzeinrichtungen am System

Für die Anbringung von zusätzlichen Einrichtungen der Straßenausstattung sind bereits Vorkehrungen an den Elementen des Systems getroffen worden.

Verkehrszeichen

Die Montage von üblichen Verkehrszeichen ist auf dem Kastenprofile bzw. auf der verkehrsabgewandten Seite des Kastenprofils an den Abstandhaltern oder Pfosten möglich. Für die Befestigung sind die dafür bestimmten Verkehrszeichenhalter zu benutzen. Dabei ist darauf zu achten, dass das so montierte Verkehrszeichen nicht in den Verkehrsraum ragt.

Fußgängerschutz

Für das Anbringen des Fußgängergleitschutzes sind am Pfosten bereits entsprechende Befestigungspunkte vorhanden. Gleiches gilt für den Zweiradfahrerschutz und das Anbringen eines Aufsatzgeländers.

Blendschutzeinrichtungen

Die Montage von Blendschutzeinrichtung ist auf dem Pfosten grundsätzlich möglich. Dort sind bereits Bohrungen für die üblichen Befestigungskonstruktionen vorhanden. Abhängig von der Art des Blendschutzes können eventuell zusätzliche Bohrungen erforderlich sein.

Fitting additional safety devices to the system

There are connection features on the system for attaching additional road safety devices.

Trafic Signs

The assembly of common traffic signs is possible at the rear of the guardrail beams in the box beam section i.e. on the spacer bar or posts. For attaching use the specific traffic sign holders. If there is a danger that certain traffic signs encroach into the traffic area, consultation with the manufacturer regarding the positioning of the traffic sign is required.

Pedestrian Protection

For mounting pedestrian protection rails, corresponding mounting points are already available at the spacer bars. The same applies to motorcycle rails and the fitting of a vertical extension rail.

Anti-glare systems

It is possible to fit anti-glare systems onto the posts. Bolt holes are already located for the usual connection fixtures. Extra bolt holes can be made depending on the type of anti-glare systems.

Reparaturen, Inspektion und Wartung

Reparaturen

Grundsätzlich sind nur diejenigen Bauteile am System auszutauschen, die eine bleibende (plastische) Verformung aufweisen.

Handelt es sich um nur unwesentliche, örtlich begrenzte, Verformungen an einem Bauteil, so ist ein Austausch nicht unbedingt erforderlich. Sind Pfosten verbogen, so müssen diese ausgetauscht werden. Leichte Schrägstellungen der unverformten Pfosten können nur dann durch Richten behoben werden, wenn sich dadurch die Flucht der Längsprofile (Planke) wieder herstellen lässt.

Ist ein bloßes Richten nicht möglich, und sind mehrere Bauteile beschädigt, so ist im Bereich der Unfallstelle das System im modularem 4.50 Meter Raster komplett auszutauschen. Dabei sind alle demontierten Verbindungsmittel (Schrauben) durch neue zu ersetzen. Die hierbei entstandenen erweiterten Pfostenlöcher sind zu verfüllen und ausreichend zu verdichten.

Außerdem ist darauf zu achten, dass Beschädigungen an den verzinkten Oberflächen vermieden werden. Kleine Fehlstellen an der Zinkoberfläche sind nach sorgfältiger Vorbereitung durch auftragen einer Zinkstaubbeschichtung nachzubessern. Überzähliges Material ist vollständig von der Reparaturstelle zu entfernen.

Reparaturarbeiten können durch jeden Fachbetrieb problemlos erledigt werden. Die einzelnen Bauteile für Reparaturarbeiten sind auf dem Markt frei erhältlich, wobei darauf zu achten ist, dass diese von einem CE-zertifizierten Hersteller stammen.

Beschädigte Teile entsorgen / recyclen

Recyceln Sie beschädigte Teile entsprechend den gesetzlichen und örtlichen Abfallentsorgungs-Vorschriften. Es sind keine toxischen bzw. gefährlichen Materialien in Verwendung.

Inspektion und Wartung

Führen Sie alle 12 Monate eine Sichtprüfung durch. Das System ist wartungsfrei.

Repairs, Inspection and Maintenance

Repairs

Basically, you need to replace only those components that have any residual (plastic) deformation in the system.

If these are merely minor deformations in one component that are local in nature, replacement is not really necessary. However, if posts are bent, they must be replaced. Minor skews in the non-deformed posts can be attended to by straightening or turning them, but only if the alignment of the longitudinal section (plank) can be restored.

If straightening or turning is not possible, and if more than one component is damaged, the system in the damaged section must be replaced completely using the modular 4.50 metre sections. In the process, all disassembled connection fittings (screws) must be replaced with new ones. The expanded holes in the posts resulting from this must be filled up and sealed adequately.

Moreover, care must be taken to ensure that the galvanised surfaces do not get damaged. Minor defective spots on the galvanised surface must be attended to by careful preparation with the application of zinc dust coating. Surplus material must be removed completely from the area that has been repaired.

Repair work can easily be undertaken by any contractor. The required components can be purchased on the open market as long as they have the CE Mark of the manufacturer.

Dispose/recycled damaged components

Recycle damaged parts according to legal and local waste disposal regulations. There are no hazardous and dangerous substances.

Inspection and Maintenance

Run every 12 months, a visual check.
The System is maintenance free.

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Bedarfsanforderungen und Anpassungen an örtliche Bedingungen

Umbauten des geprüften Rückhaltesystems in anderer als der zuvor beschriebenen Bauweise sind ohne die schriftliche Zustimmung des Herstellers nicht zulässig.

Montage

Die Schutzplankenholme müssen in Fahrtrichtung überlappen. Die Pfosten werden mit der geschlossenen Seite zum Verkehr hin installiert.

Paßstücke

Paßstücke können auf der Arbeitsstelle angefertigt werden. Dabei sind folgende Bedingungen während der Herstellung zu beachten:

- Mindestlänge 750 mm auf der Arbeitsstelle (Profilüberlappung).
- keine Überschreitung des vorgegebenen Pfostenabstands der Schutzplankenkonstruktion beim Einbau,
- fachgerechtes Trennen mit einer Trennschleifemaschine oder Säge,
- fachgerechtes Bohren der Verschraubungslöcher,
- fachgerechtes Nachbessern von Schnittstellen und gebohrten Verschraubungslöchern durch Auftragen von Zinkstaubeschichtungsstoffen.

Abweichender Untergrund

Bei der Verwendung auf nicht ebenerdigen Banketten ist die Lage der Systemlängselemente der Flucht der durchlaufenden Schutzeinrichtung anzupassen.

Radien, Mindestradien

In Kurvenbereichen sind ab einem Radius von 30 m vorgebogene Schutzplankenholme zu verwenden. Für Radien von 50 m bis 10 m sind verkürzte Kastenprofile (z.B. 2 m) zu verwenden, die die entsprechende Radienführung zulassen. Bei Radien < 10 m sind vorgebogene Kastenprofile zu verwenden.

Necessary requirements and conforming to local condition

Modifications to the tested restraint system are not permitted without the written confirmation of the manufacturer.

Assembly

The beams must overlap in the direction of driving. The Posts are installed with the closed side towards the traffic.

Cut pieces

Beams can be cut to fit on site. The following conditions must be adhered to during production:

- Minimum length 750 mm on site (beam overlap)
- On installation the post spacing of the guardrail system must not be extended
- Professional cuts using angle grinder or saw
- Professional drilling for bolt holes
- Professional re-work of cuts and drill holes using zinc spray material

Uneven Ground Conditions

The position of the system on uneven ground conditions should follow the alignment of the adjacent systems.

Radius, minimum radius

In curved road sections of more than radius 30 m, prebend radius guardrails must be used. For radii between 50m and 10m, shorter box beams (e.g. 2 m) must be used which meet the curvature. For radii < 10 m prebend box beams must be used.

Eingeschränkter Wirkungsbereich

Wird der Wirkungsbereich durch bauliche Gegebenheiten eingeschränkt, ist der Regelabstand zwischen System und Verkehrsraum zu reduzieren.

Ausführung von Verschwenkungen

Ist auf Grund der baulichen Situation eine seitliche Verschwenkung des Systems notwendig, sollte diese gem. den nationalen Vorschriften ausgeführt werden.

Ausführung im asphaltierten Untergrund

Ist auf Grund der baulichen Situation eine Installation im asphaltierten Untergrund notwendig, ist das System mittels Doppelbohrung zu installieren. Die Doppelbohrung ist durch zwei überlappende Bohrungen mit einem Durchmesser von 170 mm auszuführen, so dass die Außenabmessungen der Gesamtbohrung mindestens 170 x 260 mm betragen. Nach dem Verfüllen und Verdichten der Doppelbohrung ist der Pfosten mittig im verkehrseitigen Bohrloch zu rammen.

Restricted Working Width

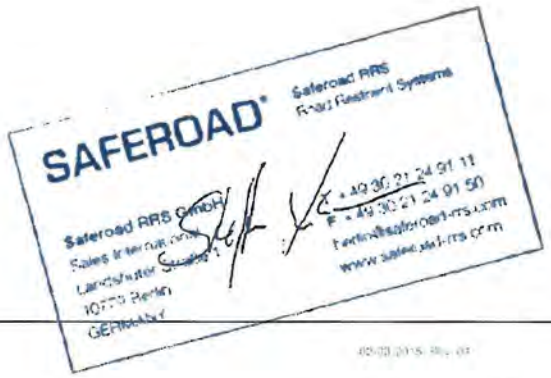
If the working width is limited due to structural obstructions, the regulatory set-back between the safety barrier system and traffic area should be reduced accordingly.

Installation of Flared Ends

If there are structural conditions where the terminal ends must be flared back, the flared ends should be installed in accordance with national regulations.

Installation in tarmacked Underground

If there are structural conditions where the system must be installed in tarmacked underground, the posts have to be rammed in a double hole. The double hole is made of two overlapping holes with a diameter of 170 cm, so that the total dimension of the double hole is at least 170 x 260 mm. After backfilling and compaction of the double hole, the post has to be installed in the center of the road side hole.



Änderung von Systemteilen

Änderungen an Systemteilen sind mit dem Hersteller abzustimmen.

Modification of System Components

Modifications to the system's components must be agreed with the manufacturer.

Sonstige Hinweise

Auf Grund der abgestuften Systemhöhe ist das System problemlos übersteigbar.

Detaillierte Bauteilzeichnungen des geprüften Rückhaltesystems können nachgereicht werden.

Wird beim Einbau ohne Rücksprache mit dem Hersteller von den vorangegangenen Anforderungen abgewichen, so geht die Mängelhaftung für das Bauprodukt vom Hersteller auf den Monteur über.

Rechtliche Gültigkeit nur in deutscher Sprache.

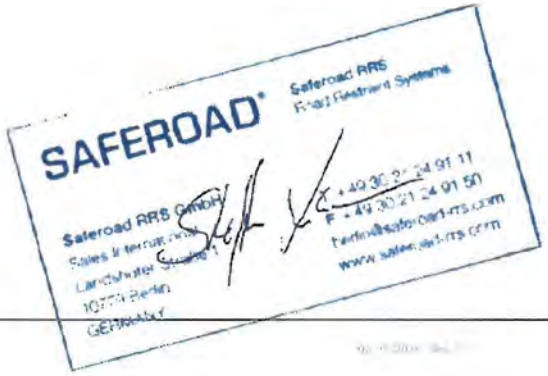
Other Information

As the system height for the guardrail beam is stepped, it can easily be mounted.

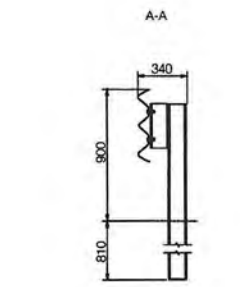
Detailed drawings of the tested restraint system may be submitted.

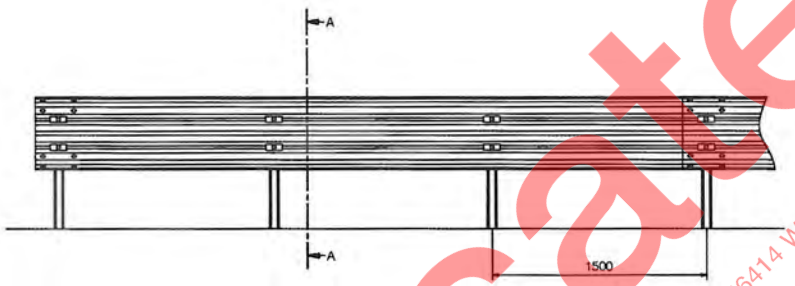
In case the assembly deviates from preceding requirements without consultation of the manufacturer the liability of the product passes from the manufacturer to the installer.

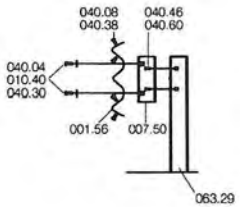
Valid legal version is in german language.



SAFEROAD®



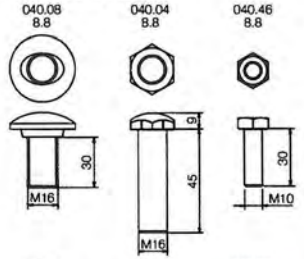




Parts

Art. no.	Description	Qty/4.5 m
001.56	Beam 4.820 mm	1.0
007.50	Spacer 125 mm	3.0
010.40	Plate M16	6.0
040.04	Panhead bolt M16x45, 8.8	6.0
040.08	Panhead bolt M16x30, 8.8	8.0
040.30	Washer Ø18x30	6.0
040.38	Washer Ø18x38	8.0
040.46	Hexagonal bolt M10x30, 8.8	6.0
040.60	Washer Ø11x20	6.0
063.29	Post C125, 1.600 mm	3.0

Fasteners



Systemübersicht · System overview · Présentation du système · Panoramica del sistema · Descripción general del sistema · Visão geral do sistema · Přehled systému · Sisteme Genel Bakış · Przegląd systemu · Обзор системы · Prezentare generală sistem · Overzicht van het systeem · Systemtegning · Systemritning · نظام عرض عام

SafeStar 231

H2 · W3 · A

K208010-1-1

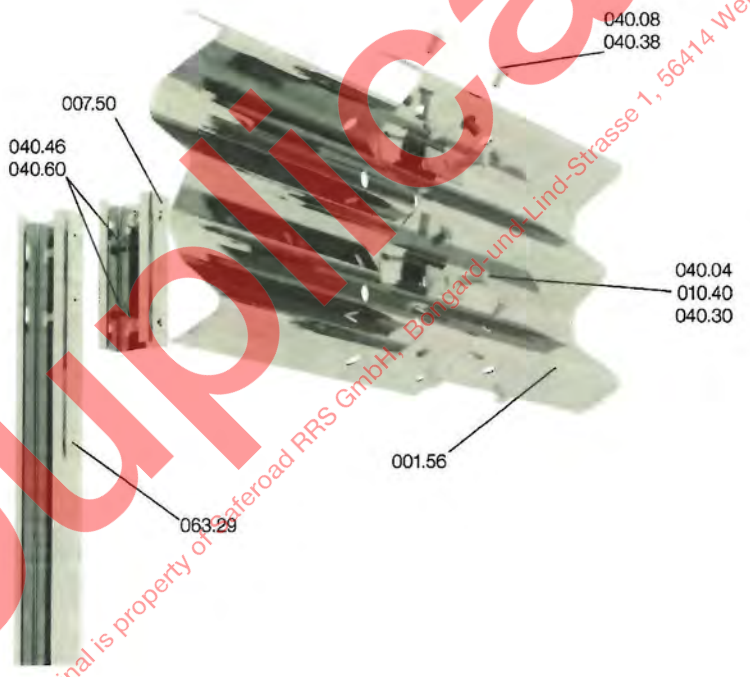
SAFEROAD®

Main components

001.56 - Beam 3W, 4.820 mm, d = 2.5 mm
007.50 - Spacer C125, 275 mm, d = 5.0 mm
063.29 - Post C125, 1.600 mm, d = 5.0 mm

Fasteners

010.40 - Plate M16
040.04 - Panhead bolt with hexagon M16x45, 8.8
040.08 - Panhead bolt with shoulder M16x30, 8.8
040.30 - Washer Ø 18x30
040.38 - Washer Ø 18x38
040.46 - Hexagonal bolt M10x30, 8.8
040.60 - Washer Ø 11

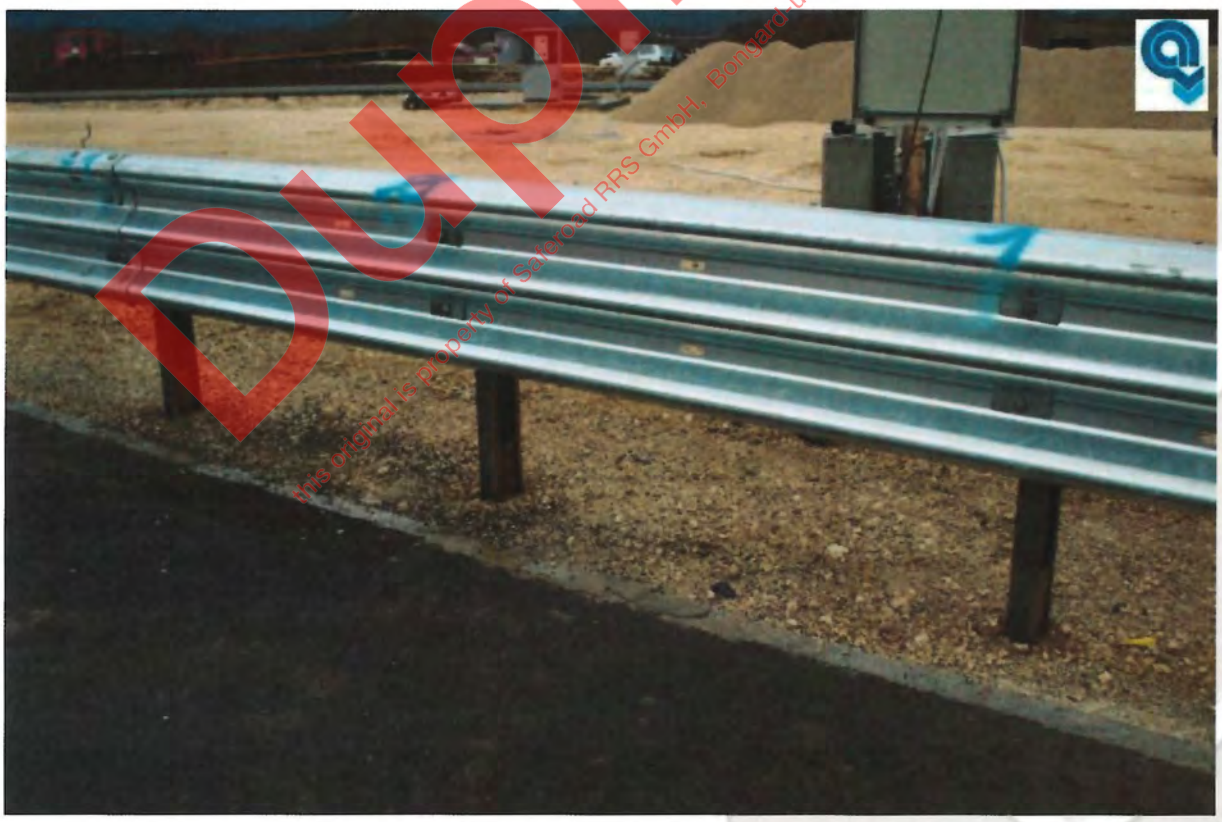


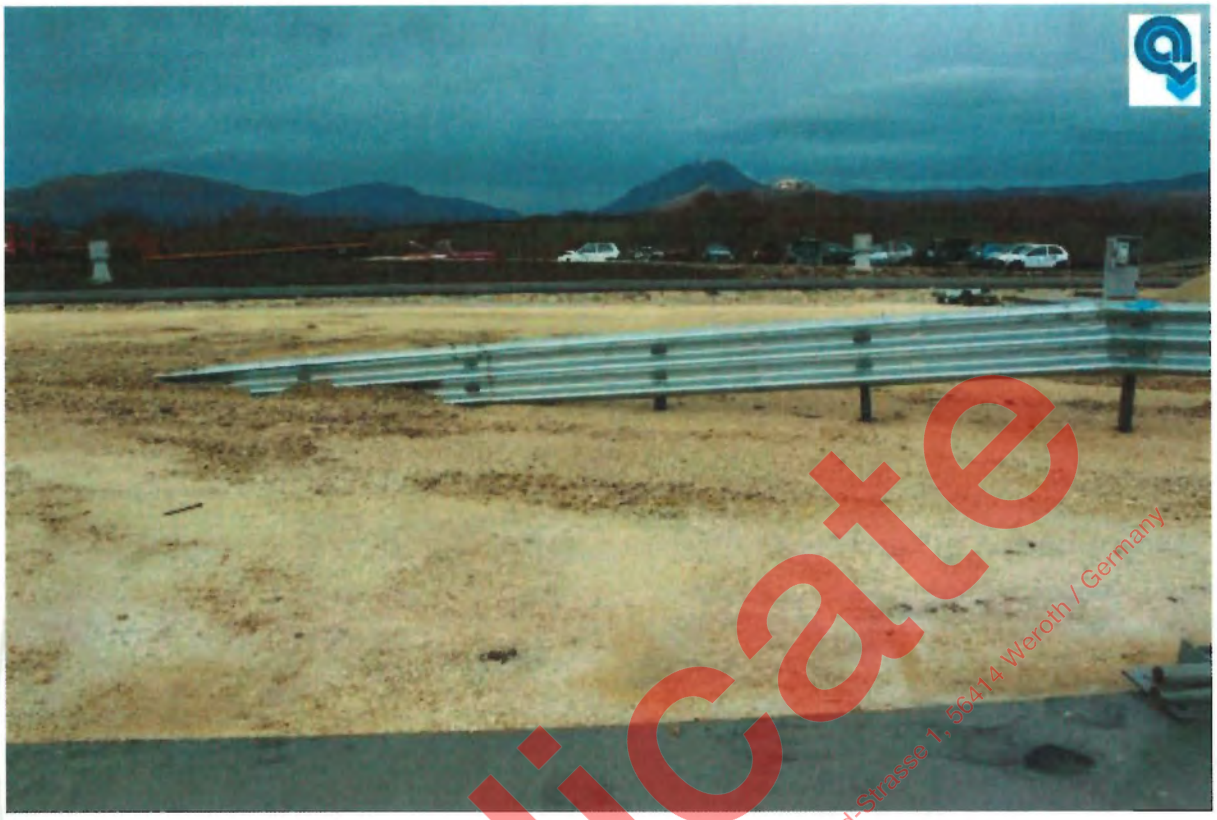
Montagetafel · Assembly drawing

SafeStar 231
H2 · W3 · A

SAFEROAD® Saferoad RRS Road Restraint Systems
Saferoad RRS GmbH
T + 49 30 21 24 91 11
F + 49 30 21 24 91 50
www.saferoad-rrs.com

ALLEGATO C1 - ANNEX C1





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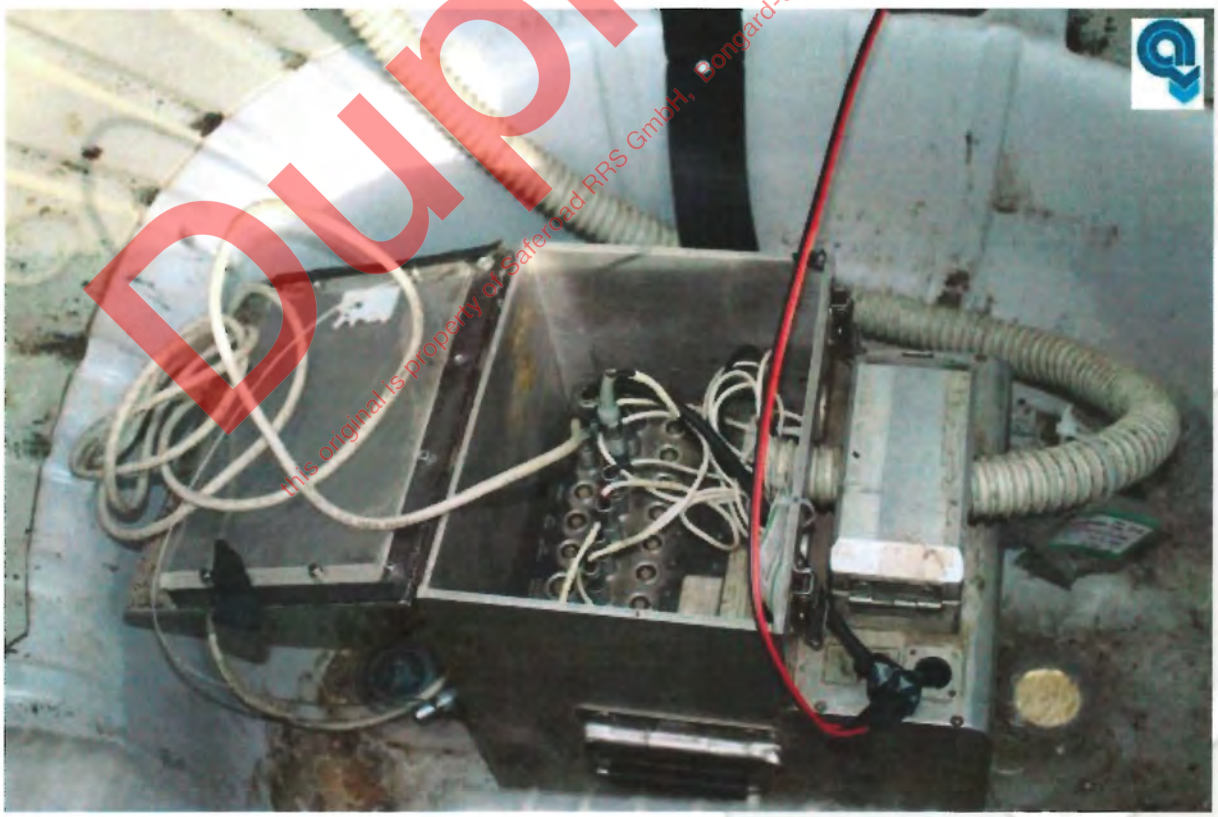


ALLEGATO C3 - ANNEX C3

Foto dei paletti di sostegno deformati – *Deformed posts photos*

Montante/Post +3

Montante/Post +2

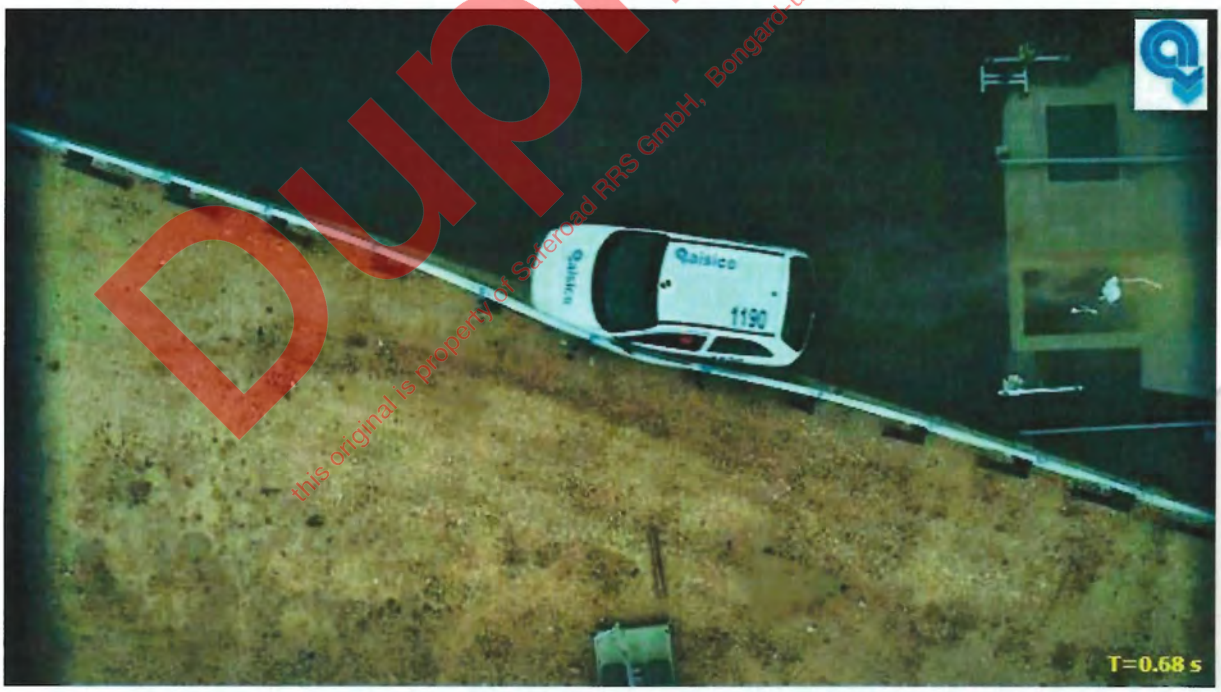
Montante/Post +1

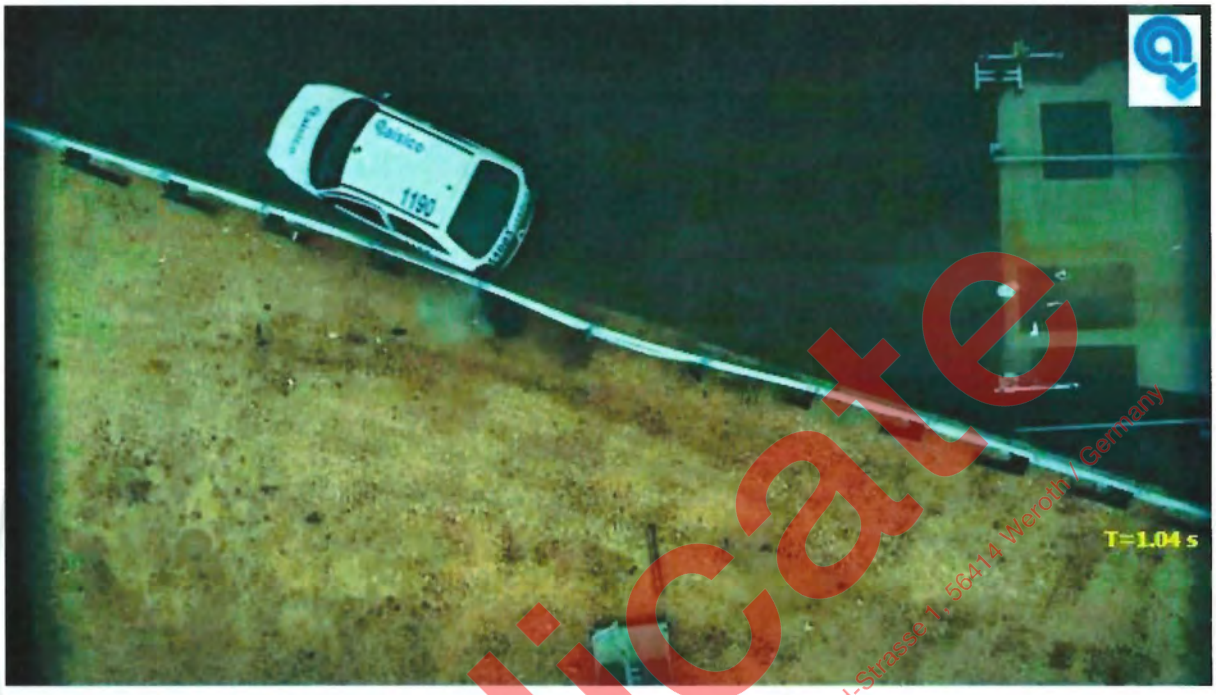
Montante/Post 0

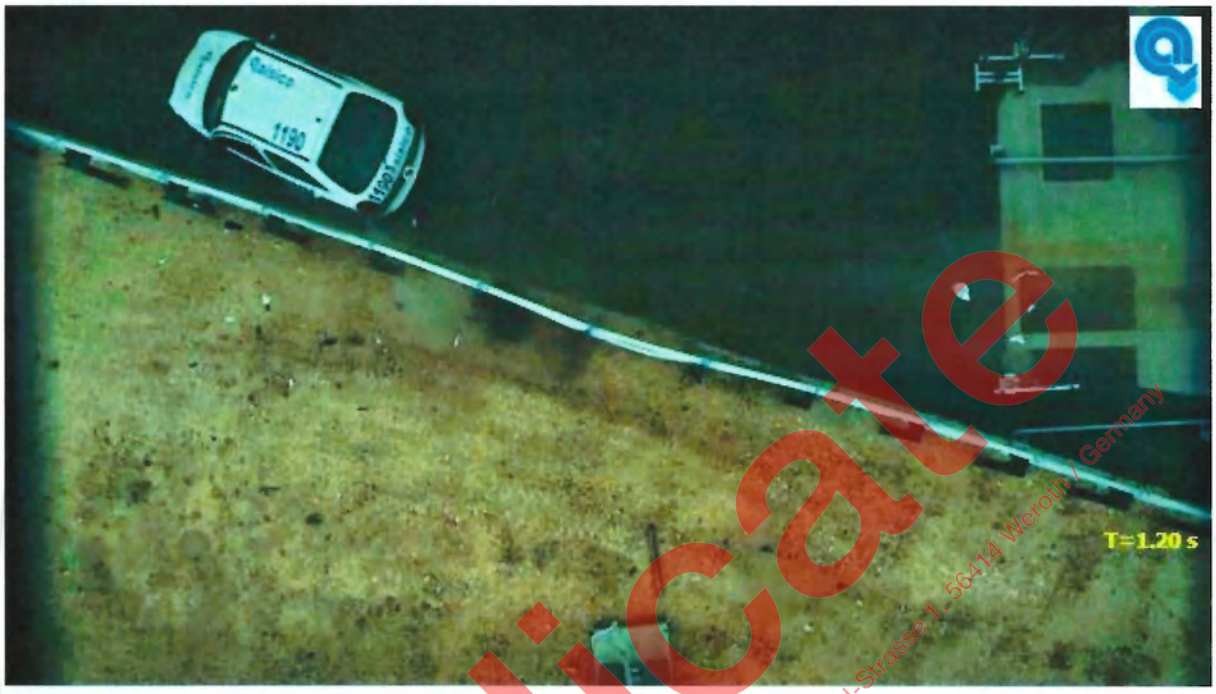
Montante/Post -1

ALLEGATO C4 - ANNEX C4

ALLEGATO C5 - ANNEX C5







ALLEGATO C6 - ANNEX C6

CENTRO PROVE aisico

Test # 1190 of 2014/12/16
SAFEROAD RRS GmbH
H2 Safety barrier for side edge
mod. SafeStar 231

ALLEGATO D - ANNEX D

aisico

Test 1190

2014 ,16th December

CLIENT: Saferoad RRS GmbH

IMPACT TEST: TB 11

Test 1190 2014, 16th December - IMPACT TEST TB 11 - Saferoad RRS GmbH

Test 1190

2014 ,16th December

DVD A
Crash Videos
- 1.1 Above
- 1.2 Front
- 1.3 Rear
- 1.4 Lateral
- 1.5 Axial

Vehicle and Device
- 2.1 Vehicle Pre-Crash
- 2.2 Vehicle Post-Crash
- 2.3 Device Pre-Crash
- 2.4 Device Post-Crash

DVD B
High Frame Rate Videos
- 1.1 Front
- 1.2 Above
- 1.3 Rear
- 1.4 Axial
- 1.5 Rear B

High Definition Photos

aisico

Date of Test Report
2015/03/03

Allegato D
Pag. 1 of 1

Test House Director

ALLEGATO E - ANNEX E

SOGEA srl
Via Casalmonferrato 2E - ROMA
tel. 067016809 - fax 067011625
Laboratorio geotecnico

AZIENDA CON SISTEMA DI GESTIONE QUALITA' UNI EN ISO 9001:2008 CERTIFICATO DA CERTIQUALITY

Certificazione Ufficiale - Settore « A » - Prove di laboratorio sulle terre
AUTORIZZAZIONE MINISTERO INFRASTRUTTURE E TRASPORTI
Decreto 57027/5-11-2007 - Art. 59 DPR 380/2001 - Circolare 7618/STC/2010

CERTIFICATO DI PROVA N°: 06046 Pagina 1/2	DATA DI EMISSIONE: 10/06/13	Inizio prova:	03/06/13
VERBALE DI ACCETTAZIONE N°: 112 del 03/06/13		Fine prova:	03/06/13

COMMITTENTE: AISICO srl
RIFERIMENTO: Nuovo impianto Crash - Pereto (AQ)
PROVA: 2

PROVA DI CARICO SU PIASTRA

Modalità di prova: Norma CNR 146/92

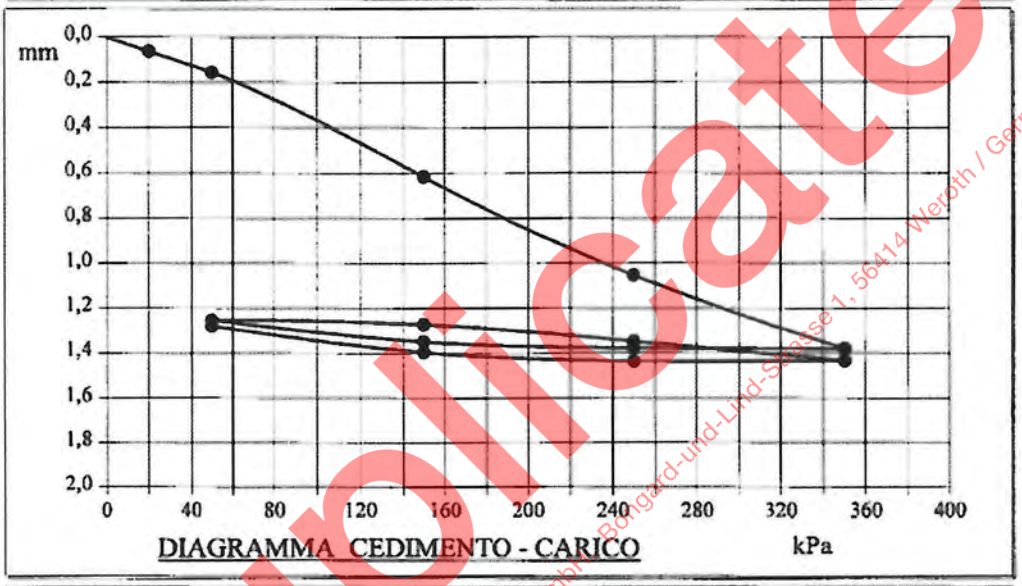


DIAGRAMMA CEDIMENTO - CARICO

	Strato di Base	Md(I° ciclo) / Md(II° ciclo) = 0,273	
I° ciclo	Modulo di deformazione: Md(250-350 kPa) = 90909 kPa	Deformaz.: d(250-350 kPa) = 0,33 mm	
	Cedimento totale = 1,38 mm	Ritorno elastico = 9,18 %	Residuo plastico = 90,82 %
II° ciclo	Modulo di deformazione: Md(250-350 kPa) = 333333 kPa	Deformaz.: d(250-350 kPa) = 0,09 mm	
	Cedimento totale = 1,43 mm		

ALTRI PARAMETRI

Coefficiente di Poisson = 0,35	Ks(I° ciclo) = 300,8 MN/m³	Ks(II° ciclo) = 48785,3 MN/m³	
I° ciclo — Modulo di Young (kPa)	E(50-150) = 44924	E(150-250) = 46966	E(250-350) = 62622
I° ciclo — Modulo edometrico (kPa)	Ed(50-150) = 149747	Ed(150-250) = 156554	Ed(250-350) = 208739
II° ciclo — Modulo di Young (kPa)	E(50-150) = 1033256	E(150-250) = 295216	E(250-350) = 229613
II° ciclo — Modulo edometrico (kPa)	Ed(50-150) = 3444188	Ed(150-250) = 984054	Ed(250-350) = 765375

NOTA: Tutti i parametri sono stati calcolati sulla base dei punti sperimentali

Ghiaia sabbiosa di colore nocciola.

2
27400

SGEO Laboratorio 3.0 - 2012

Lo sperimentatore
Dott. Fabrizio Rabottino

Il direttore del laboratorio
Dott. Sergio Rabottino

SOGEA srl
Via Casalmonferrato 2E - ROMA
tel. 067016809 - fax 067011625
Laboratorio geotecnico

AZIENDA CON SISTEMA DI GESTIONE QUALITÀ UNI EN ISO 9001:2008 CERTIFICATO DA CERTIQUALITY

Certificazione Ufficiale - Settore « A » - Prove di laboratorio sulle terre
AUTORIZZAZIONE MINISTERO INFRASTRUTTURE E TRASPORTI
Decreto 57027/5-11-2007 - Art. 59 DPR 380/2001 - Circolare 7618/STC/2010

CERTIFICATO DI PROVA N°: 06045 Pagina 2/2	DATA DI EMISSIONE: 10/06/13	Inizio prova:	03/06/13
VERBALE DI ACCETTAZIONE N°: 112 del 03/06/13		Fine prova:	03/06/13

COMMITTENTE: AISICO srl
RIFERIMENTO: Nuovo impianto Crash - Pereto (AQ)
PROVA: 2

PROVA DI CARICO SU PIASTRA

Modalità di prova: Norma CNR 146/92

Carico kPa	T min	Deformazione (mm) Comp. 1	Comp. 2	Comp. 3		Media mm
20	0	0,05	0,07	0,05		0,06
	1	0,06	0,08	0,05	>	0,06
50	0	0,09	0,13	0,10		0,11
	1	0,14	0,17	0,13		0,15
	2	0,15	0,18	0,14	>	0,16
150	0	0,42	0,61	0,56		0,53
	1	0,45	0,67	0,62		0,58
	2	0,48	0,70	0,64		0,61
	3	0,48	0,71	0,66	>	0,62
250	0	0,63	1,00	0,98		0,87
	1	0,73	1,09	1,05		0,96
	2	0,76	1,12	1,09		0,99
	3	0,83	1,15	1,12		1,03
	4	0,85	1,17	1,14	>	1,05
350	0	1,10	1,34	1,33		1,26
	1	1,20	1,40	1,38		1,33
	2	1,25	1,44	1,41		1,37
	3	1,27	1,45	1,42	>	1,38
250	0	1,27	1,45	1,42		1,38
	1	1,26	1,45	1,42	>	1,38
150	0	1,23	1,43	1,41		1,36
	1	1,23	1,42	1,40	>	1,35
50	0	1,13	1,35	1,30		1,26
	1	1,11	1,35	1,30	>	1,25
150	0	1,13	1,36	1,30		1,26
	1	1,14	1,37	1,31	>	1,27
250	0	1,22	1,43	1,38		1,34
	1	1,22	1,43	1,39	>	1,35
350	0	1,32	1,50	1,47		1,43
	1	1,32	1,50	1,48	>	1,43
250	0	1,32	1,50	1,48		1,43
	1	1,32	1,50	1,48	>	1,43
150	0	1,29	1,48	1,45		1,41
	1	1,26	1,48	1,45	>	1,40
50	0	1,16	1,40	1,36		1,31
	1	1,12	1,38	1,35		1,28
	2	1,11	1,38	1,35	>	1,28

Carico kPa	T min	Deformazione (mm) Comp. 1	Comp. 2	Comp. 3	Media mm

2
27400

SGEO - Laboratorio 3.0 - 2012

Lo sperimentatore
Dott. Fabrizio Rabottino

Il direttore del laboratorio
Dott. Sergio Rabottino

intec s. r. l.

Laboratorio di ricerca e sperimentazioni su materiali da costruzione, su terreni, acque ed ambiente.
Reg. Soc. Tribunale di Frosinone n° 3498 del 26/11/1982
Codice Fiscale e Partita I.V.A. : 007 310 506 05

03012 ANAGNI (FR) - Via Fontanile S. Angelo n° 2 (Via Casilina km 61) - Tel. con R. A. 0775-768.767 - Fax e Segr. 0775-768.183

CERTIFICATO DI PROVE A COMPRESSIONE n. 162844 Pag. 1/1
su CUBETTI IN CONGLOMERATO CEMENTIZIO

Prot. n.	A567-55824	**Nota**	**n.** R.S.T.	**del**	16-01-2009
Anagni	22-01-2009	**V.A.**	**n.** 44074	**del**	16-01-2009

DATI FORNITI DAL RICHIEDENTE

Committente : AISICO
Associazione Italiana per la Sicurezza della Circolazione

Provenienza dei Campioni : REALIZZAZIONE CORDOLO IN C.A. .
c/o CENTRO CRASH di ANAGNI (FR)

DATI FORNITI DAL RICHIEDENTE			DATI DI LABORATORIO						
N°	Posizione in Opera e/o Contrassegno	Data Prelievo	Dimensioni mm	Massa Volumica kg/m³	Area cm²	Rottura N/mm²	Data Prova	S	R
1	CORDOLO "A" (n° 1)	N.D.	150x147x147	2380	220,5	48,0	20-01-2009	2	1
2	CORDOLO "A" (n° 2)	N.D.	150x147x147	2380	220,5	46,5	20-01-2009	2	1
3	CORDOLO "A" (n° 3)	N.D.	150x147x147	2370	220,5	47,0	20-01-2009	2	1

S = SPIANATURA: 1=Effettuata mediante rettifica (UNI EN 12390-3) 2=Non ritenuta necessaria per tolleranza di planarità conforme a UNI EN 12390-1

R = TIPO DI ROTTURA : 1 = Soddisfacente Bipiramidale 2 = Soddisfacente Piramidale 3 = Soddisfacente Esplosiva 4 = Non Soddisfacente

NORMATIVE DI RIFERIMENTO : Compressione UNI EN 12390-3

N.D. = Dato non dichiarato

NOTE : - CAMPIONI E DATI FORNITI DAL RICHIEDENTE LE PROVE
- DOMANDA DI PROVE SOTTOSCRITTA DAL RESPONSABILE SETTORE TECNICO
Dott. Ing. ANDREA BIANCHI

Lo Sperimentatore
Sig. Claudio La Marra

Il Direttore del Laboratorio
Dr Ing. Giov. Battista Bottini

ALLEGATO F - ANNEX F

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

CERTIFICATO DI ACCREDITAMENTO
Accreditation Certificate

Accreditamento n° / *Accreditation n°* **0424** Rev. **5**

Si dichiara che / *We declare that*

AISICO S.R.L.
Appartenente all'ente:
AISICO S.R.L.
Sede:
S.P. 27 del Cavaliere Loc. Salone Km 2,500 - 67064 Pereto AQ

è conforme ai requisiti della norma: UNI CEI EN ISO/IEC 17025:2005 "Requisiti generali per la competenza dei Laboratori di prova e taratura"

meets the reqirements of the standard: EN ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories" standard

quale: **Laboratorio di Prova**

as: ***Testing Laboratory***

L'accreditamento attesta la competenza tecnica del Laboratorio relativamente allo scopo riportato nelle schede allegate al presente certificato. Le schede possono variare nel tempo. I requisiti gestionali della ISO/IEC 17025:2005 (sezione 4) sono scritti in un linguaggio idoneo all'attività dei Laboratori di Prova, sono conformi ai principi della ISO 9001:2008 ed allineati con i suoi requisiti applicabili.
Il presente certificato non è da ritenersi valido se non accompagnato dalle schede allegate e può essere sospeso o revocato in qualsiasi momento nel caso di inadempienza accertata da parte di ACCREDIA.
La vigenza dell'accreditamento può essere verificata sul sito WEB (www.accredia.it) o richiesta direttamente ai singoli Dipartimenti .

The accreditation certifies the technical competence of the laboratory limited to the scope detailed in the attached Enclosure. The scope may vary in the time. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in a language relevant to Testing Laboratories operations and meet the principles of ISO 9001:2008 and are aligned with its pertinent requirements.
The present certificate is valid only if associated to the annexed schedule, and can be suspended or withdrawn at any time in the event of non fulfilment as ascertained by ACCREDIA.
The in force status of the accreditation may be checked in the WEB site (www.accredia.it) or on direct request to appointed Department.

Data di 1ª emissione / *1st issue date*	Data di modifica / *Modification date*	Data di scadenza / *Expiring date*
2002-10-16	2014-10-22	2018-10-17

Il Direttore Generale / *The General Director* (Dr. Filippo Trifiletti)

Il Direttore di Dipartimento / *Department Director* (ad interim Dr. Filippo Trifiletti)

Il Presidente / *The President* (Cav. del Lav. Federico Grazioli)

Mod. CA-01 rev. 01 Pag. 1 di 1

ACCREDIA
Sede operativa e legale: Via Guglielmo Saliceto, 7/9 | 00161 Roma - Italy | Tel. +39 06 8440991 | Fax +39 06 8841199
info@accredia.it | www.accredia.it | Partita IVA - Codice Fiscale 10566361001

ACCREDIA
ENTE ITALIANO DI ACCREDITAMENTO

AISICO S.R.L. S.P. 27 del Cavaliere Loc. Salone Km 2,500 67064 Pereto AQ	Numero di accreditamento: **0424** Sede **A**
	Revisione: **13** Data: **23/12/2014**
	Scheda **1** di **3** PA487AR13.pdf

ELENCO PROVE ACCREDITATE - CATEGORIA: 0

Acciai al carbonio e bassolegati
Carbon and low alloy steel

Denominazione della prova / Campi di prova	*Metodo di prova*
Composizione chimica del materiale. Chemical composition of the material. Aluminum 0-0.075% Carbon 0-1.1% Chromium 0-2.25% Manganese 0-2.0% Phosphorous 0-0.085% Silicon 0-1.15% Sulfur 0-0.055% Copper 0-0.045%	ASTM E415-08

Alluminio e leghe di alluminio
Aluminim e aluminium alloy

Denominazione della prova / Campi di prova	*Metodo di prova*
Composizione chimica del materaile. Chemical composition of the material. (Si%, Mn%, Cu%, Cr%, Al%, Fe%, Mg%, Ni%, Zn%, Ti%)	UNI EN 14726:2005

Dispositivi di sicurezza - barriere, attenuatori d'urto, terminali, transizioni e TMA.
Safety Device - barriers, crash cushion, final elements, transitions and TMA

Denominazione della prova / Campi di prova	*Metodo di prova*
Indici biomeccanici; Deformazioni del dispositivo; (OIV= m/s ORA =g) Determination of biomechanical indices; deformation of the device (OIV = m/S ORA= g)	AASHTO - Manual for Assesing Safety Hardware: 2009 + NCHRP Report 350:1993

Materiali metallici
Metallic Materials

Denominazione della prova / Campi di prova	*Metodo di prova*
Prova di durezza Rockwell. Rockwell hardness test. (HR)	UNI EN ISO 6508-1:2006
Trazione a temperatura ambiente: Carico unitario di snervamento, Carico unitario a rottura, Allungamento percentuale. Tensile test at room temperature: yeld stress, Ultimate Tensile stress, percentage extension.	UNI EN ISO 6892-1:2009

Sistemi di ritenuta stradali per motociclisti
Motorcyclist road restraint systems

Denominazione della prova / Campi di prova	*Metodo di prova*
Determinazione degli indici biomeccanici; Larghezza operativa del dispositivo (HIC= m2/sec4) Determination of biomechanical indices; Working width of the device	UNE 135900-1:2008 + UNE 135900-2:2008
Indici biomeccanici; Larghezza operativa del dispositivo (HIC= m2/sec4) Determination of biomechanical indices; Working width of the device	UNI CEN/TS 1317-8:2012

Sistemi di ritenuta stradali: attenuatori d'urto
Safety Device -Crash cushion

Denominazione della prova / Campi di prova	*Metodo di prova*
Severità dell'urto (Indici ASI - THIV - VCDI); Deformazione dell'attenuatore d'urto; Proiezione e distribuzione dei frammenti del veicolo di prova e dell' attenuatore d'urto, angolo d'urto, velocità impatto, Traiettoria del veicolo; Tempo di volo. Temperatura ambientale. Severity of impact (indices ASI - THIV - VCDI); Deformation of the crash cushion; Projecting and distribution of the fragments of the test vehicle and crash cushion, impact angle, impact speed, trajectory of the vehicle; Flight Time, ambient temperature.	UNI EN 1317-1:2010 + UNI EN 1317-3:2010

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	Revisione: **13** Data: **23/12/2014**
	Scheda **2** di **3** PA487AR13.pdf

Sistemi di ritenuta stradali: barriere di sicurezza
Safety Device: barriers

Denominazione della prova / Campi di prova	*Metodo di prova*
Severità dell'urto (Indici ASI - THIV - VCDI); Deformazione della Barriera; Deflessione dinamica;Larghezza operativa; intrusione del veicolo; angolo d'urto, Velocità di impatto e di uscita; Spazio libero in metri; Traiettoria del veicolo; Tempo di volo. Severity of impact (indices ASI - THIV - VCDI); Deformation of the barrier; Dynamic deflection; Working width; impact angle, vheicle intrusion; impact velocity and exit speed Free space in meters; Trajectory of the vehicle; Flight Time.	UNI EN 1317-1:2010 + UNI EN 1317-2:2010

Sistemi di ritenuta stradali: terminali e transizioni
Safety Device - terminal elements and transition of the safety barriers

Denominazione della prova / Campi di prova	*Metodo di prova*
Comportamento del dispositivo; Comportamento del veicolo di prova; Indici di severità (ASI - THIV- PHD- VCDI). Behavior of the device; Behavior of the test vehicle; Severity Indices (ASI - THIV- PHD- VCDI).	UNI EN 1317-1:2010 + UNI ENV 1317-4:2003

Strutture di sostegno per attrezzature stradali
Support structures for roads equipments

Denominazione della prova / Campi di prova	*Metodo di prova*
Comportamento del veicolo; Indice di severità ASI; Velocità d'impatto teorico della testa THIV; Velocità d'impatto; Velocità d'uscita; Angolo d'impatto. Behavior of the vehicle; Severity Index ASI; Theoretical impact velocity of the head THIV; Impact velocity; Output rate; Angle of impact.	UNI EN 1317-1:2010 + UNI EN 12767:2008

Vehicle security barrier systems

Denominazione della prova / Campi di prova	*Metodo di prova*
Prestazioni dei VBS (vehicle security barriers) e loro classificazione. Performance of VBS (vehicle security barriers) and their classification (kg-km/h 1500/16 - 30000/80).	PAS 68:2013 + Pas 69:2013, ASTM F2656-07, ISO-IWA14-1:2014, ISO-IWA14-2:2014

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L'ENTE ITALIANO DI ACCREDITAMENTO

AISICO S.R.L. S.P. 27 del Cavaliere Loc. Salone Km 2,500 67064 Pereto AQ	Numero di accreditamento: **0424** Sede **A**
	Revisione: **13** Data: **23/12/2014**
	Scheda **3** di **3** PA487AR13.pdf

ELENCO PROVE ACCREDITATE - CATEGORIA: III

Dispositivi per la riduzione del rumore da traffico ferroviario
Devices for the reduction of noise from rail traffic

Denominazione della prova / Campi di prova	*Metodo di prova*
Dispositivi per la riduzione del rumore da traffico ferroviario Devices for the reduction of noise from rail traffic	prEN16272-6:2012 + prEN16272-3-2:2012 + UNI CEN/TS16272-5:2014

Dispositivi per la riduzione del rumore da traffico stradale

Denominazione della prova / Campi di prova	*Metodo di prova*
Prestazione acustica: Valori in situ della riflessione sonora e dell'isolamento acustico per via aerea (100 Hz - 5 KHz).	UNI CEN/TS 1793-5:2006
Prestazione acustica: Valori in situ della diffrazione sonora (100 Hz - 5 KHz).	UNI CEN/TS 1793-4:2004

Dispositivi per la riduzione del rumore da traffico stradale
Devices for the reduction of noise from road traffic

Denominazione della prova / Campi di prova	*Metodo di prova*
Prestazione acustica: Valori in situ della riflessione sonora e dell'isolamento acustico per via aerea (100 Hz - 5 kHz). termination of the acoustic performance. Acoustic performance - in situ values of sound reflection and airborne sound insulation (100 Hz - 5 kHz).	UNI CEN/TS 1793-5:2006
Prestazione acustica: Valori in situ della diffrazione sonora (100 Hz - 5 kHz). Determination of the acoustic performance. Acoustic performance - in situ values of sound diffraction (100 Hz - 5 kHz).	UNI CEN/TS 1793-4:2004

Legenda
DM: Decreto Ministeriale
GU: Gazzetta Ufficiale
UNI: Ente Nazionale Italiano di Unificazione
EN: Norme Europee elaborate dal Comité Européen de Normalisation
ISO: International Organization for Standardization

ACCREDIA
Il Direttore del Dipartimento
(*ad interim Dr. Filippo Trifiletti*)

Firmato digitalmente da
SILVIA TRAMONTIN

ALLEGATO G - ANNEX G

Prove sui materiali / *Material test* – Crash Test 1190-1200

ELEMENTO / *ELEMENT*	IDENTIFICAZIONE / *SAMPLE CODE*	PROVE - *TEST*		
		Trazione / *Tensile strength*	Durezza Rockwell / *Rocwell hardness*	Analisi chimica / *Chemical analysis*
3W Beam	Prova n° 1190-1200 A	X		X
C125 Post	Prova n° 1190-1200 B	X		X
C125 Spacer	Prova n° 1190-1200 C		X	
Plate M16	Prova n° 1190-1200 D		X	
Panhead screw w. oval M16x30	Prova n° 1190-1200 E		X	
Panhead screw w. hexagon M16x30	Prova n° 1190-1200 F		X	
Hexagonal screw M10X30	Prova n° 1190-1200 G		X	
Nut M10	Prova n° 1190-1200 H		X	
Nut M16	Prova n° 1190-1200 I		X	
Washer ⌀18	Prova n° 1190-1200 L		X	
Washer ⌀18x38	Prova n° 1190-1200 M		X	
Washer ⌀11	Prova n° 1190-1200 N		X	

Le dimensioni degli elementi sono espresse in mm / Element dimensions in mm

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LAB N° 0424

TEST REPORT n° PM0576/15 - Pag.1/1

Tests n°: AT 1724-1725-1726 — of: 2015, 13th February
V.A. n°: 186 — of: 2014, 16th December

INFORMATION PROVIDED BY THE CLIENT			
Client	SAFEROAD RRS GmbH	**Crash test:**	1190-1200
Origino of samples:	CENTRO PROVE AISICO	**Laboratory of test:**	LABORATORIO AISICO
Receipt date of samples:	2014, 16th December	**Element:**	3 wave beam

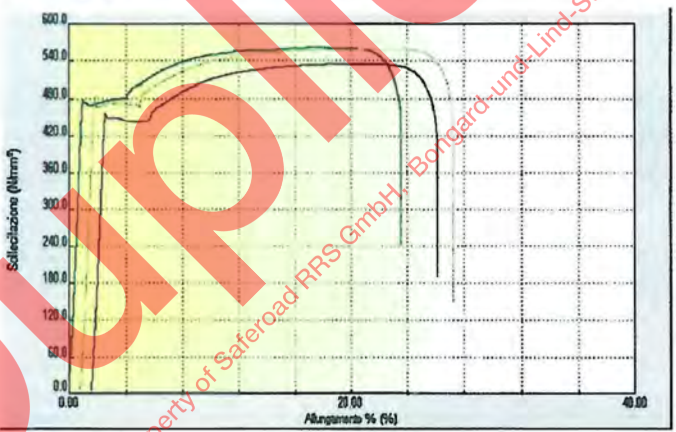
TEST CONDITIONS			
Preload	8.00 N/mm	**Step 2 (yield strength) – Speed Test:**	0.0015 mm/mm/s
Step 1 (elastic) – Speed Test:	30.00 N/mm /s	**Step 3 (plastic) – Speed Test:**	0.0015 mm/mm/s

LABORATORY DATA

Type of material: STEEL

N°	Sample code	SAMPLE: Parallel length L_c (mm)	Thickness a_0 (mm)	Width b_0 (mm)	Cross-section S_0 (mm²)	TENSILE DATA: $R_{p0.2}$ (N/mm²)	R_{eL} (N/mm²)	R_{eH} (N/mm²)	Rm (N/mm²)	A(*) (%)
1	1190-1200 A n°1	141	2.55	19.96	50.90	472.76	468.11	476.99	560.60	22.51
2	1190-1200 A n°2	137	2.59	19.96	51.70	448.14	442.21	455.58	534.09	24.79
3	1190-1200 A n°3	142	2.58	19.90	51.34	466.28	463.33	481.59	558.49	21.28

(*)elongation base: 80 mm for thickness < 3.0 mm, 5.65√S_0 for thickness ≥ 3.0 mm



NOTES:
- REFERENCE STANDARD: UNI EN ISO 6892-1:2009
- SAMPLES PROVIDED BY THE CLIENT TESTING
- TEST REPORT ONLY REFERS TO THE PROVEN SAMPLE TEST
- TEST REPORT CAN NOT BE REPRODUCED IN PART WITHOUT PERMISSION OF THE TEST CENTER AISICO
- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

Date: 2015, 13th February

Head of test
Mr. Cristiano Carinci

Head of laboratory
Eng. Stefano Fraschetti

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LAB N° 0424

TEST REPORT n° CH0413/15 - Pag.1/1

Test n°: 413 del: 2015-02-13

V. A. n°: 186 del: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	CHEMICAL ANALYSIS					
			C%	Si%	Mn%	P%	S%
Sample	3 wave beam	Results	0.179	0.022	1.481	0.021	0.012
			Cu%	Cr%	Al%	Fe%	
A	Crash test 1190-1200	Results	0.036	0.027	0.042	97.698	

TEST METHOD: OPTICAL EMISSION SPECTROSCOPY - ASTM E415-08

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- THE SAMPLE OF TEST ONLY REFERS TO THE PROVEN SAMPLE TEST
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- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

Head of test
Mr. Cristiano Carinci

Head of laboratory
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TEST REPORT n° PM0577/15 - Pag.1/1

Tests n°: AT 1727-1728-1729 — of: 2015, 13th February
V.A. n°: 186 — of: 2014, 16th December

INFORMATION PROVIDED BY THE CLIENT			
Client	SAFEROAD RRS GmbH	**Crash test:**	1190-1200
Origino of samples:	CENTRO PROVE AISICO	**Laboratory of test:**	LABORATORIO AISICO
Receipt date of samples:	2014, 16th December	**Element:**	**C Post**

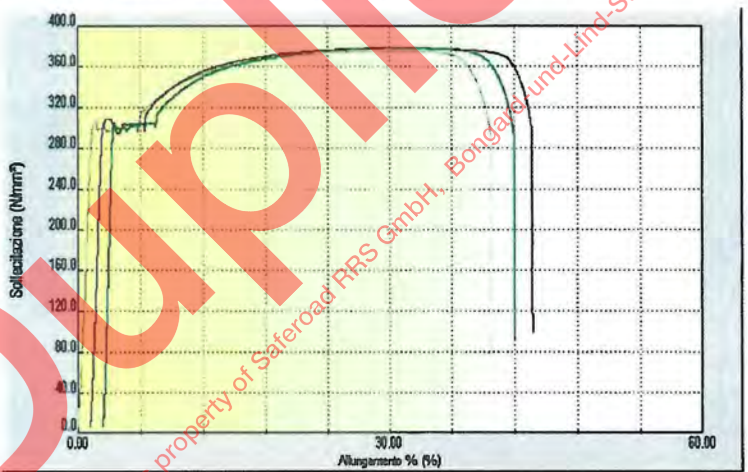
TEST CONDITIONS			
Preload	8.00 N/mm	**Step 2 (yield strength) – Speed Test:**	0.0015 mm/mm/s
Step 1 (elastic) – Speed Test:	30.00 N/mm /s	**Step 3 (plastic) – Speed Test:**	0.0015 mm/mm/s

LABORATORY DATA

Type of material: STEEL

N°	Sample code	SAMPLE				TENSILE DATA				
		Parallel length L_c (mm)	Thickness a_0 (mm)	Width b_0 (mm)	Cross-section S_0 (mm²)	$R_{p0.2}$ (N/mm²)	R_{eL} (N/mm²)	R_{eH} (N/mm²)	Rm (N/mm²)	A(*) (%)
1	1190-1200 B n°1	136	5.09	20.05	102.05	**300.02**	**295.00**	**307.29**	**374.78**	**37.57**
2	1190-1200 B n°2	142	5.10	20.04	102.20	**295.30**	**292.59**	**308.55**	**377.60**	**40.61**
3	1190-1200 B n°3	139	5.10	20.04	102.20	**296.79**	**296.06**	**304.29**	**377.40**	**40.19**

(*) elongation base: 80 mm for thickness < 3.0 mm, $5.65\sqrt{S_0}$ for thickness. ≥ 3.0 mm



NOTES:
- REFERENCE STANDARD UNI EN ISO 6892-1:2009
- SAMPLES PROVIDED BY THE CLIENT TESTING
- TEST REPORT ONLY REFERS TO THE PROVEN SAMPLE TEST
- TEST REPORT CAN NOT BE REPRODUCED IN PART WITHOUT PERMISSION OF THE TEST CENTER AISICO
- CALCULATION OF UNCERTAINTY LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

Date: 2015, 13th February

Head of test
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LAB N° 0424

TEST REPORT n° CH0414/15 - Pag.1/1

Test n°: 414 del: 2015-02-13

V. A. n°: 186 del: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	CHEMICAL ANALYSIS					
			C%	Si%	Mn%	P%	S%
Sample	C Post	Results	0.157	0.051	0.395	0.015	0.014
			Cu%	Cr%	Al%	Fe%	
B	Crash test 1190-1200	Results	0.053	0.020	0.055	99.096	

TEST METHOD: OPTICAL EMISSION SPECTROSCOPY - ASTM E415-08

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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TEST REPORT n° HD1075/15 - Pag.1/1

Test n°: 1075 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample C	*Spacer* Crash test 1190-1200	1	72.1	442.0	≅ 126
		2	78.2	482.0	≅ 141
		3	81.7	516.3	≅ 151
		4	75.9	466.7	≅ 135
		5	72.2	443.0	≅ 126
		6	77.4	474.0	≅ 139
		MEDIA	76.3	470.7	137

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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TEST REPORT n° HD1076/15 - Pag.1/1

Test n°: 1076 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample D	*Plate M16* Crash test 1190-1200	1	87.2	580.0	≅ 126
		2	89.5	613.0	≅ 141
		3	86.5	568.5	≅ 151
		4	80.8	508.0	≅ 135
		5	88.9	606.0	≅ 126
		6	88.4	596.0	≅ 139
		MEDIA	86.9	578.6	137

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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ACCREDIA
LAB N° 0424

TEST REPORT n° HD1077/15 - Pag.1/1

Test n°: 1077 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: C	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample E	*Panhead screw w. oval M16x30* 1190-1200	1	20.3	790.0	≅ 227
		2	24.1	855.0	≅ 248
		3	26.6	918.2	≅ 263
		4	29.5	985.5	≅ 282
		5	22.0	824.0	≅ 236
		6	27.6	942.2	≅ 269
		MEDIA	**25.0**	885.8	254

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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Rome, 2015 13th February

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ACCREDIA
LAB N° 0424

TEST REPORT n° HD1078/15 - Pag.1/1

Test n°: 1078 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: C	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample F	*Panhead screw w. hexagon M16x45* 1190-1200	1	19.5	778.2	≅ 218
		2	25.6	890.4	≅ 256
		3	18.3	752.0	≅ 217
		4	19.7	782.1	≅ 189
		5	21.2	808.4	≅ 192
		6	25.6	890.4	≅ 212
		MEDIA	21.7	816.9	214

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
- SAMPLES PROVIDED BY THE CLIENT TESTING
- THE SAMPLE OF TEST ONLY REFERS TO THE PROVEN SAMPLE TEST
- THE TEST REPORT CAN NOT BE REPRODUCED IN PART WITHOUT PERMISSION OF THE TEST CENTER AISICO
- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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ACCREDIA
LAB N° 0424

TEST REPORT n° HD1079/15 - Pag.1/1

Test n°: 1079 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: C	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample G	*Hexagonal screw M10X30* 1190-1200	1	20.8	797.1	≅ 230
		2	21.7	812.8	≅ 234
		3	22.7	830.3	≅ 240
		4	21.5	809.9	≅ 233
		5	21.2	804.3	≅ 232
		6	20.0	784.4	≅ 226
		MEDIA	21.3	806.5	232

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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ACCREDIA
LAB N° 0424

TEST REPORT n° HD1080/15 - Pag.1/1

Test n°: 1080 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample H	*M10 Nut* 1190-1200	1	87.0	578.0	≅ 170
		2	78.0	480.0	≅ 141
		3	89.7	615.0	≅ 181
		4	79.4	494.0	≅ 145
		5	84.1	540.0	≅ 159
		6	86.4	566.6	≅ 168
		MEDIA	84.1	545.6	161

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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LAB N° 0424

TEST REPORT n° HD1081/15 - Pag.1/1

Test n°: 1081 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample I	*M16 Nut* 1190-1200	1	**87.0**	578.0	≅ 170
		2	**88.3**	594.0	≅ 141
		3	**89.7**	615.0	≅ 181
		4	**93.6**	678.4	≅ 145
		5	**95.8**	721.2	≅ 159
		6	**89.0**	608.0	≅ 168
		MEDIA	**90.6**	632.4	161

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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LAB N° 0424

TEST REPORT n° HD1082/15 - Pag.1/1

Test n°: 1082 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample L	*Ø18 Washer* 1190-1200	1	65.3	397.3	≅ 110
		2	67.6	410.0	≅ 115
		3	72.3	444.0	≅ 127
		4	66.7	405.5	≅ 113
		5	67.6	410.0	≅ 115
		6	65.3	397.3	≅ 110
		MEDIA	67.5	410.7	115

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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LAB N° 0424

TEST REPORT n° HD1083/15 - Pag.1/1

Test n°: 1083 of: 2015-02-13

V. A. n°: 186 of: 2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample M	*Ø18X38 Washer* 1190-1200	1	**98.6**	796.0	≅ 230
		2	**90.8**	633.2	≅ 186
		3	**77.3**	473.0	≅ 139
		4	**82.5**	524.0	≅ 154
		5	**95.0**	706.0	≅ 208
		6	**95.4**	713.6	≅ 210
		MEDIA	**89.9**	641.0	188

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- CALCULATION OF UNCERTAINTY: LEVEL OF CONFIDENCE = 95%, COVER FACTOR = 2
- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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TEST REPORT n° HD1084/15 - Pag.1/1

Test n°:	1084	of:	2015-02-13
V. A. n°:	186	of:	2014-12-16

INFORMATION PROVIDED BY THE CLIENT	
Client	SAFEROAD RRS GmbH
Origin of samples	CENTRO PROVE AISICO - Pereto (AQ)
Receipt date of samples	2014, 16th December
Type of material	Steel
Laboratory test	LABORATORIO AISICO - Pereto (AQ)
More data	ELEMENTS OF ROAD SAFETY BARRIERS

LABORATORY DATA

Notes	Mark pointed out	Test n.	HARDNESS ROCKWELL HR Scala: B	Ultimate tensile [N/mm²]	Equivalence Brinell scale
Sample N	Ø11 Washer 1190-1200	1	71.3	434.0	≅ 124
		2	72.2	443.0	≅ 126
		3	76.1	467.3	≅ 136
		4	76.3	467.9	≅ 136
		5	75.1	464.3	≅ 133
		6	73.1	452.0	≅ 128
		MEDIA	74.0	454.8	131

TEST METHOD: **UNI EN ISO 6508-1:2006**

TEST TEMPERATURE BETWEEN 10 °C and 35 °C	YES	NO
	X	

NOTES:
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- N.D. = DATA NOT DECLARED

Rome, 2015 13th February

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