



TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague, S0E

Akreditované zkušební laboratoře, Autorizovaná osoba, Notifikovaná osoba, Oznamovaný subjekt, Subjekt pro technické posuzování, Certifikační orgány, Inspekční orgán / Accredited Testing Laboratories, Authorized Body, Notified Body, Technical Assessment Body, Certification Bodies, Inspection Body • Prosecká 811/76a, Prosek, 190 00 Praha 9, Czech Republic

Notified Body 1020

CERTIFICATE OF CONSTANCY OF PERFORMANCE

No. 1020 – CPR – 090-053759

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

ROAD RESTRAINT SYSTEM

Variant: Steel safety barrier one-sided

passco PLUS ULTRA H2-A-W4 (ES 1.33)

Level of restraint	H2
Impact intensity	A
Normalised working width	W4
Normalised vehicle intrusion	VI6
Snow removal	NPD

An integral part of this certificate is annex where is specified modifications of road restraint system **passco PLUS ULTRA H2-A-W4 (ES 1.33)**

placed on the market under the name or trade mark of

PASS+CO INTERNATIONAL GmbH

Identification No.: DE811750759

Address: Dortmunder Str. 8, 57234 Wilnsdorf/ Germany

and produced in the manufacturing plant

Code format PL1

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

EN 1317-5:2007+A2:2012/AC:2012

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

constancy of performance of the construction product.

This certificate was first issued on 11.11.2021 and will remain valid as long as neither the harmonised standard, the construction product, the AVCP methods nor the manufacturing conditions in the plant are modified significantly, unless suspended or withdrawn by the notified product certification body.

The stamp of the Notified Body 1020

Prague, 2nd September 2022



Martin Pešek

Deputy Manager of the Notified Body

Digitally signed by Malu Nicolae
Date: 2024.07.19 16:21:17 EEST
Reason: MoldSign Signature
Location: Moldova





CENTRO PROVE AISICO

LABORATORIO ACREDITADO SEGÚN LA NORMA UNI CEI EN ISO / IEC 17025:2005
ACCREDITED LABORATORY ACCORDING TO NORM UNI CEI EN ISO / IEC 17025:2005

INFORME DE ENSAYO n° 1255 CRASH TEST REPORT

Tipo de ensayo: Vehículo pesado – TB51
(Test type) Heavy vehicle – TB51

Tipo de barrera: Barrera metálica para borde lateral cl. H2 mod. BLIDH2C13
(Test item) H2 safety barrier for side edge mod. BLIDH2C13

Fecha de ensayo: 2015/06/15
(Date of Test)



Normas de Referencia – Reference Standard:
EN 1317-1 :2010 del 07/2010
EN 1317-2:2010 del 07/2010

Lengua oficial de referencia
(Official test report language)

Español / Spanish

Responsable Científico del ensayo
(Test Scientific Responsible)
Ing. Andrea Bianchi



Fecha del informe de ensayo
(Date of report)

2015/07/02

Director del Laboratorio
(Test House Director)
Ing. Stefano Calamini

1. Випробувальна лабораторія

ВИПРОБУВАЛЬНА ЛАБОРАТОРІЯ	
Комерційна назва	AISICO S.r.L.
Адреса	Віале Бруно Буоцці, 47, 00197 Рим, Італія
Телефон	+39 06 32110436
Факс	+39 06 32502282
Адреса електронної пошти	centroprove@aisico.it
Сайт	www.aisico.it

ЦЕНТР ВИПРОБУВАНЬ AISICO	
Адреса	Автодорога провінційного підпорядкування в Кавальєре, кілометрова позначка 2+500, 67064 Перето (провінція Аквіла), Італія
Телефон	+39 0863 1827288
Факс	+39 0863 1827289

Центр випробувань AISICO розташований всередині земельної ділянки площею 16 гектарів у Перето, провінція Аквіла, приблизно за 40 км на північ від Рима, проїзд автострадою Рим – Терамо.

В центрі є три пускових доріжки, розміщених під кутами 15°, 20° і 25° до осі випробуваного пристрою, що дає транспортним засобам досягти потрібної швидкості випробування і чітко дотримуватись визначеної траєкторії.

Там є також пускова доріжка, розміщена під кутом 30° для краш-тестування огорожень для мотоциклів.

2. Замовник

ЗАГАЛЬНІ ВІДОМОСТІ	
Комерційна назва	Industrias Duero S.L.
Адреса	Гонсалес Давіла, 1 28031 Мадрид Іспанія

3. Випробуване огороження

ЗАХИСНЕ ОГОРОДЖЕННЯ	
Встановлений випробуваний пристрій	Металеве бар'єрне огороження для узбіччя класу H2 модель BLIDH2C13
Дата прийняття випробуваного пристрою	12.06.2015 р.
Дата проведення випробування	15.06.2015 р.
Номер випробування	1255

4. Процедура випробування

4.1. Опис випробування

Еталонний стандарт	UNI EN 1317-1:2010 / 1317-2:2010
Тип випробування	TB51
Розрахункова швидкість транспортного засобу	70 км/год ^{+7% / - 0%}
Розрахунковий кут зіткнення	20° ^{+1,5% / - 1%}
Розрахункова маса транспортного засобу	13 000 ^{± 400} кг
Розрахункова енергія зіткнення	287,5 кДж

4.2. Місце випробувань

Місце випробувань включає асфальтовану ділянку 100 м завдовжки і 20 м завширшки, залізобетонний бордюр для встановлення випробуваних пристроїв для мостів і ділянку без покриття за бордюром для встановлення випробуваних пристроїв для узбіччя.

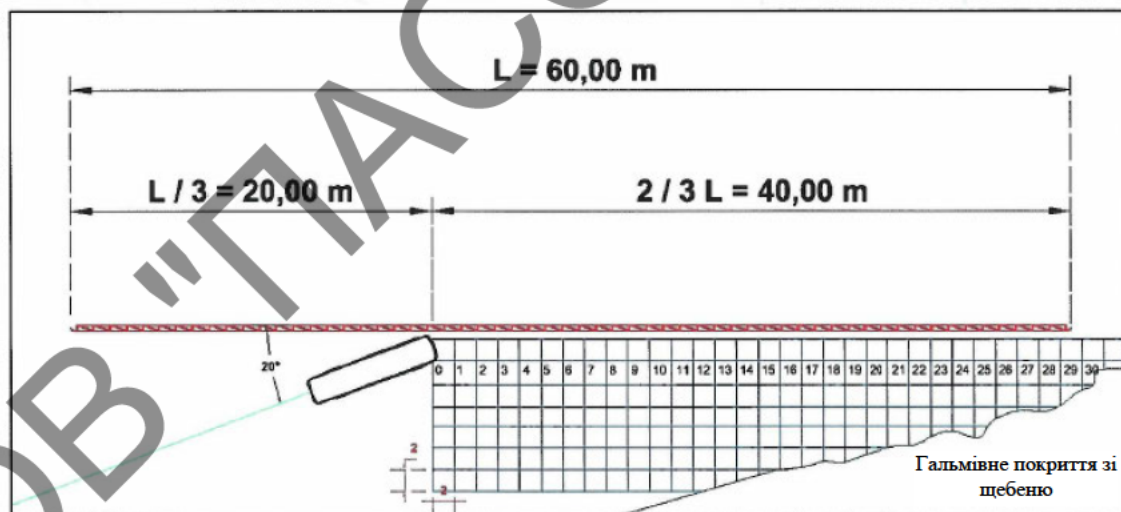
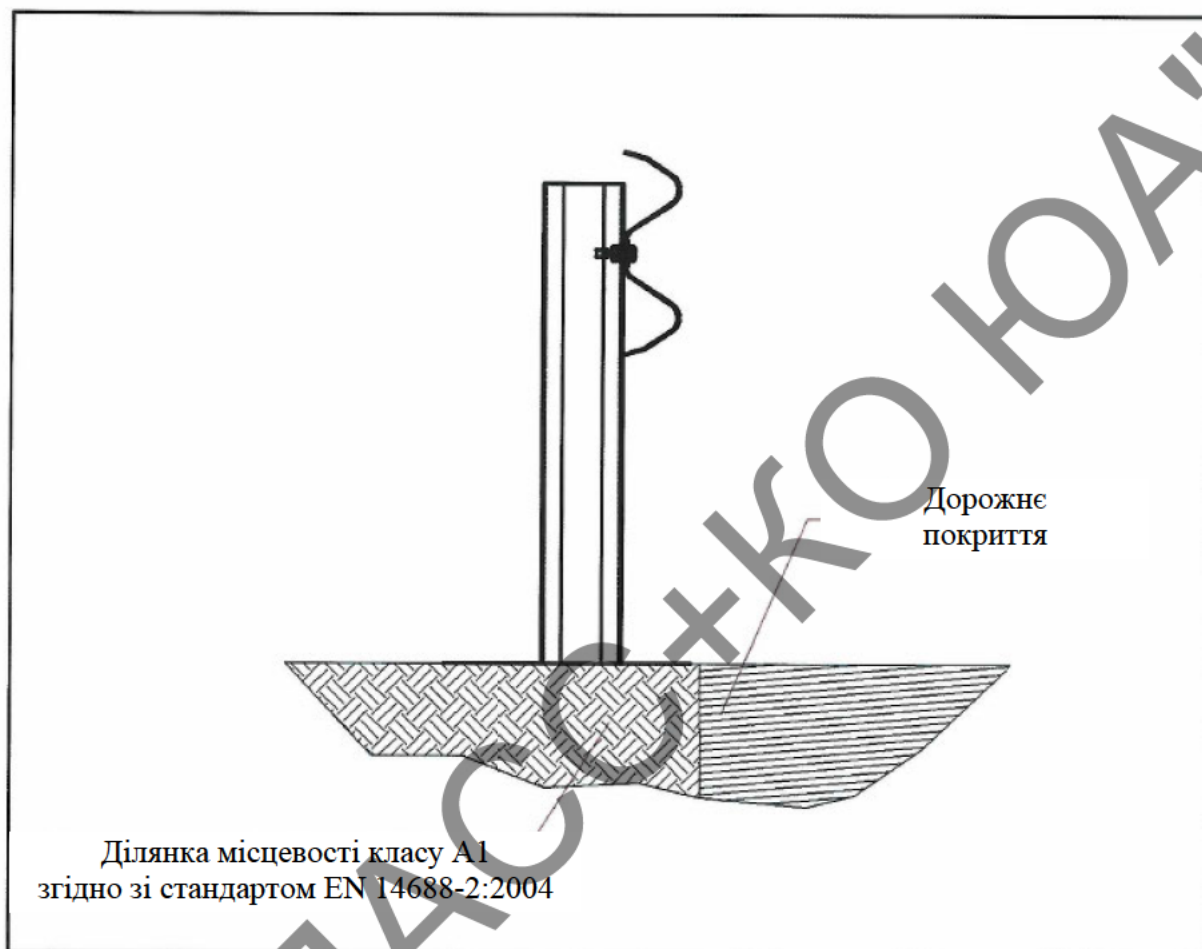


Рис. 1 – Траєкторія руху до огороження



Ри 2 – Встановлений пристрій у розрізі

Випробуваний пристрій був встановлений на ділянці, вкритій вапняковим щебенем, на піщано-глиняній основі згідно зі стандартом EN 14688-2:2004. Виконаний гранулометричний і геотехнічний аналіз, а також випробування навантаженням відповідно до стандарту CNR 146/92.

4.4. Опис транспортного засобу

ХАРАКТЕРИСТИКИ ТРАНСПОРТНОГО ЗАСОБУ	
Вид транспортного засобу	Автобус
Номер транспортного засобу	968
Модель	MAN NL222
Рік випуску	1997
Ідентифікаційний номер транспортного засобу	WMA8980723C002892
Вага транспортного засобу без баласту	10 518 кг
Центр ваги транспортного засобу	$X_g = 3\,755\text{ мм}$ $Y_g = 142\text{ мм}$ $Z_g = \text{не визначено}$
Вид баласту	Бочки з водою
Положення баласту	На пасажирських місцях
Вага (баласт + обладнання)	2 205 кг
Загальна вага	12 722 кг

РОЗМІРИ ТРАНСПОРТНОГО ЗАСОБУ

WB	Відстань між осями	5 900 mm
F	Передній звис	2 800 mm
R	Задній звис	3 270 mm
L	Довжина транспортного засобу	11 970 mm
W	Ширина транспортного засобу	2 460 mm
T _{ant}	Коля передніх коліс	2 100 mm
T _{post}	Коля задніх коліс	1 900 mm
h	Висота платформи автобуса	1 060 mm
H	Висота транспортного засобу	2 800 mm
i	Відстань від передньої осі до платформи	1 370 mm
r	Радіус коліс порожнього транспортного засобу	490 mm

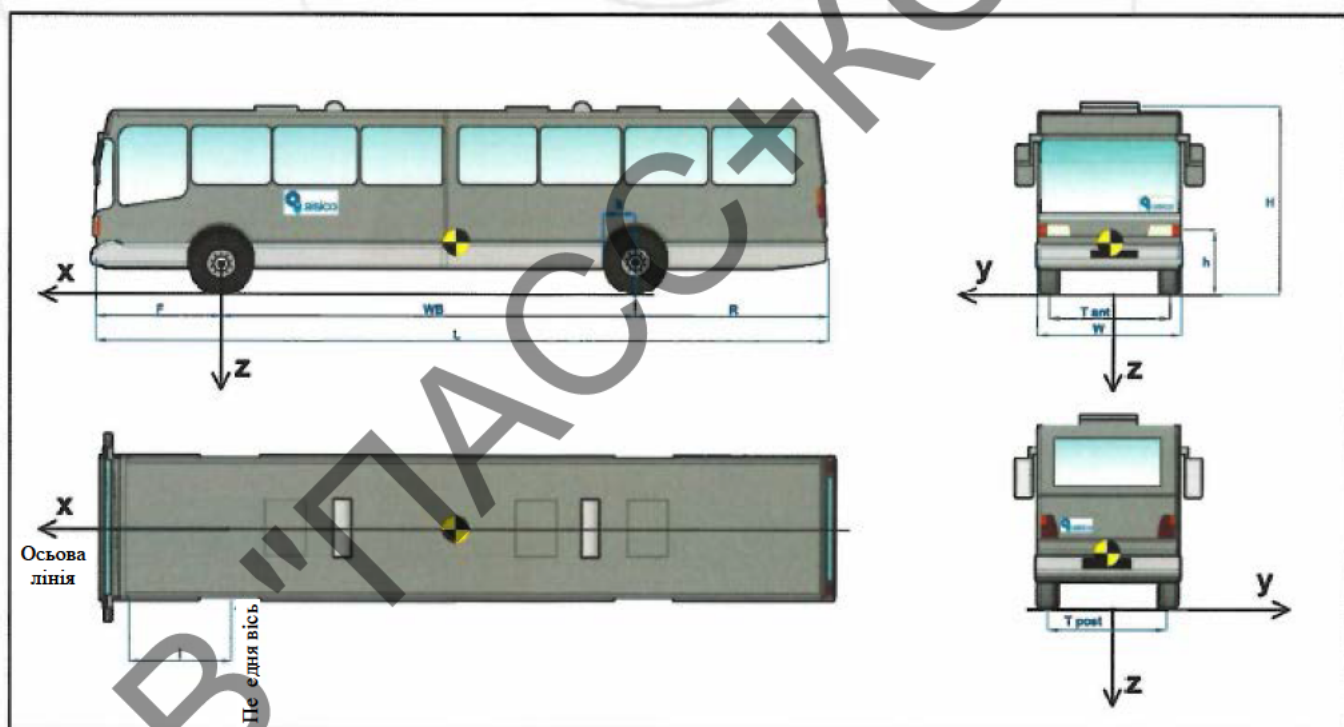


Рис. 3 – Розміри транспортного засобу

5. Результати

5.1. Погодні умови

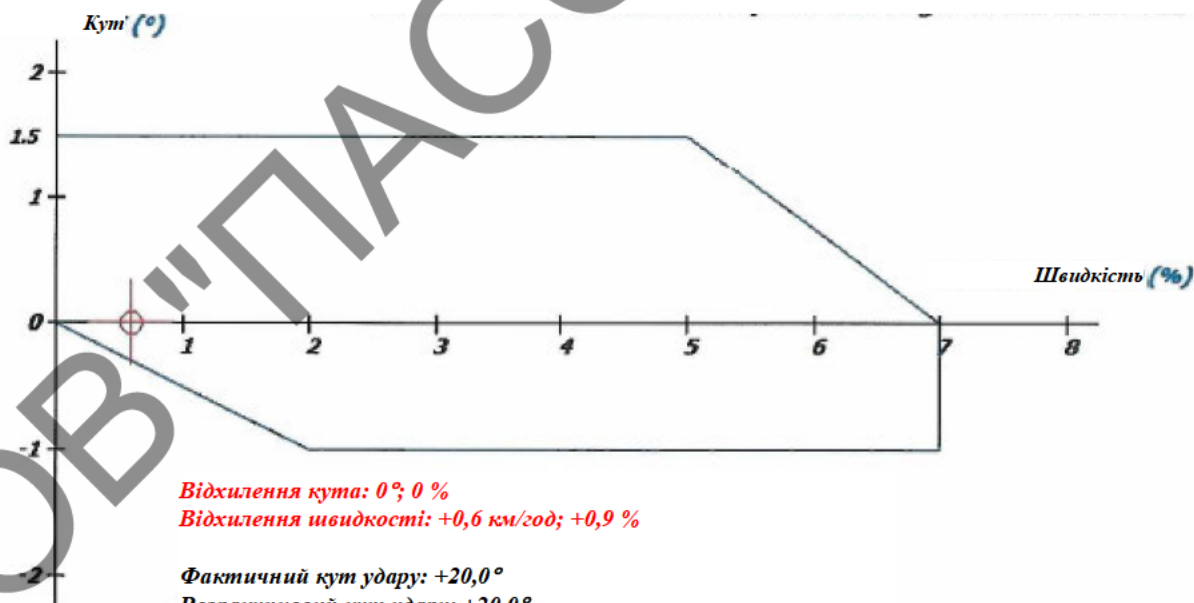
Хмарність	Ясно
Температура	24 °C

5.2. Умови проведення випробування

Швидкість у момент удару	70,6 км/год
Відміна від розрахункової швидкості	+ 0,6 км/год (+ 0,9 %)
Кут удару	20,0°
Відміна від розрахункового кута	0° (0 %)

Випробування № 1255

Комбіновані допустимі відхилення від розрахункових значень швидкості і кута в межах області відхилення: ТАК



Фактичний кут удару: +20,0°

Розрахунковий кут удару: +20,0°

Фактична швидкість у момент удару: +70,6 км/год

Розрахункова швидкість у момент удару: +70,0 км/год

Рис. 5 – Область комбінованих допустимих відхилень

5.3. Випробувана конструкція огородження

ЗАГАЛЬНІ ПОКАЗНИКИ	
Максимальний динамічний прогин (D_m)	1,1 м
Нормований максимальний прогин від динамічного навантаження (D_N)	1,1 м
Робоча ширина огородження (W_m)	1,3 м
Нормована робоча ширина огородження (W_N)	1,3 м
Клас нормованої робочої ширини	W4
Проникнення транспортного засобу (VI_m)	0,0 м
Нормоване проникнення транспортного засобу (VI_N)	2,0 м – VI6
Максимальний залишковий прогин	0,8 м
Довжина контакту	22,0 м
Точка удару	24,3 м

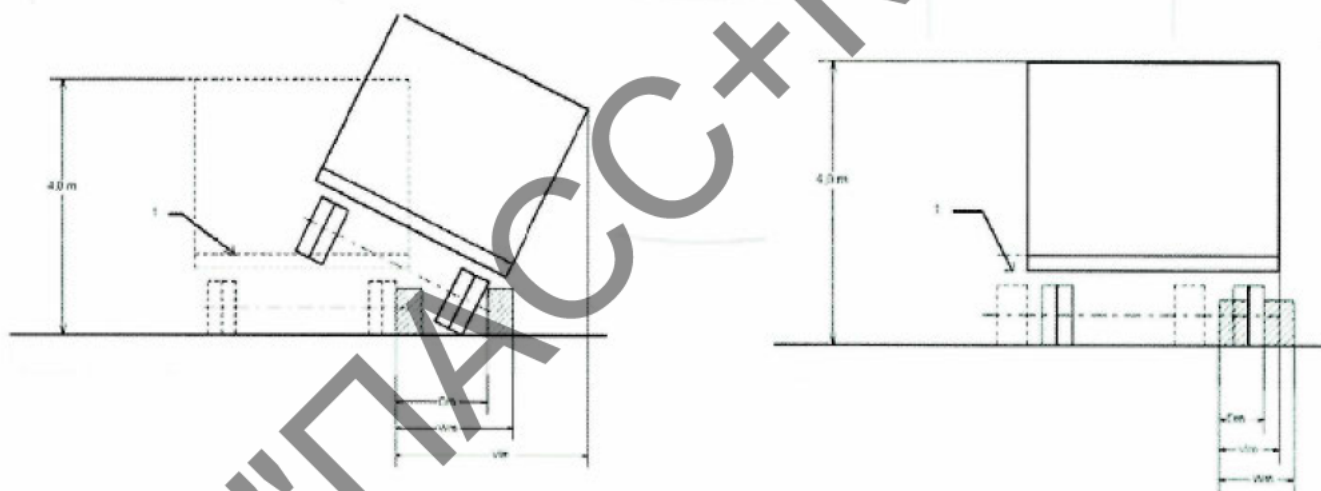


Рис. 6 – Поведінка огородження під час випробування

6. Підсумкові оцінки

РЕЗУЛЬТАТИ	
Тип випробування	TB51
Номер випробування	1255
Випробуваний пристрій	Металеве бар'єрне огородження для узбіччя класу H2 Модель BLIDH2C13
Дата випробування	15.06.2015 р.
ПАРАМЕТРИ ВИПРОБУВАННЯ	
Маса транспортного засобу	12 722,0 кг
Швидкість транспортного засобу	70,6 км/год
Кут удару	20,0°
РЕЗУЛЬТАТИ ВИПРОБУВАННЯ	
Максимальний динамічний прогин	1,1 м
Нормований динамічний прогин	1,1 м
Робоча ширина огородження	1,3 м
Нормована робоча ширина огородження	1,3 м
Клас нормованої робочої ширини	W4
Проникнення транспортного засобу	2,0 м
Нормоване проникнення транспортного засобу	2,0 м – VI6
Максимальний залишковий прогин	0,8 м
ПОВЕДІНКА ВИПРОБУВАНОЇ ОГОРОЖІ	
Огородження стримало транспортний засіб	ТАК
Повне руйнування яких-небудь основних поздовжніх елементів випробуваного огородження	НІ
Повне відокремлення деталей випробуваного огородження вагою більше 2 кг	НІ
ПОВЕДІНКА ТРАНСПОРТНОГО ЗАСОБУ	
Не більше ніж одне колесо транспортного засобу перейшло за найбільш віддалену частину деформованого огородження	ТАК
Транспортний засіб переїхав через випробувану ділянку огородження	НІ
Траєкторія транспортного засобу не вийшла за безпечні межі	ТАК

7. Заяви загального характеру

Результати випробувань, наведені в цьому протоколі, стосуються тільки зразків, підданих випробуванню.

Жодна з частин цього протоколу не може бути передрукована без попереднього письмового дозволу випробувальної лабораторії.

Поправки до цього протоколу можуть бути оформлені тільки шляхом складання нового документа, який повинен бути позначений як «редакція» вихідного документа.

Доповнення до цього протоколу можуть бути оформлені тільки шляхом складання нового документа, який повинен бути позначений як «доповнення» до документа, якого він стосується.

Цей протокол доповнений фотографіями і відеоматеріалами.

Офіційною мовою цього протоколу є іспанська мова.

8 Aprobación del informe de ensayo – Test report approval

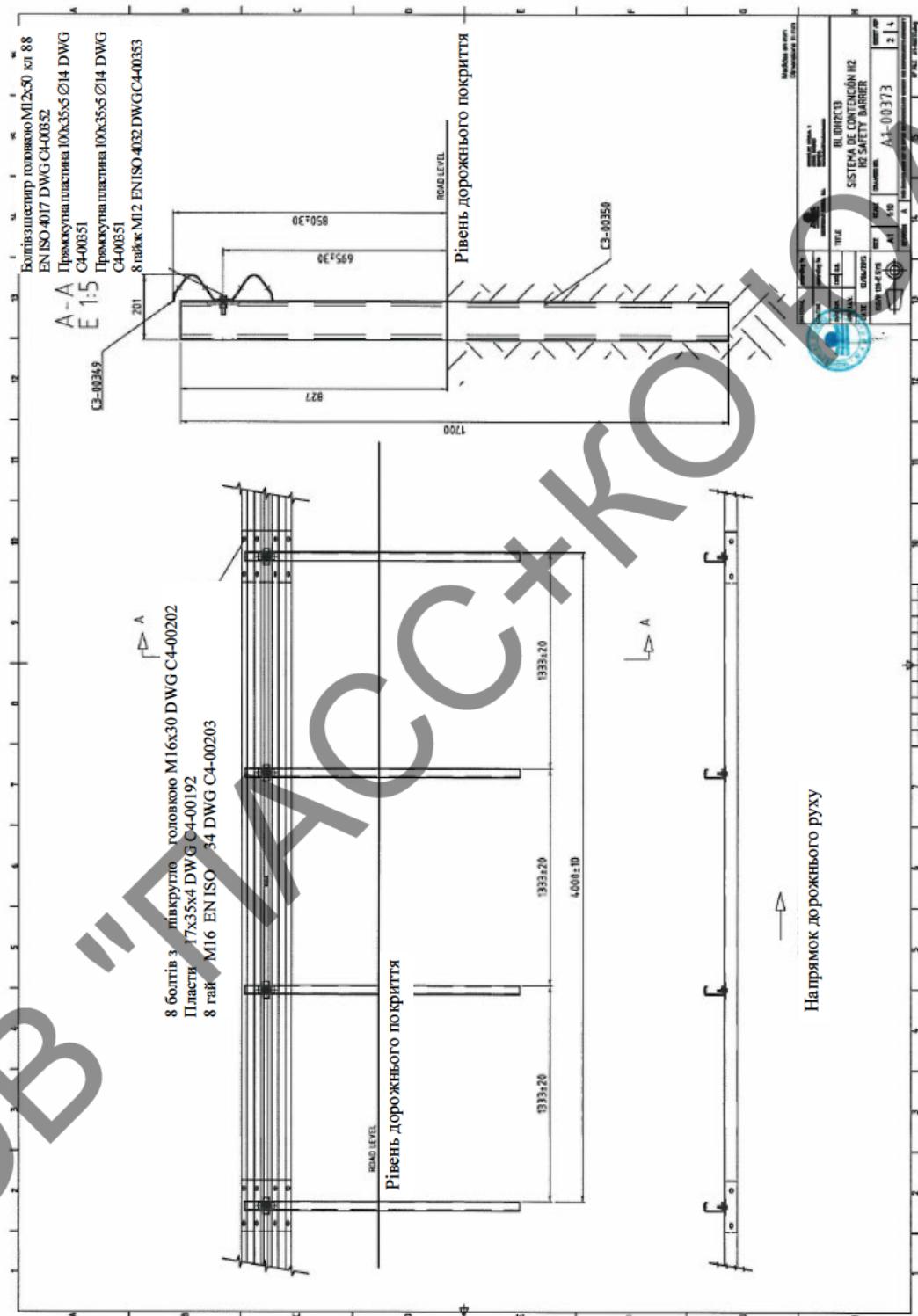
TÉCNICO RESPONSABLE DEL ENSAYO – TESTING RESPONSIBLE ENGINEERS		
NOMBRE- NAME	COMPETENCIA -COMPETENCE	FIRMA-SIGNATURE
Ing. Andrea Bianchi	Responsable científico del ensayo, elaboración de los datos y redacción del informe de ensayo – Test scientific data processing and report editing responsible.	

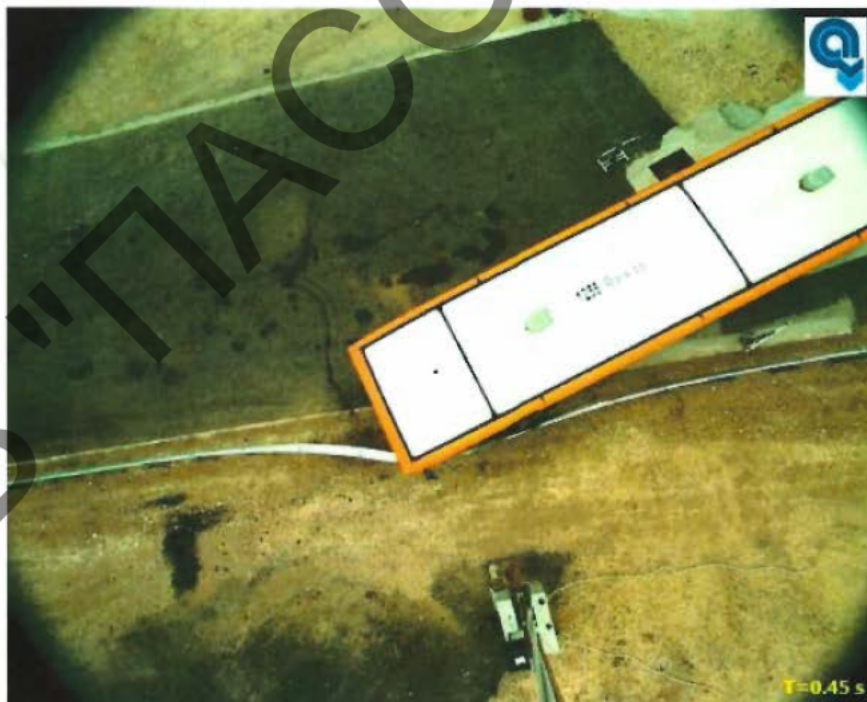
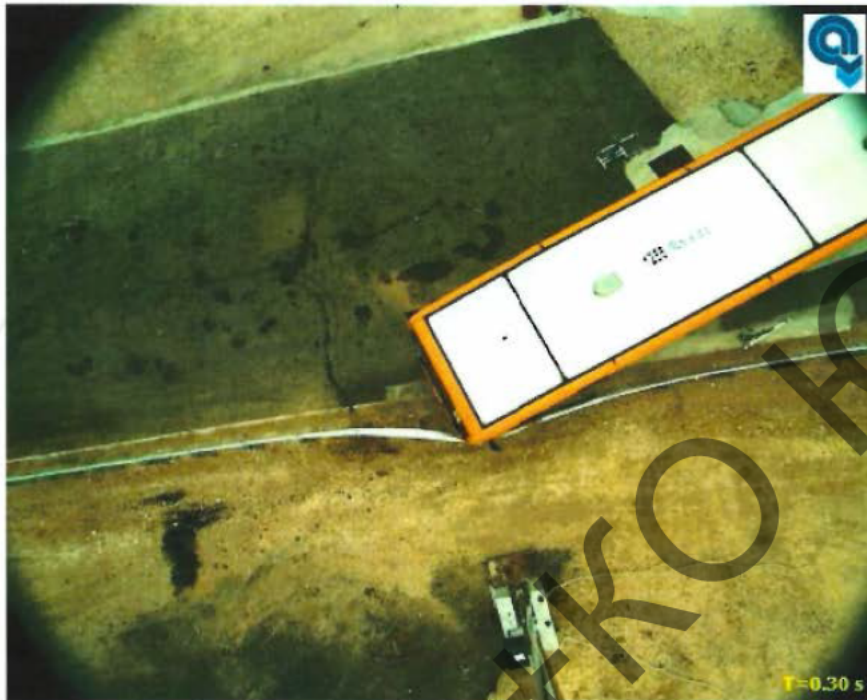
EL DIRECTOR DEL LABORATORIO – TEST HOUSE DIRECTOR		
Ing. Stefano Calamanti		
		

Pereto, li 2015/07/02

Fin Informe de Ensayo n.1255 del 2015/07/02 / End of Test Report # 1255 of 2015/07/02

Fecha Informe de ensayo
2015/07/02







PASS+CO®

ТОВ «ПАСС+КО ЮА»

passco PLUS ULTRA H2-A-W4 (ES 1.33)

Installation manual

PASS+CO UA LLC
Ukraine, Kyiv, str.Bolsunovska 8

Tel .: +38 044 227 23 27
+38 098 092 61 00

info@passco.com.ua
www.passco.com.ua

General information

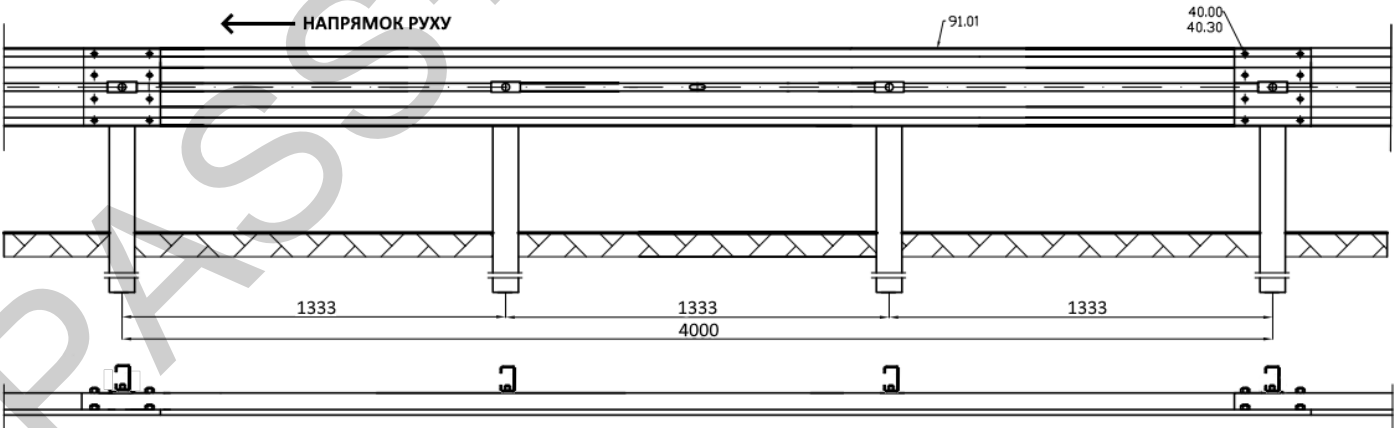
1. The Road Restraint System (RRS) is designed for installation on road traffic areas. It is intended to protect occupants of errant vehicles on the roadway, to protect third parties and objects and can be installed in medians and side lanes as well as on verges.

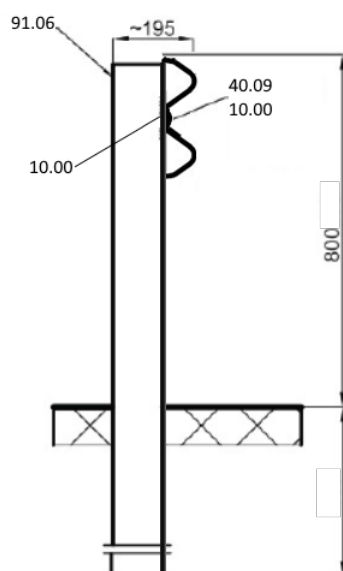
Technical characteristics

2. The system has been fully tested according to EN 1317. The test results have been reached by the conditions mentioned in the test report.

Containment level	H2
Containment level K _j	280
Index ASI	A
Working width W 3	W4
Working width (m)	≤ 1,3
Post distance (m)	1,33
System height (mm)	800
Crash test (car)	TB 11
Crash test (truck)	TB 51

General view of the system





No	Description
91,01	Passco Beam 4300 mm, thickness
91,06	Passco post C-120
10,00	Deck plate 35x5x100
40,00	Bolt with nut M16x30
40,30	Washer 18
40,09	Bolt with nut M12x50





BUREAU
VERITAS

Bureau Veritas Certification

CERTIFICATE OF CONSTANCY OF PERFORMANCE

Certificate No: 1035-CPR-ES1055474-172-B

In compliance of the Regulation No: 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products, it has been stated that the product:

VEHICLE RESTRAINT SYSTEM SAFETY BARRIER SIMPLE STEEL GUARDRAIL "CPS11-H2 2.66"

The characteristics are detailed in the attached annex

Placed in the market by: **ÇEPAŞ GALVANİZ DEMİR ÇELİK MADENCİLİK
İNŞAAT NAKLIYE TİC. VE SAN. A.Ş.**

Produced in: **İSTANBUL YOLU 25.KM - SARAY MAHALLESİ 175 - SOKAK
No: 2,2/A - KAHRAMANKAZAN - ANKARA (TURKEY)**

They are submitted by the manufacturer to factory production control established at the standard EN 1317-5:2007+A2:2012 Road restraint systems. Part 5: Product requirements and evaluation of conformity for vehicle restraint systems, and the initial type testing by accredited laboratory of samples taken at the factory.

The notified body BUREAU VERITAS CERTIFICATION has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control established in the harmonized standard concerned.

This certificate attests that all provisions concerning the attestation of factory production control described in the Annex ZA of the harmonised standard were applied and it authorizes the manufacturer or its agent to fix the CE marking.

This certificate remains valid as long as the conditions laid down with the harmonised standard concerned or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Initial date of issue: 2023 / 07 / 07



Mónica Botas
Certification Manager





BUREAU
VERITAS

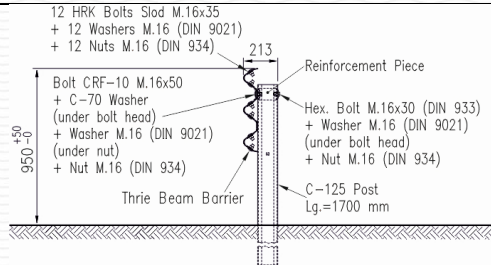
Bureau Veritas Certification

TECHNICAL DATA SHEET ANNEXED TO CERTIFICATE OF CONSTANCY OF PERFORMANCE

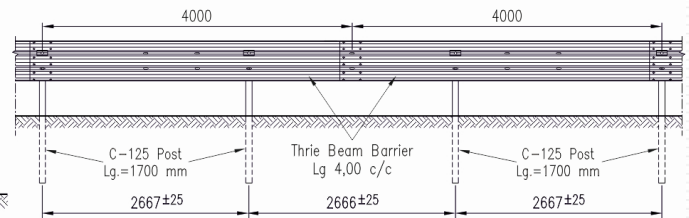
Nº: 1035-CPR-ES1055474-172-B

Date of approval: 2023 / 07 / 07

"CPS11-H2 2.66"



CROSS SECTION



ELEVATION

Dimensions in mm

STANDARDS	PERFORMANCE PARAMETERS	ACCORDING TO UNE-EN 1317-2
UNE EN 1317-1 UNE EN 1317-2 UNE EN 1317-5	a) Performance Level b) Impact Severity Level c) Normalized Working Width d) Normalized Dynamic Deflection e) Normalized Vehicle Intrusion f) Resistance to snow removal	H2 A H2 : 1.0 m (W3) DN= 0.9 m V15 (1,4 m) Class 3
DETACHED PIECES:	Totally detached elements having a solid mass >2.0 kg: Not	
SOIL DESCRIPTION:	Controlled soil Result Static Post Test according to UNE135124: OK	
HAZARDOUS SUBSTANCES:	NPD	
OBSERVATIONS:	NONE	
INITIAL TYPE-TEST LABORATORY:	CSI S.P.A. ITALIA	
VEHICLE IMPACT TEST CODES:	0056\ME\HRB\23 0057\ME\HRB\23	TB51 TB11
MATERIALS:	Steel / UNE-EN 10025	DURABILITY: Hot dip galvanizing. UNE-EN ISO 1461, UNE-EN ISO 14713

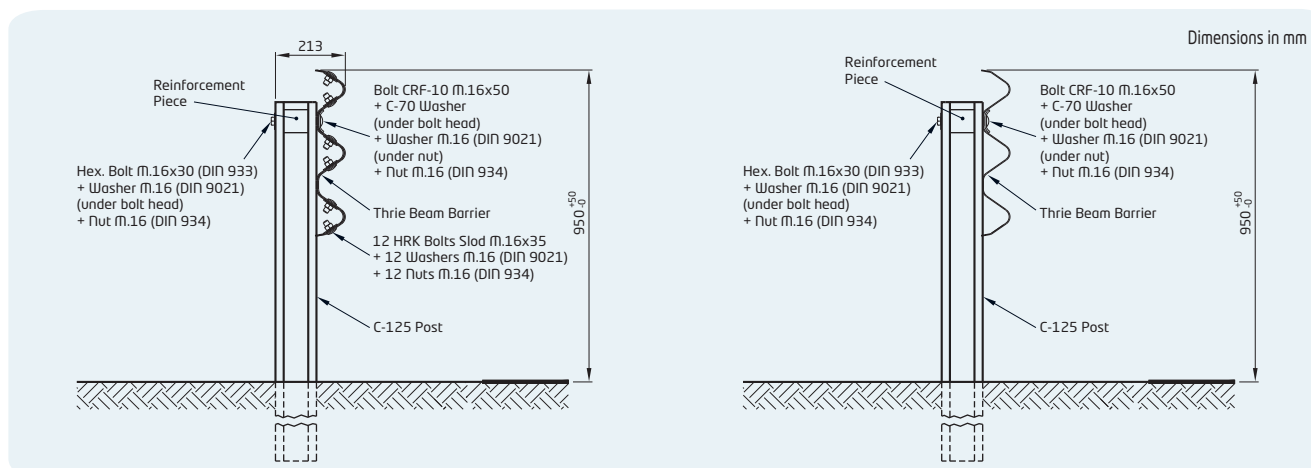
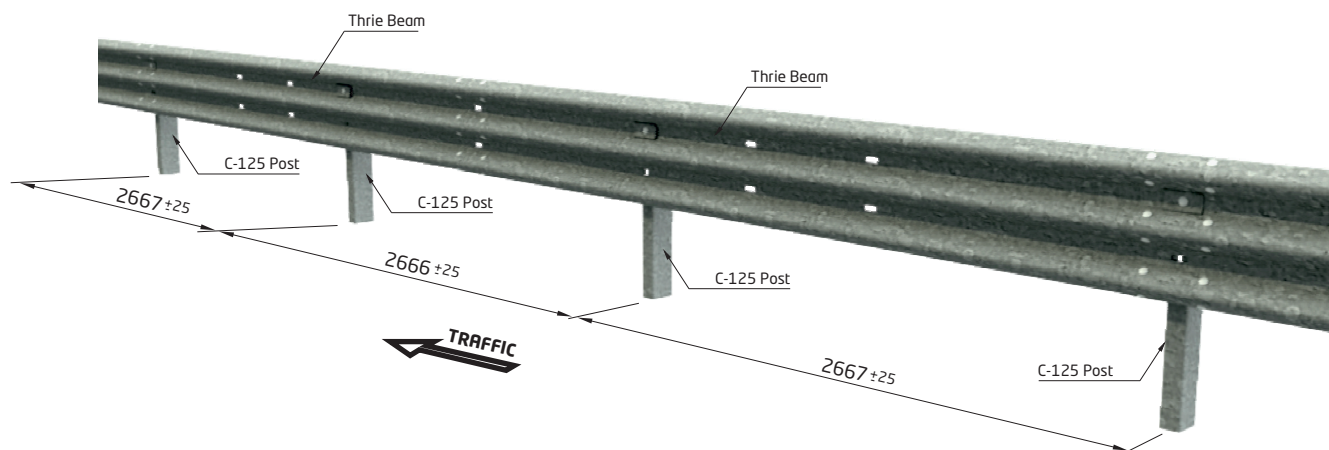


Mónica Botas
Certification Manager



Single Steel Guardrail of High Containment CPS 11 H2 2.66

1. DESCRIPTION AND ASSEMBLY:



The "CPS 11 H2 2.66" single steel guardrail is a safety barrier specifically designed to be installed on shoulders and median reserves of any type of road. It is composed by a thrie beam is fixed to the post through an intermediate element able to work both as spacer and energy absorber during vehicle impact. The

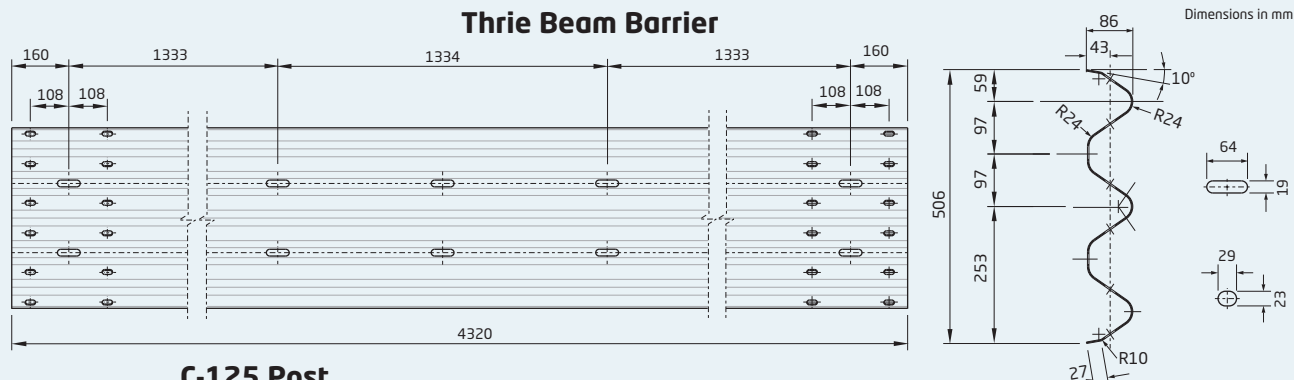
posts are "C-125" shaped and placed at every 2,66 m. The whole barrier is made from hot rolled steel sheet of grade S235JR and S355JR according to European standard EN 10.025, hot dip galvanized in accordance with the European standard EN ISO 1461.



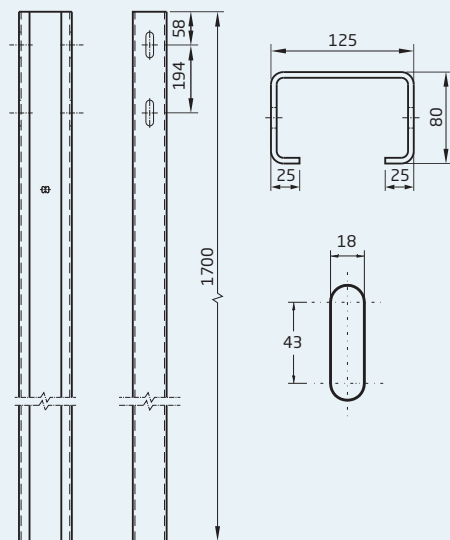
Single Steel Guardrail of High Containment CPS 11 H2 2.66

2. COMPONENTS:

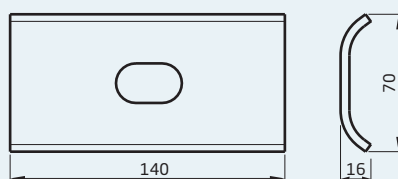
Thrie Beam Barrier



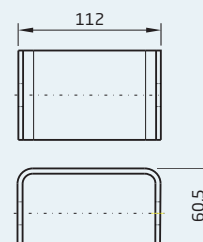
C-125 Post



C-70 Washer



Reinforcement Piece



3. PERFORMANCE UNDER VEHICLE IMPACT:

The "CPS 11 H2 2.66" Single Steel Guardrail successfully passed the full scale crash-tests TB51 and TB11 according to the European standard EN 1317-2, meeting all acceptance criteria for **H2** containment level, with impact severity class **A** and working width **W3**.

TB 11 Crash-Test

Car 900 Kg.,
at 100 Km/h and 20°



TB 51 Crash-Test

Coach 13.000 Kg.,
at 70 Km/h and 20°



RAPPORTO DI PROVA / TEST REPORT

NUMERO / NUMBER

0056\ME\HRB\23

DATA DI EMISSIONE / EMISSION DATE

13/06/2023

BUSINESS SECTOR

Infrastructures & Mobility

LABORATORIO / LABORATORY

Infrastructures & Mobility

IDENTIFICAZIONE E DESCRIZIONE DEL CAMPIONE / SPECIMEN DESCRIPTION

Barriera Monolaterale classe H2 terra interasse 2.66 m

Monolateral Barrier H2 class soil 2.66 m post spacing

'CPS11 H2 2.66'

CLIENTE / CUSTOMER

Road Steel Engineering

Paseo de Belen, 11 - Edificio Uvalnnoa

47011 Valladolid (EE)

NORMA DI RIFERIMENTO / REFERENCE STANDARD

UNI EN 1317-1:2010; UNI EN 1317-2:2010

ITT: TB51

La presente documentazione tecnica è redatta in tre lingue: italiano, inglese e spagnolo. Fa fede la versione italiana.

This documentation is written in three languages: Italian, English and Spanish. The official one is the Italian version.

Esta documentación técnica está escrita en tres idiomas: italiano, inglés y español. La versión italiana es auténtica.

Organismo notificato 0497

Notified body 0497

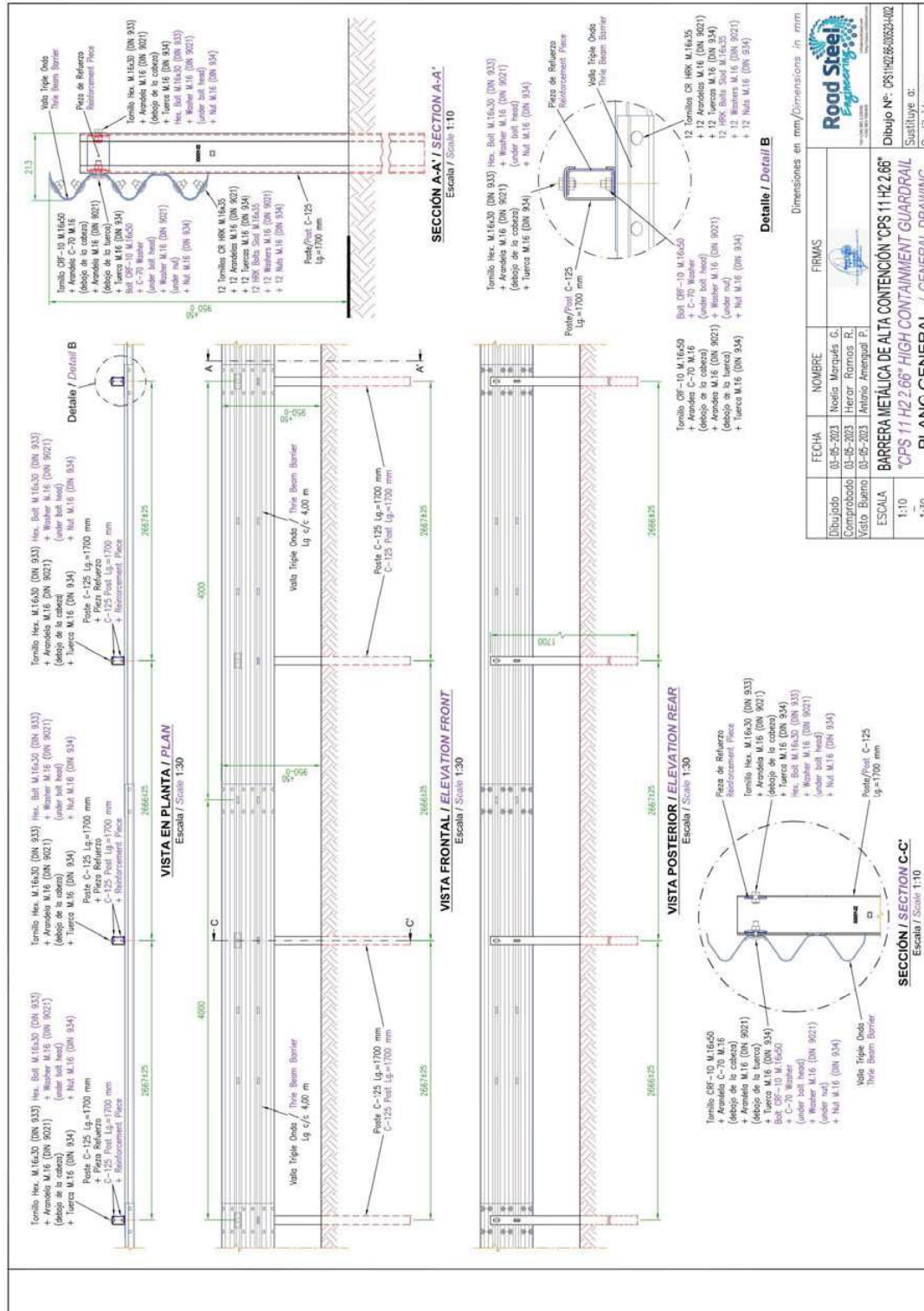
Organismo notificado 0497

GQ001 REV.00

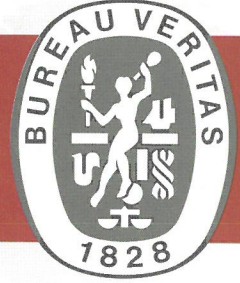
5.2. DISPOSITIVO / TEST ITEM/ DISPOSITIVO

L'urto ha procurato una deformazione del dispositivo. Le informazioni su tali deformazioni sono qui riportate. The impact has determined a deformation of the device. Its deformations are listed here. La colisión provocó una deformación del dispositivo. La información sobre estas deformaciones se reporta aquí.

Deflessione dinamica / Dinamic deflection / Deflexión dinámica (5.2.1):	0.9 m	(0.87 m)
Deflessione dinamica normalizzata / Normalized dinamic deflection / Deflexión dinámica normalizada (5.2.2):	0.9 m	(0.90 m)
Larghezza operativa / Working width / Ancho de operación (5.2.3):	1.0 m	(1.01 m)
Larghezza operativa normalizzata / Normalized working width / Ancho de operación normalizado (5.2.4):	1.0 m	(1.04 m)
Classe di funzionamento / Functional level / Clase operativa (5.2.5):	W3	($W_N \leq 1.0$ m)
Intrusione Veicolo / Vehicle Intrusion / Intrusión Vehículo (5.2.6):	1.3 m	(1.30 m)
Intrusione Veicolo Normalizzata / Normalized Vehicle Intrusion / Intrusión Normalizada Vehículo (5.2.6.a):	1.4 m	(1.35 m)
Classe dell'intrusione veicolo / Class of Vehicle Intrusion / Clase de intrusión de vehículo (5.2.6.b):	VI5	($VI_N \leq 1.7$ m)
Massima deformazione permanente / Maximum permanent deflection / Deformación máxima permanente (5.2.7):	0.99 m	
Larghezza operativa permanente / Permanent working width / Ancho de operación permanente (5.2.7.a):	0.36 m	
Lunghezza del contatto / Length of contact / Longitud de contacto (5.2.8):	34 m	
Punto di impatto / Actual impact point / Punto de impacto (5.2.9):	Palo / Post n° 8	
Spostamento permanente terminali / Permanent displacement of the end anchorage (5.2.10):	0.0 m	



BUREAU VERITAS
Certification



CERTIFICATE OF CONSTANCY OF PERFORMANCE

Certificate nb: **1035-CPR-ES105474-148-B**

In compliance of the Regulation No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonized conditions for the marketing of construction products, it has been stated that the product:

VEHICLE RESTRAINT SYSTEM – SAFETY BARRIER "CPS 05-H2 2.00"

The characteristics are detailed in the attached annex

Placed in the market by:

Manufactured by:

**ÇEPAŞ Galvaniz Demir Çelik Madencilik İnşaat
Nakliye Tic. ve San. A.Ş.**

Produced in:

İstanbul Yolu 25.Km, Saray Mahallesi 175. Sokak No:2,2/A, Kahramankazan, Ankara, Turkey

They are submitted by the manufacturer to factory production control established at the standard EN 1317-5:2007+A2:2012 Road restraint systems. Part 5: Product requirements and evaluation of conformity for vehicle restraint systems, and the initial type testing by accredited laboratory of samples taken at the factory.

The notified body BUREAU VERITAS CERTIFICATION has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control established in the harmonized standard concerned.

This certificate attests that all provisions concerning the attestation of factory production control described in the Annex ZA of the harmonised standard were applied and it authorizes the manufacturer or its agent to fix the CE marking.
This certificate remains valid as long as the conditions laid down with the harmonised standard concerned or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Place and date of initial issuing: **2019, November 4th**



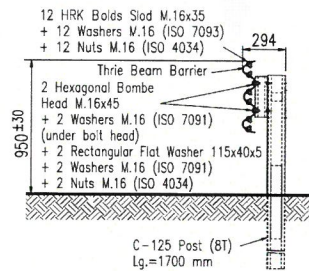
Mónica Botas
Certification Manager

Bureau Veritas Iberia, S.L., Edificio Caoba. C/ Valportillo Primera 22-24 Polígono Industrial La Granja, 28108 – Alcobendas (MADRID). Notified Body 1035

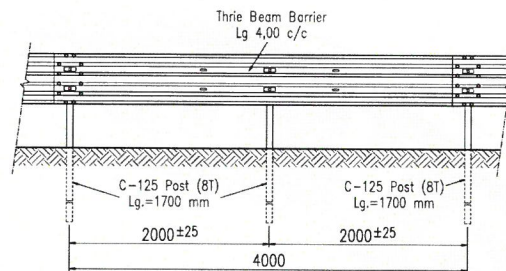


TECHNICAL DATA SHEET ANNEXED TO CERTIFICATE
OF CONSTANCY OF PERFORMANCE
Nº: 1035-CPR- ES105474-148-B
Date of approval: 2019, November 4th

Barrier
CPS 05-H2 2.00



CROSS SECTION



ELEVATION

Dimensions in mm

STANDARDS	PERFORMANCE PARAMETERS	ACCORDING TO UNE-EN 1317-2
UNE EN 1317-1 UNE EN 1317-2 UNE EN 1317-5	a) Performance Level b) Impact Severity Level c) Normalized Working Width d) Normalized Dynamic Deflection e) Normalized Vehicle Intrusion f) Resistance to snow removal	H2 A $W_N = 1,3 \text{ m (W4)}$ $D_N = 0,7 \text{ m}$ $1,0\text{m (VI3)}$ Class 3
DETACHED PIECES:	Total detached elements having a solid mass >2.0 Kg: NO Total detached elements having a solid mass >0.5 Kg: NO	
SOIL DESCRIPTION:	Controller soil	
HAZARDOUS SUBSTANCES:	NPD	
OBSERVATIONS:	None	
INITIAL TYPE-TEST LABORATORY:		CSI SpA, MI, Italia
VEHICLE IMPACT TEST CODES:		0053\ME\HRB\19_3 0052\ME\HRB\19_3 TB11 TB51
MATERIALS:	Steel EN 10025	DURABILITY: Hot Dip Galvanizing EN ISO 1461, EN ISO 14713

SINGLE STEEL GUARDRAIL "CPS 05-H2 2.00"

INSTALLATION MANUAL

July 2019



Paseo de Belén, 11 - Edificio UVainnova - Campus Miguel Delibes
47011 - Valladolid, ESPAÑA (SPAIN) Tel: +(34) 983 990468
e-mail: info@roadsteel.com - <http://www.roadsteel.com>

SINGLE STEEL GUARDRAIL “CPS 05-H2 2.00”: INSTALLATION WORKS

The “CPS 05-H2 2.00” Single Steel Guardrail is a longitudinal safety barrier made entirely of galvanized steel and specifically designed to be installed by post embedding in soil on both the shoulders and central reserve of any type of road.

The “CPS 05-H2 2.00” Single Steel Guardrail is composed by a continuous horizontal rail (Thrie-Beam) exposed to traffic and regularly supported by C-shaped vertical posts distributed at each two meters with spacers set in between of the Thrie-Beam and each post.

All components are assembled by means of threaded joints with bolts, nuts and washers. Continuity of the horizontal components (beams) is obtained through partial splices of consecutive elements through screwed joints with bolts, nuts and washers.

Installation works.

1.- Post Insertion.

Posts of “CPS 05-H2 2.00” Single Steel Guardrail are to be embedded in soil. Posts shall be driven in soil using a hydraulic or pneumatic hammering machine or any other system equivalent to mechanical post-driving. Posts shall be driven with 2.00 meters spacing and at the proper depth to meet the barrier height.



The machine can be guided setting the motorized wheel inside the sine of the Thrie-Beam, this would be used as guide and the torn holes of the Thrie-Beam would be taken as reference for embedding the posts.



In those particular cases where the soil conditions do not allow an adequate post-driving, an equivalent insertion system is to be executed:

- *In hard soils*, a cylindrical hole of 200mm diameter and aprox. 900mm deep shall be bored with appropriate equipment (crown-boring machine), the C-125 steel post shall be positioned partially embedded in the hole using timber wedges in order to fasten it. Then, the hole shall be totally filled with soil, well compacted and the upper surface totally covered by an impermeable layer of cement mortar.



- *In weak soils*, a cubic foundation made of concrete shall be executed leaving a cylindrical hole of 200mm diameter and aprox. 900mm deep just in the centre (a tube can be used), the C-125 post shall be positioned partially embedded in the hole using timber wedges in order to fasten it. Then, the hole shall be totally filled with soil, well compacted and the upper surface totally covered by an impermeable layer of cement mortar.

2.- Assembly.

The site assembly of all the barrier components, once the posts are driven in soil, shall be made only by tightening bolts (screw, nuts and washers) meeting both the configuration, dimensions and tolerances defined in attached drawings.

The C-80 spacer is to be fastened to the posts by means of hexagonal bolts M10x45 but not definitively tightened. A circular flat washer located under the nut (inside the post) shall be used.

The Thrie-Beam is to be fastened to the spacer by means of round head hexagonal bolts M16x45, washers and nuts. A circular flat washer (located just under the bolt neck and over the rectangular flat washer), a rectangular flat washer (located just under the circular flat washer and over the Thrie-Beam) and a circular flat washer located just under the nut shall be used.

Consecutive rails are spliced and tightened, by means of round head bolts M16x35, nuts and washers, in order to provide continuity to a certain length of barrier.

Finally, the proper alignment of posts and height alignment of rail shall be checked and adjusted before the definitive spacer-post bolts tightening.

For ramping down end sections at both the beginning and end of the extension of barrier, the assembly sequence is similar to that described for the straight section of the barrier described above. With the particularities that no spacer is placed between the beam and the post (the beam is attached directly to post through M16x45 screws, nut, rectangular washer and circular washer M16), terminal posts shall be driven with 1.33 meters spacing, and four belts shall be used as indicated in the attached drawings.

3.- Tightening of Bolts.

Bolts fastening the spacer to the post shall be tightened with a torque from 40 N.m to 60 N.m.

Bolts fastening the Thrie-Beams to spacers shall be tightened with a torque from 90 N.m to 140 N.m.

Bolts fastening consecutive Thrie-Beams shall be tightened with a torque from 90 N.m to 140 N.m.

Attached to this specification, the ANNEX 1 includes all installation drawings needed (general drawings of standard barrier section and end terminals) and ANNEX 2 shows the installation steps:

A. Posts insertion

B. Fastening of the spacer to inserted post

C. Rails assembly

D. Vertical alignment and definitive tightening

SINGLE STEEL GUARDRAIL

"CPS 05-H2 2.00"

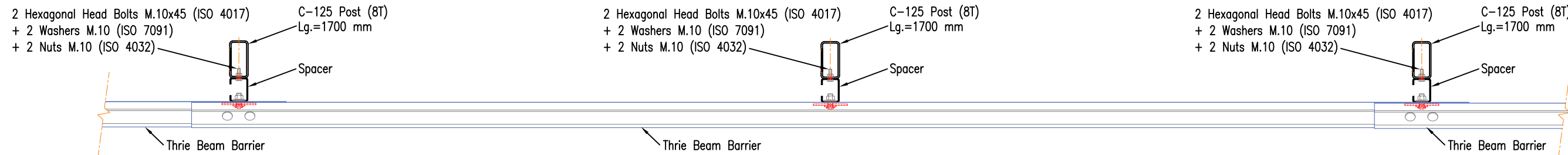
Annex 1:

Installation Drawings

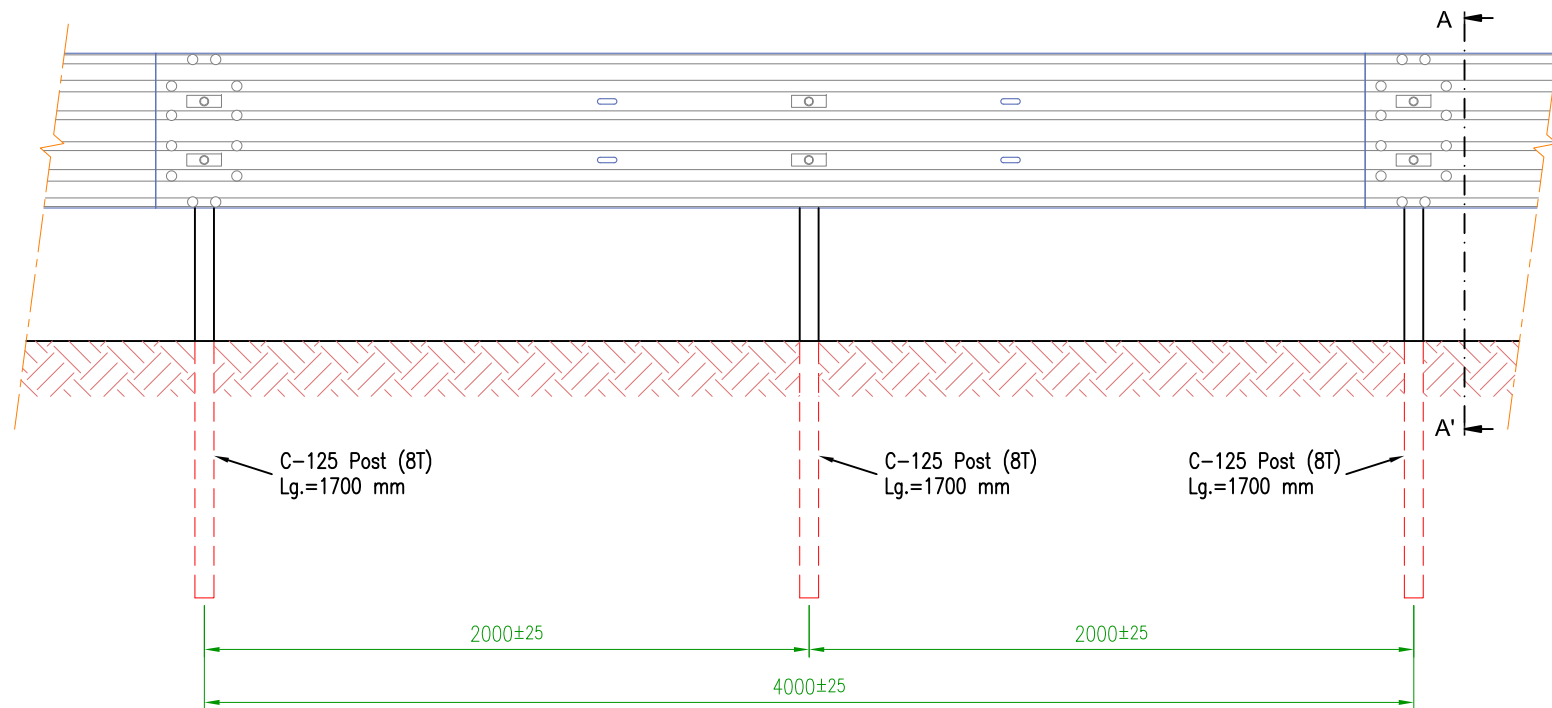
July 2019



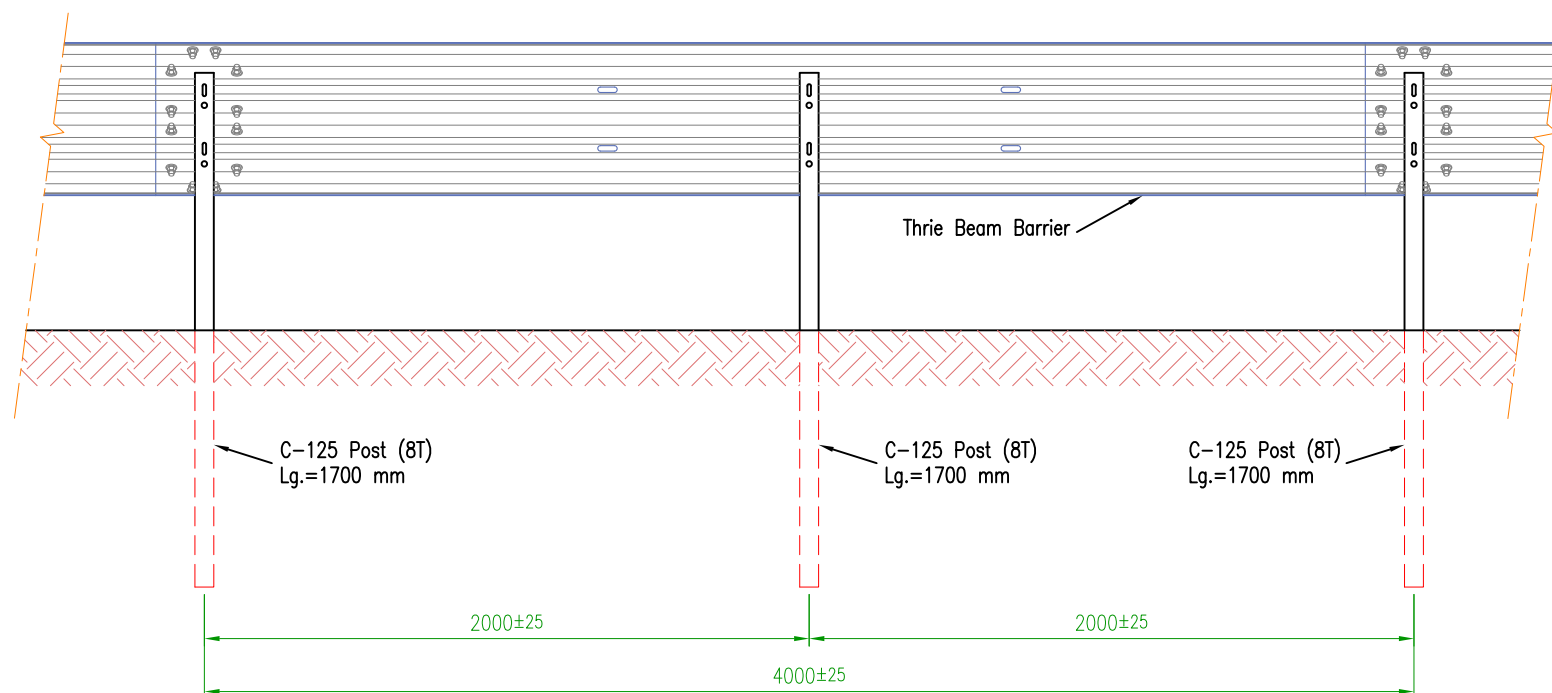
Paseo de Belén, 11 - Edificio UVainnova - Campus Miguel Delibes
47011 - Valladolid, ESPAÑA (SPAIN) Tel: +(34) 983 990468
e-mail: info@roadsteel.com - <http://www.roadsteel.com>



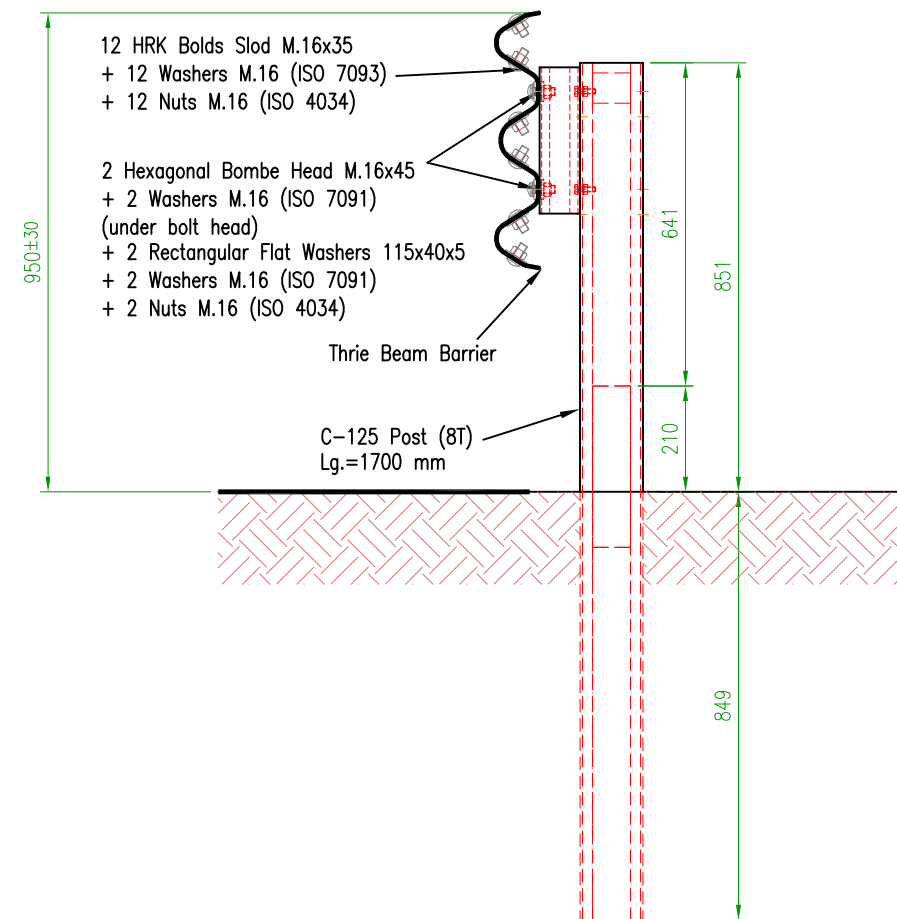
PLAN
Scale 1:15



FRONT ELEVATION
Scale 1:25



REAR ELEVATION
Scale 1:25



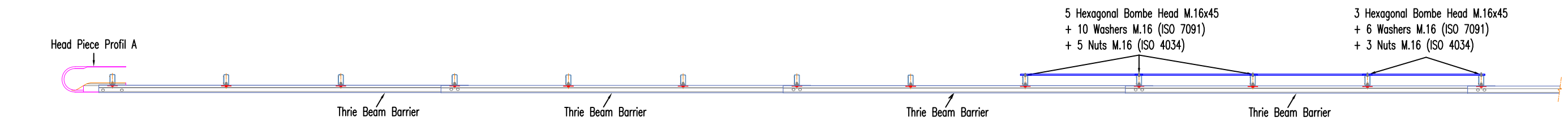
SECTION A-A'
Scale 1:15

Dimensions in mm

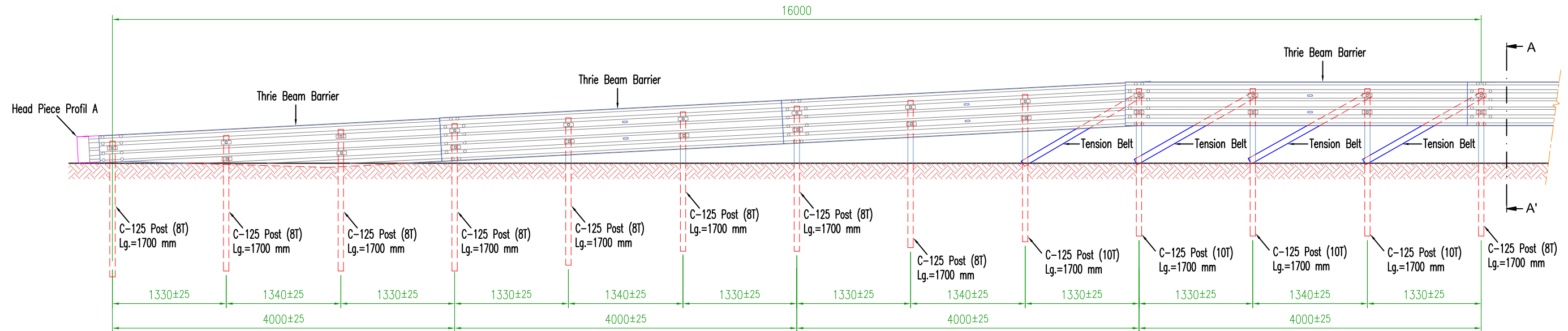
	DATE	NAME	SIGNATURES	 Tel: +34 985 128200 +34 983 990468 info@roadsteel.com http://www.roadsteel.com
Draw	12-07-2019	Jonathan Cordero P.		
Review	12-07-2019	Juan Jose Mostaza F.		
Accept	12-07-2019	Antonio Amengual P.		
SCALE	"CPS 05-H2 2.00" HIGH CONTAINMENT GUARDRAIL			Drawing N°: CPS 05-H2 2.00-120719-MAN-001
1:15	GENERAL DRAWING			Replace to:
1:25				Replaced for:



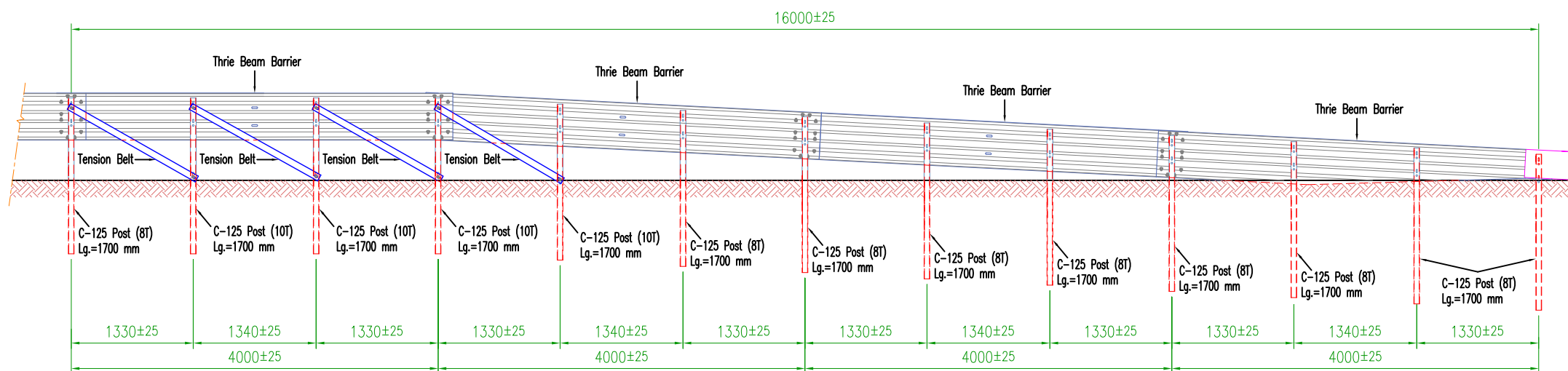
	DATE	NAME	SIGNATURES	 Tel: (34) 985 128200 + (34) 983 990468 info@roadsteel.com http://www.roadsteel.com	
Draw	12-07-2019	Jonathan Cordero P.			
Review	12-07-2019	Juan Jose Mostaza F.			
Accept	12-07-2019	Antonio Amengual P.			
SCALE	"CPS 05-H2 2.00" HIGH CONTAINMENT GUARDRAIL			Drawing N°: CPS 05-H2 2.00-120719-AMIAN-01	
1:50				DRAWING OF END RAMPING DOWN SECTION (System Start Decline)	Replace to:
1:60					Replaced for:



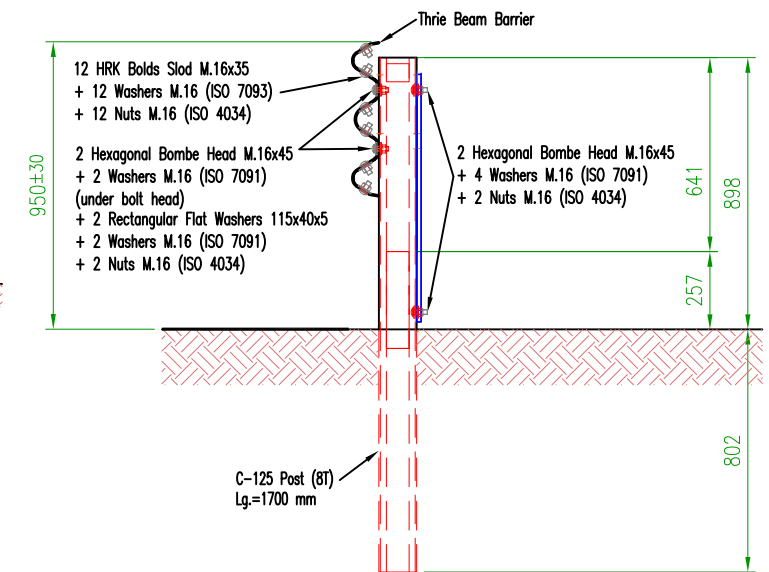
PLAN



FRONT ELEVATION



REAR ELEVATION



SECTION A-A'
Scale 1:25

Dimensions in mm

	DATE	NAME	SIGNATURES	
Draw	12-07-2019	Jonathan Cordero P.		
Review	12-07-2019	Juan Jose Mostaza F.		
Accept	12-07-2019	Antonio Amengual P.		
SCALE	"CPS 05-H2 2.00" HIGH CONTAINMENT GUARDRAIL			Drawing N°: CPS 05-H2 2.00-120719-MAN-003
1:50	DRAWING OF END RAMPING DOWN SECTION (System Terminal Decline)			Replace to:
1:60				Replaced for:



RAPPORTO DI PROVA / TEST REPORT

NUMERO / NUMBER / NÚMERO

0053\ME\HRB\19_3 Rev. 1

**DATA DI EMISSIONE / EMISSION DATE /
FECHA DE EMISIÓN**

03/08/2021

BUSINESS SECTORInfrastructures & Mobility and
Industrial Product Testing Area**LABORATORIO / LABORATORY**

Infrastructures & Mobility

**IDENTIFICAZIONE E DESCRIZIONE DEL CAMPIONE / SPECIMEN DESCRIPTION /
IDENTIFICACIÓN Y DESCRIPCIÓN DEL PRODUCTO**

Barriera Monolaterale classe H2 su terra

Monolateral Barrier H2 class on soil

Barrera Monolateral H2 clase en tierra

'CPS 05-H2 2.00'

CLIENTE / CUSTOMER / CLIENTE

Road Steel Engineering

Paseo de Belen, 11 - Edificio Uvalnova

47011 Valladolid (EE)

NORMA DI RIFERIMENTO / REFERENCE STANDARD / NORMA DE REFERENCIA

UNI EN 1317-1: 2010; UNI EN 1317-2: 2010

ITT: TB11

La presente documentazione tecnica è redatta in tre lingue: italiano, inglese, spagnolo. Fa fede la versione italiana.
This documentation is written in three languages: Italian, English and Spanish. The official one is the Italian version.
Esta documentación técnica está escrita en tres idiomas: italiano, inglés y español. La versión italiana es auténtica.

Organismo notificato 0497

Notified body 0497

Organismo notificado 0497

GQ001 REV.00

5. RISULTATI / RESULTS / RESULTADOS

5.1. CONDIZIONI DI PROVA / TEST CONDITIONS / CONDICIONES DE PRUEBA

Velocità dell'urto / Impact speed / Velocidad del impacto: 100.8 km/h (5.1.1)

Differenza rispetto al nominale / Difference / Diferencia respecto a la nominal: 0.8 % (5.1.2)

Angolo d'urto / Impact angle / Ángulo de impacto: 20.0 deg (5.1.3)

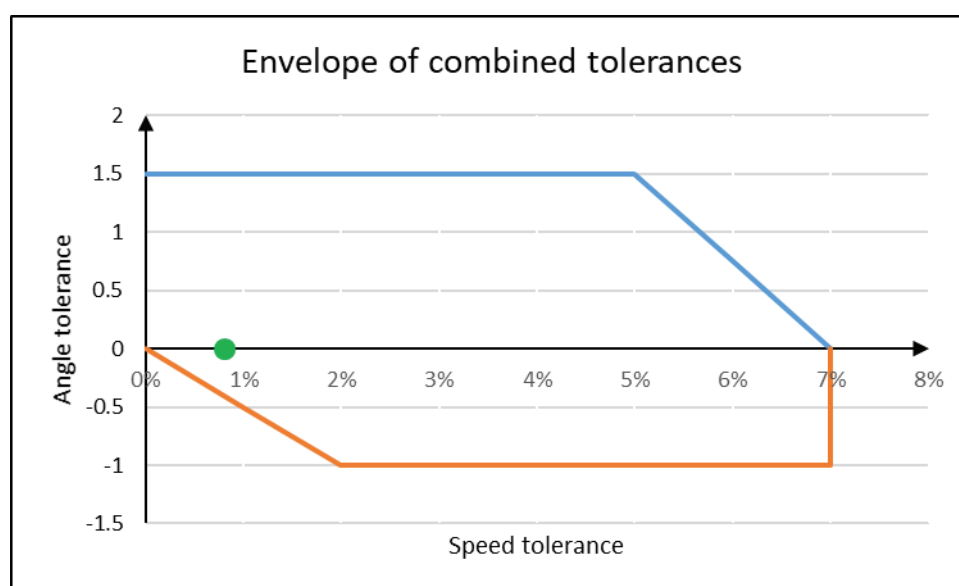
Differenza rispetto al nominale / Difference / Diferencia respecto a la nominal: 0.0 deg (5.1.4)

(5.1.5)

La prova è stata condotta in data 10/05/2019, alle ore 17:55 presso il Proving Ground di CSI S.p.A. (Bollate – Milano, IT).	Test has been performed on 10/05/2019, at 17:55 at the impact zone of the CSI S.p.A. Proving Ground (Bollate – Milano, IT).	La prueba ha sido realizada en fecha 09/05/2019, a las 18:00 horas en el Campo de Pruebas de CSI S.p.A. (Bollate – Milán, IT).
---	---	--

Condizioni climatiche / Climatic conditions / Condiciones climáticas: 24 °C. (5.1.6)

Condizioni della superficie di prova / Conditions of the impact area / Condiciones de la superficie de ensayo: asciutta / dry / seco (5.1.6.a)



5.2. DISPOSITIVO / TEST ITEM / DISPOSITIVO

L'urto ha procurato una deformazione del dispositivo. Le informazioni su tali deformazioni sono qui riportate.

The impact has determined a deformation of the device. Its deformations are listed here.

La colisión provocó una deformación del dispositivo. La información sobre estas deformaciones se reporta aquí.

Deflessione dinamica / Dinamic deflection / Deflexión dinámica (5.2.1):	0.4 m	(0.35 m)
Deflessione dinamica normalizzata / Normalized dinamic deflection / Deflexión dinámica normalizada (5.2.2):	0.3 m	(0.34 m)
Larghezza operativa / Working width / Ancho de operación (5.2.3):	0.5 m	(0.45 m)
Larghezza operativa normalizzata / Normalized working width / Ancho de operación normalizado (5.2.4):	0.4 m	(0.44 m)
Classe di funzionamento / Functional level / Clase operativa (5.2.5):	W1	($W_N \leq 0.6$ m)
Massima deformazione permanente / Maximum permanent deflection / Deformación máxima permanente (5.2.7):	0.15 m	
Larghezza operativa permanente / Permanent working width / Ancho de operación permanente (5.2.7.a):	0.45 m	
Lunghezza del contatto / Length of contact / Longitud de contacto (5.2.8):	4.0 m	
Punto di impatto / Actual impact point / Punto de impacto (5.2.9):	Palo / Post / Poste n°7	
Spostamento permanente terminali / Permanent displacement of the end anchorage / Deformación terminal permanente (5.2.10):	0.0 m	

Descrizione dei danni dell'oggetto di prova / Description of damage to test item / Descripción del daño del objeto de prueba: (5.2.12)

Lieve danneggiamento dei componenti nella zona di impatto. Distacco del palo numero 6 dal distanziatore.

Slight damage of the components in the impact zone. Detachment of the post number 6 from the spacer.

Daños leves a los componentes en el área de impacto. Desprendimiento del polo número 6 del espaciador.

Descrizione danni alle fondazioni / Damage description of foundations / Descripción del daño a las fundaciones:

Terreno smosso in prossimità dei pali interessati dall'urto.

Soil moved near the posts involved in the impact.

Suelo suelto cerca de los polos afectados por el impacto.

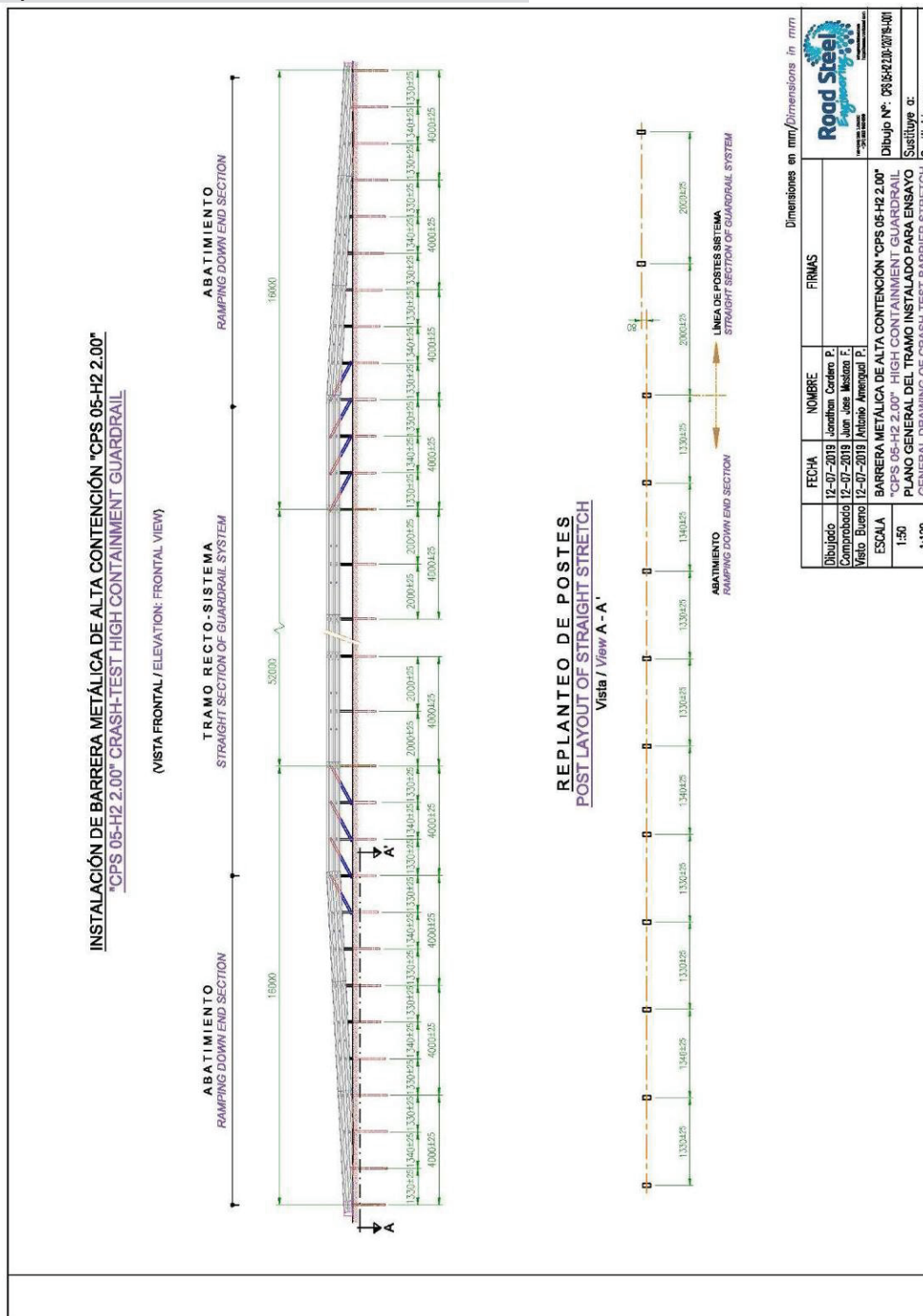
Posizione cerniera plastica dei pali / Plastic hinge position of posts / Posición de la bisagra plástica de los postes:

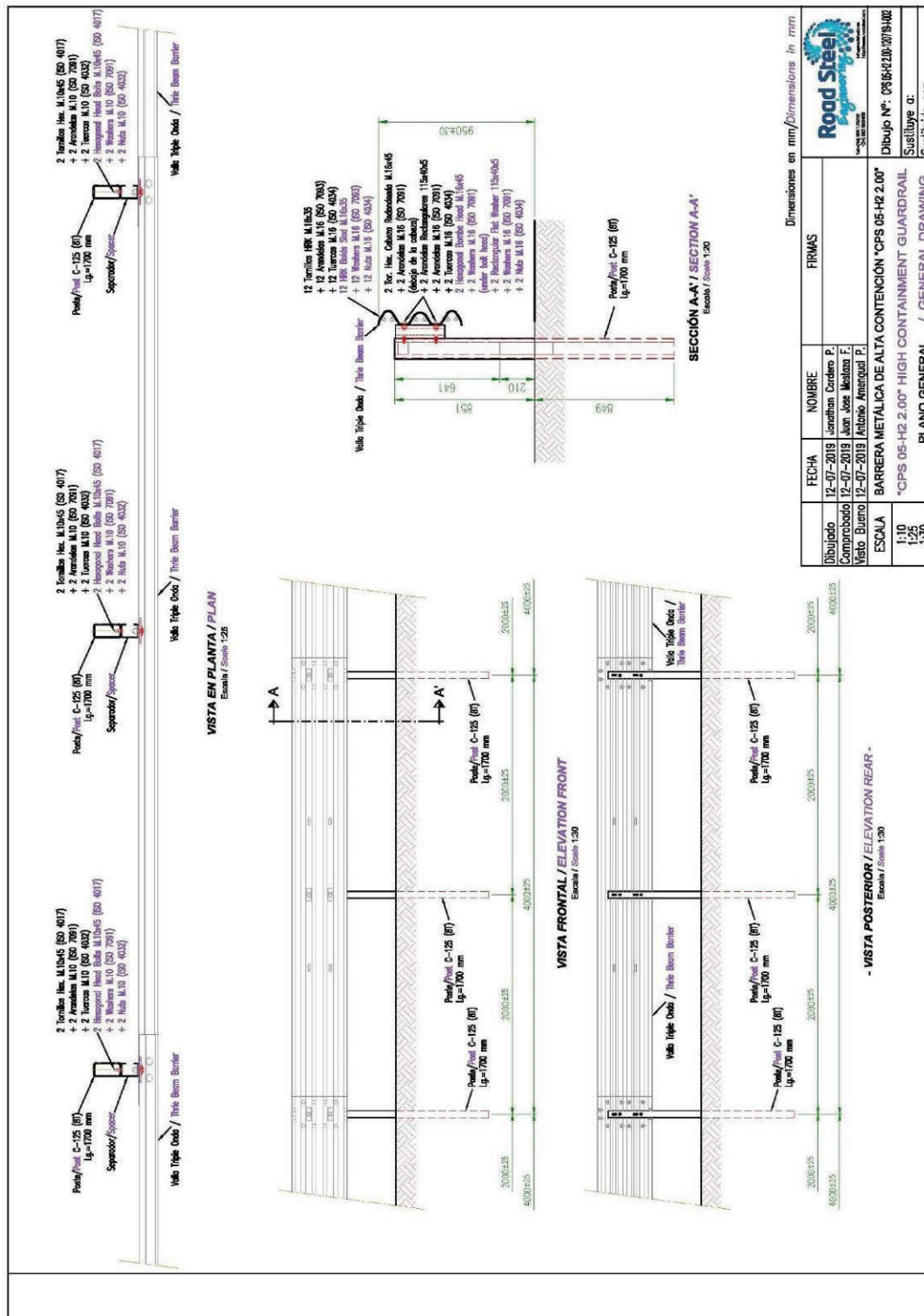
Assente.

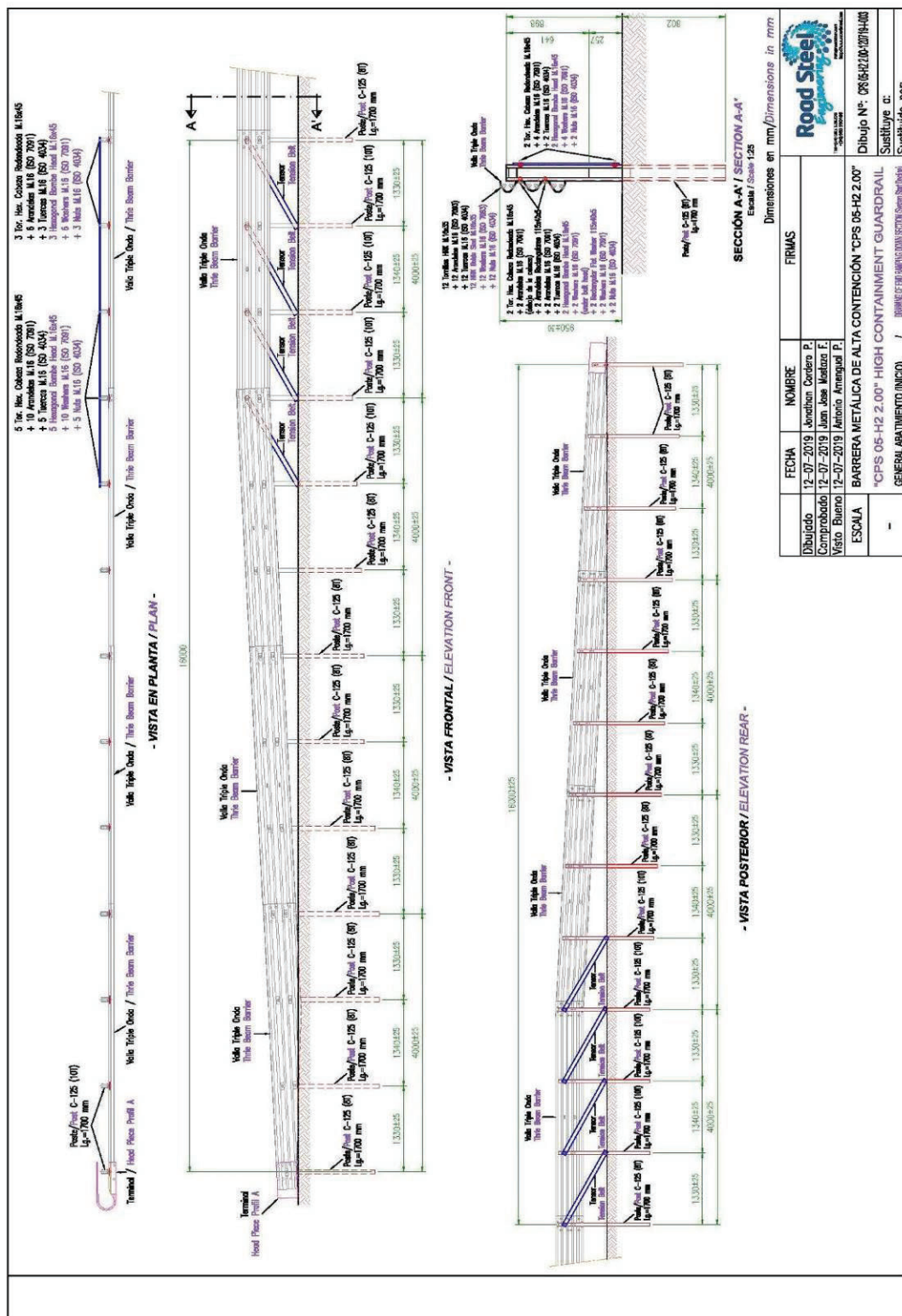
Absent.

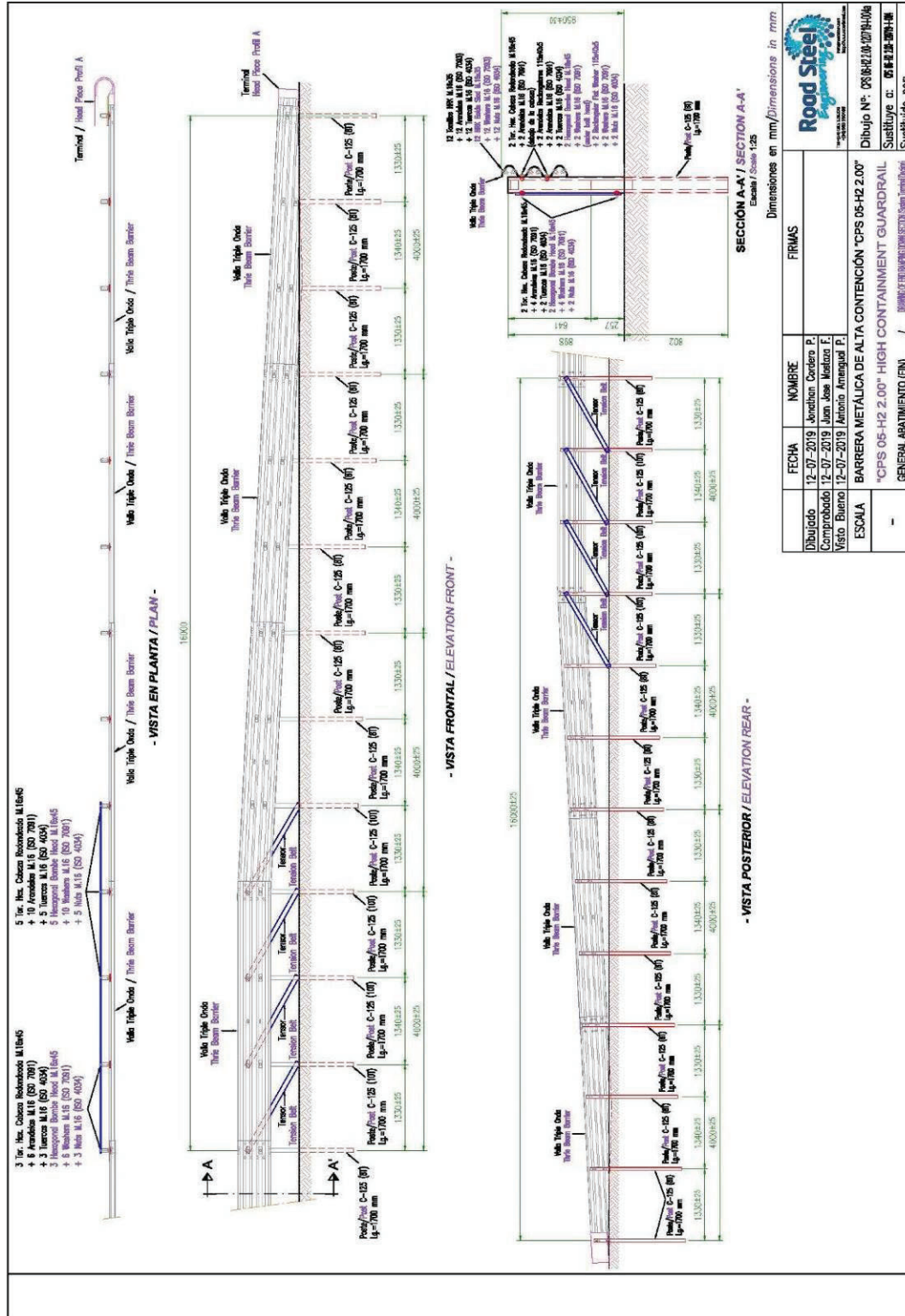
Ausente.

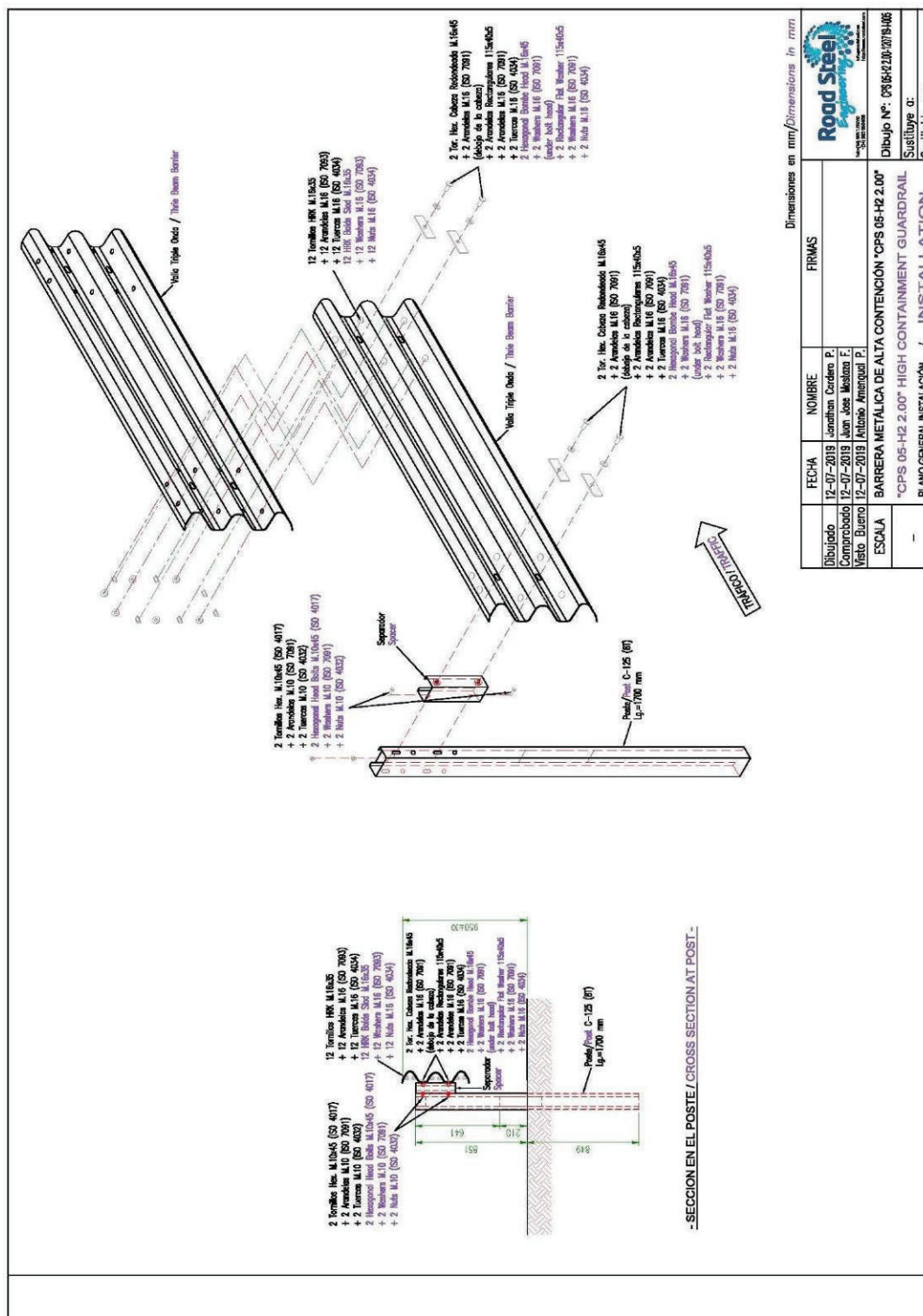
8.1. ALLEGATO A: DISEGNI TECNICI DEL CAMPIONE TESTATO / TECHNICAL DRAWINGS OF THE TESTED ITEM / DISEÑOS TÉCNICOS DE LA MUESTRA PROBADA











RAPPORTO DI PROVA / TEST REPORT

NUMERO / NUMBER / NÚMERO

0052\ME\HRB\19_3 Rev. 1

**DATA DI EMISSIONE / EMISSION DATE /
FECHA DE EMISIÓN**

03/08/2021

BUSINESS SECTORInfrastructures & Mobility and
Industrial Product Testing Area**LABORATORIO / LABORATORY**

Infrastructures & Mobility

**IDENTIFICAZIONE E DESCRIZIONE DEL CAMPIONE / SPECIMEN DESCRIPTION /
IDENTIFICACIÓN Y DESCRIPCIÓN DEL PRODUCTO**

Barriera Monolaterale classe H2 su terra

Monolateral Barrier H2 class on soil

Barrera Monolateral H2 clase en tierra

'CPS 05-H2 2.00'

CLIENTE / CUSTOMER / CLIENTE

Road Steel Engineering

Paseo de Belen, 11 - Edificio Uvalnnova

47011 Valladolid (EE)

NORMA DI RIFERIMENTO / REFERENCE STANDARD / NORMA DE REFERENCIA

UNI EN 1317-1: 2010; UNI EN 1317-2: 2010

ITT: TB51

La presente documentazione tecnica è redatta in tre lingue: italiano, inglese, spagnolo. Fa fede la versione italiana.
This documentation is written in three languages: Italian, English and Spanish. The official one is the Italian version.
Esta documentación técnica está escrita en tres idiomas: italiano, inglés y español. La versión italiana es auténtica.

Organismo notificato 0497
Notified body 0497
Organismo notificado 0497

GQ001 REV.00

5. RISULTATI / RESULTS / RESULTADOS

5.1. CONDIZIONI DI PROVA / TEST CONDITIONS / CONDICIONES DE PRUEBA

Velocità dell'urto / Impact speed / Velocidad del impacto: 70.5 km/h (5.1.1)

Differenza rispetto al nominale / Difference / Diferencia respecto a la nominal: 0.71 % (5.1.2)

Angolo d'urto / Impact angle / Ángulo de impacto: 20.0 deg (5.1.3)

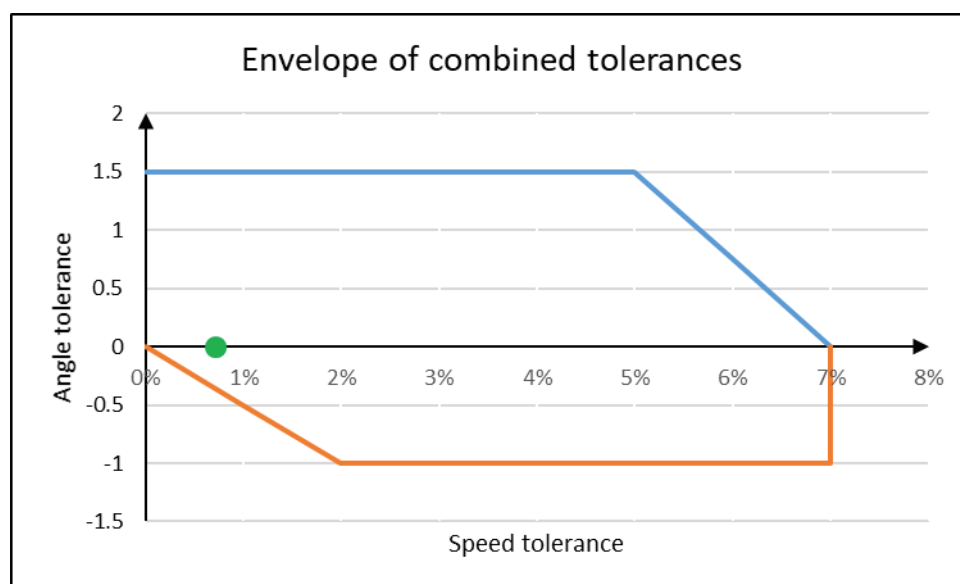
Differenza rispetto al nominale / Difference / Diferencia respecto a la nominal: 0.0 deg (5.1.4)

(5.1.5)

La prova è stata condotta in data 09/05/2019, alle ore 18:00 presso il Proving Ground di CSI S.p.A. (Bollate – Milano, IT).	Test has been performed on 09/05/2019, at 18:00 at the impact zone of the CSI S.p.A. Proving Ground (Bollate – Milano, IT).	La prueba ha sido realizada en fecha 09/05/2019, a las 18:00 horas en el Campo de Pruebas de CSI S.p.A. (Bollate – Milán, IT).
---	---	--

Condizioni climatiche / Climatic conditions / Condiciones climáticas: 20 °C. (5.1.6)

Condizioni della superficie di prova / Conditions of the impact area / Condiciones de la superficie de ensayo: asciutta / dry / seco (5.1.6.a)



5.2. DISPOSITIVO / TEST ITEM / DISPOSITIVO

L'urto ha procurato una deformazione del dispositivo. Le informazioni su tali deformazioni sono qui riportate.

The impact has determined a deformation of the device. Its deformations are listed here.

La colisión provocó una deformación del dispositivo. La información sobre estas deformaciones se reporta aquí.

Deflessione dinamica / Dinamic deflection / Deflexión dinámica (5.2.1):	0.7 m	(0.69 m)
Deflessione dinamica normalizzata / Normalized dinamic deflection / Deflexión dinámica normalizada (5.2.2):	0.7 m	(0.70 m)
Larghezza operativa / Working width / Ancho de operación (5.2.3):	1.3 m	(1.25 m)
Larghezza operativa normalizzata / Normalized working width / Ancho de operación normalizado (5.2.4):	1.3 m	(1.26 m)
Classe di funzionamento / Functional level / Clase operativa (5.2.5):	W4	($W_N \leq 1.3$ m)
Intrusione Veicolo / Vehicle Intrusion / Intrusión Vehículo (5.2.6):	1.0 m	(1.02 m)
Intrusione Veicolo Normalizzata / Normalized Vehicle Intrusion / Intrusión Normalizada Vehículo (5.2.6.a):	1.0 m	(1.03 m)
Classe dell'intrusione veicolo / Class of Vehicle Intrusion / Clase de intrusión de vehículo (5.2.6.b):	VI3	($VI_N \leq 1.0$ m)
Massima deformazione permanente / Maximum permanent deflection / Deformación máxima permanente (5.2.7):	0.93 m	
Larghezza operativa permanente / Permanent working width / Ancho de operación permanente (5.2.7.a):	1.21 m	
Lunghezza del contatto / Length of contact / Longitud de contacto (5.2.8):	9.0 m	
Punto di impatto / Actual impact point / Punto de impacto (5.2.9):	Palo / Post / Poste n°5	
Spostamento permanente terminali / Permanent displacement of the end anchorage / Deformación terminal permanente (5.2.10):	0.0 m	

Descrizione dei danni dell'oggetto di prova / Description of damage to test item / Descripción del daño del objeto de prueba: (5.2.12)

Piegati i pali nella zona di impatto dal numero 5 al 9. Distacco dei pali 6 e 7 dal distanziatore e rottura del distanziatore numero 9. Nastro tripla onda deformato senza rottura nella zona di impatto.	Posts bended in the impact zone from the number 5 to the 9. Detachment of the posts 6 and 7 from the spacer and breakage of the spacer number 9. Triple wave beam deformed without breakage in the impact zone.	Doblado los postes en la zona de impacto del número 5 al 9. Desprendimiento de los postes 6 y 7 del espaciador y la rotura del espaciador número 9. Banda de onda triple deformada sin romperse en la zona de impacto.
---	---	--

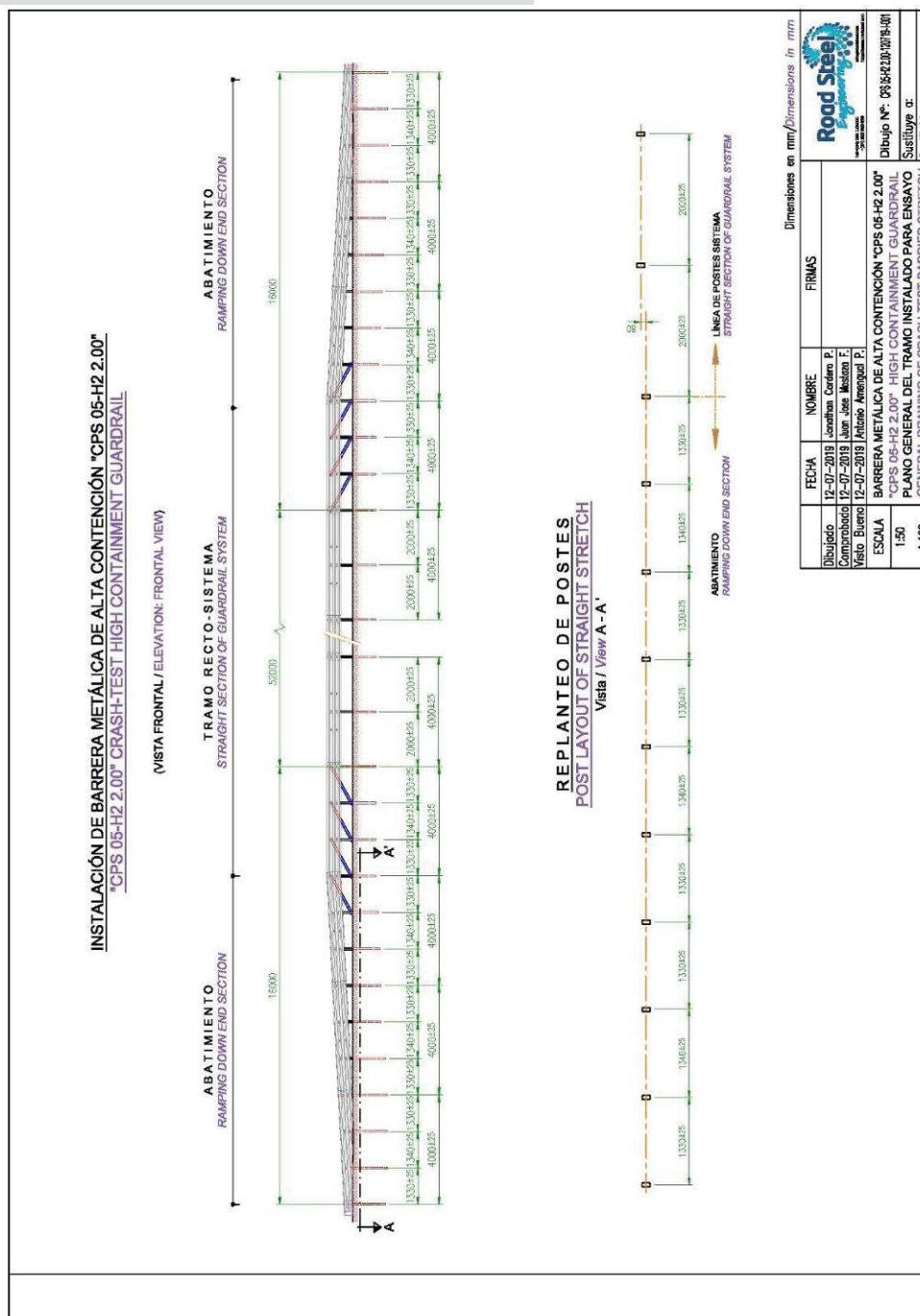
Descrizione danni alle fondazioni / Damage description of foundations / Descripción del daño a las fundaciones:

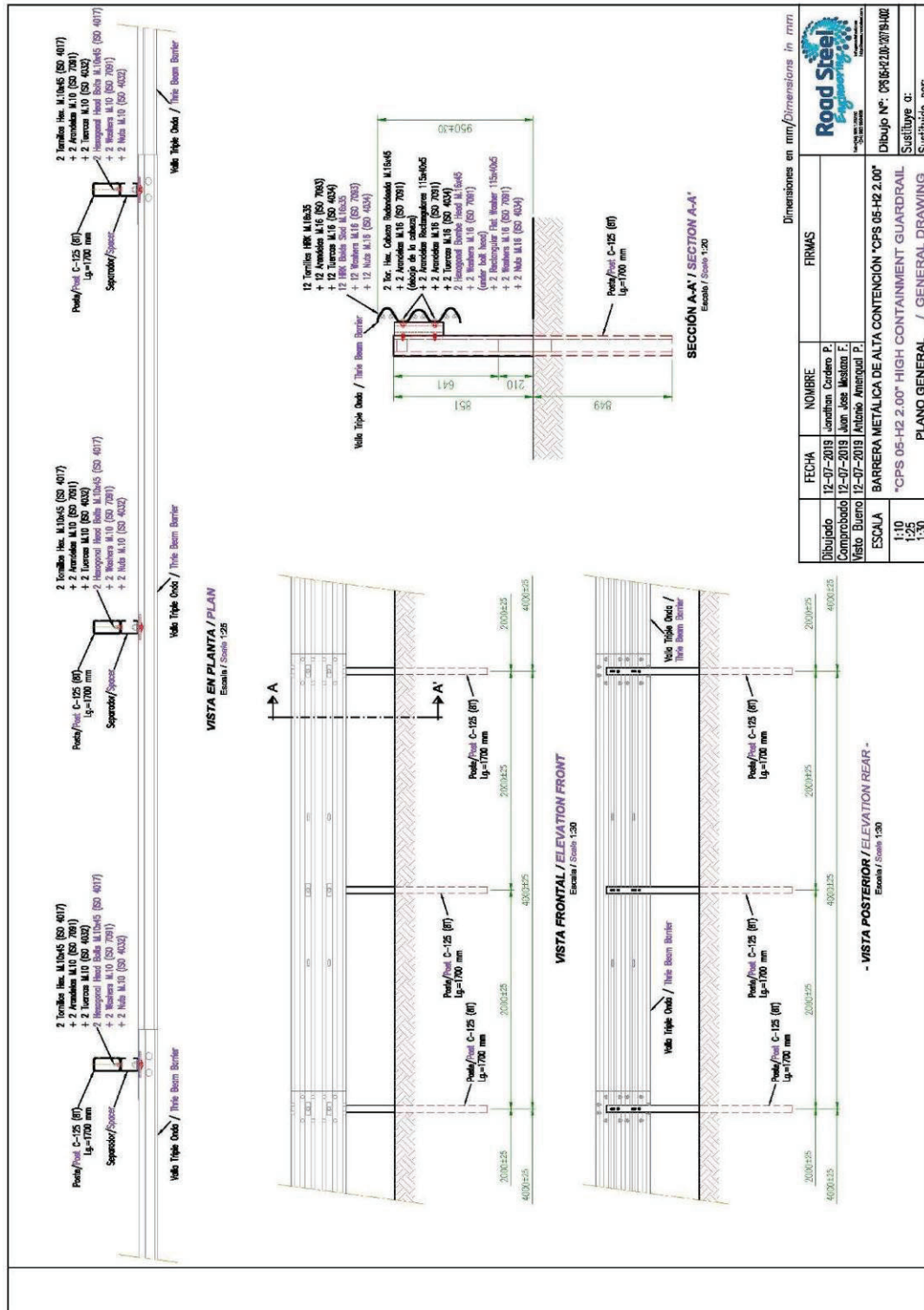
Terreno smosso in prossimità dei pali interessati dall'urto.	Soil moved near the posts involved in the impact.	Suelo suelto cerca de los polos afectados por el impacto.
--	---	---

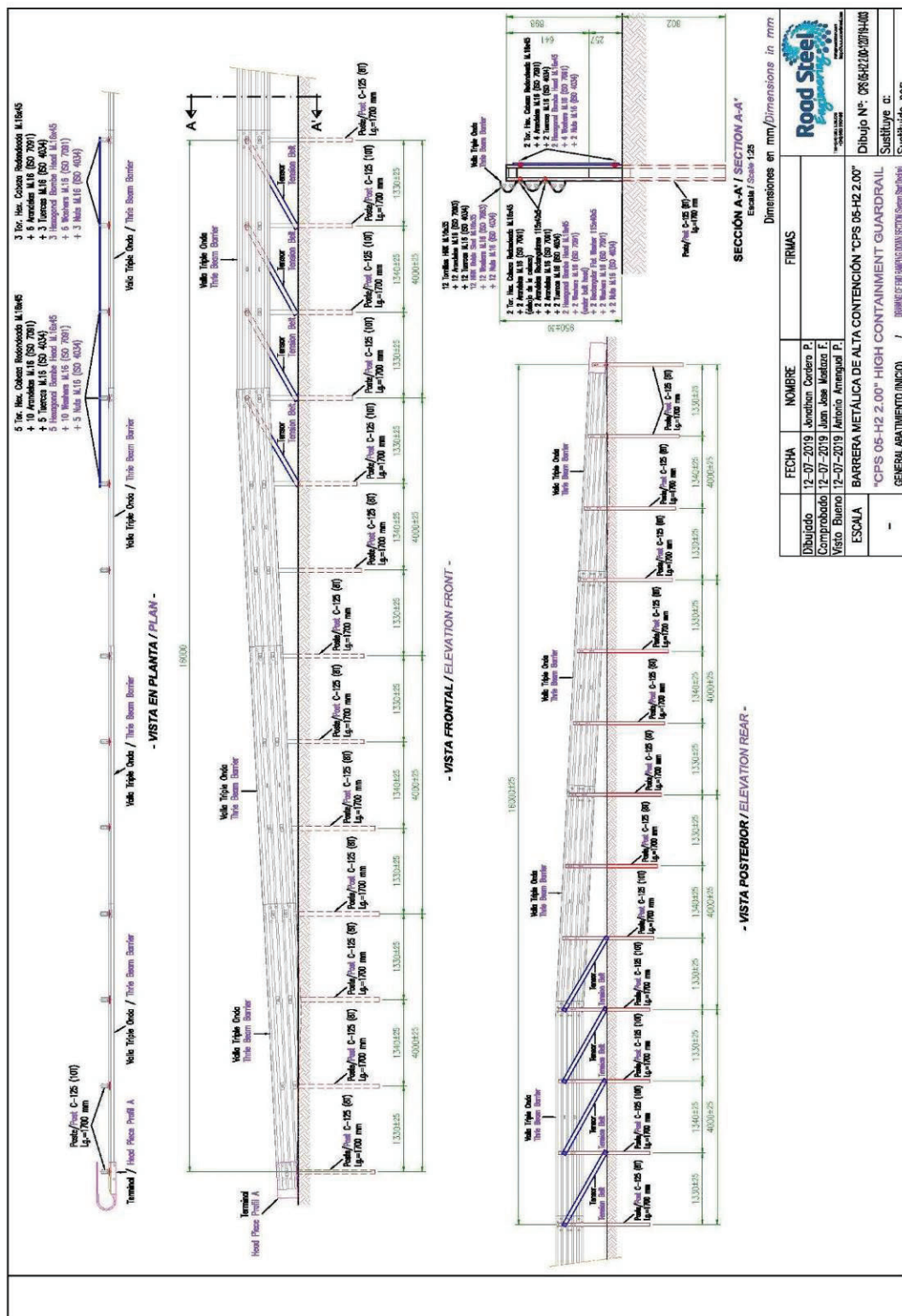
Posizione cerniera plastica dei pali / Plastic hinge position of posts / Posición de la bisagra plástica de los postes:

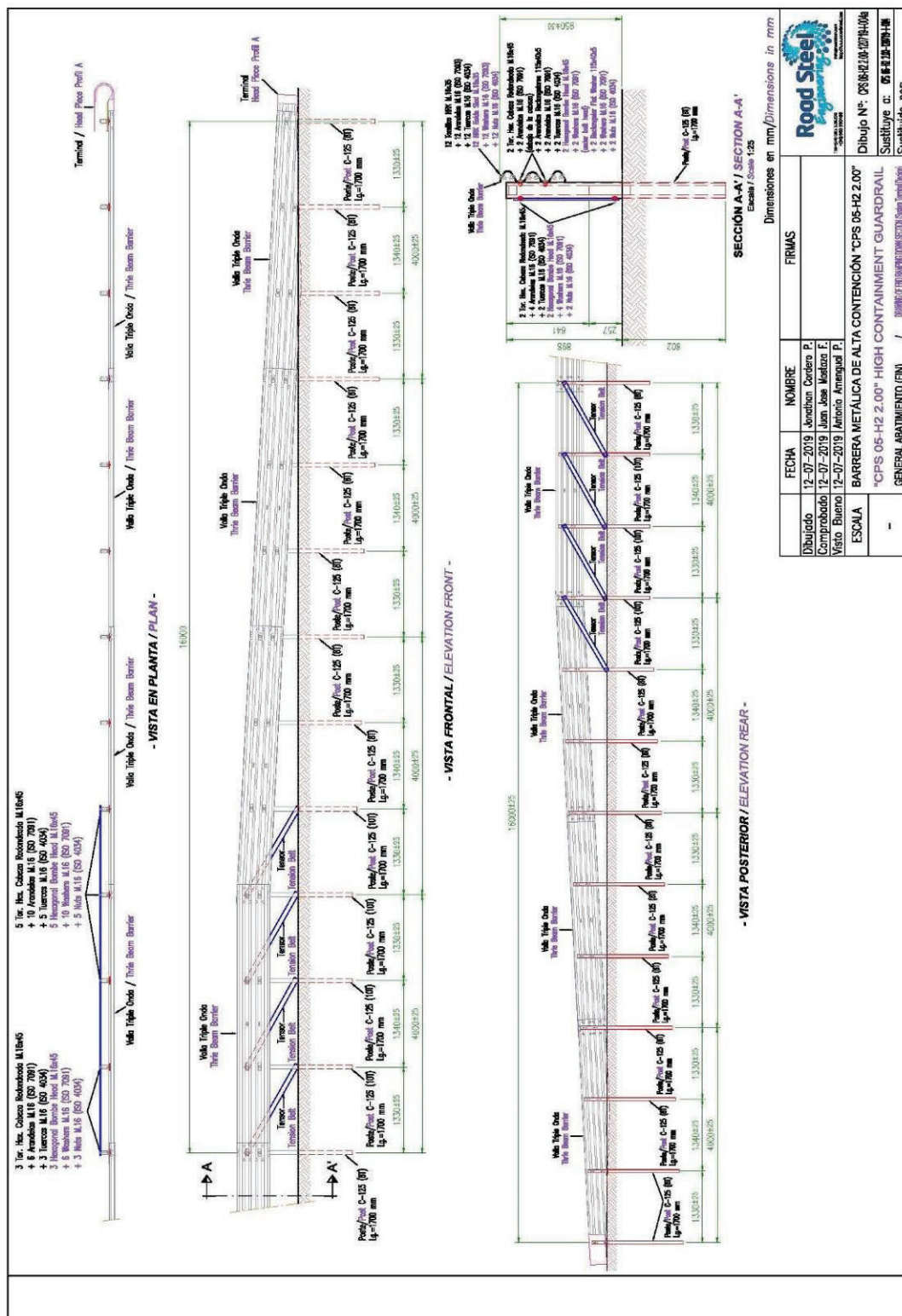
Circa 20 cm al di sotto del suolo.	About 20 cm below the ground level.	A unos 20 cm por debajo del suelo.
------------------------------------	-------------------------------------	------------------------------------

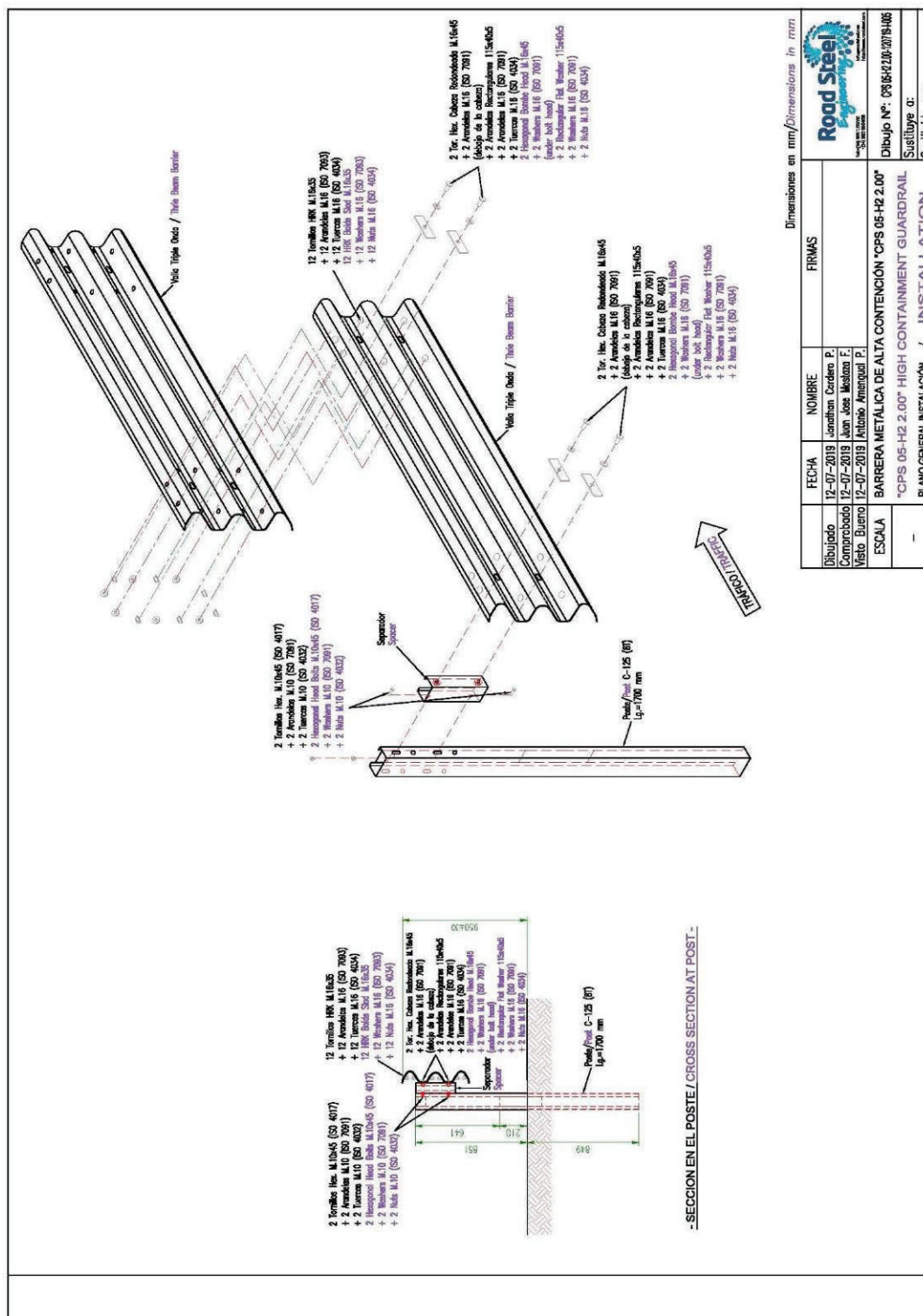
8.1. ALLEGATO A: DISEGNI TECNICI DEL CAMPIONE TESTATO / TECHNICAL DRAWINGS OF THE TESTED ITEM / DISEÑOS TÉCNICOS DE LA MUESTRA PROBADA











EC-CERTIFICATE OF CONSTANCY OF PERFORMANCE

607_Rev.1/2131/CPR/2017

of the product:

ROAD SAFETY BARRIER FOR GROUND LEVEL H2

MODEL: TR-H2W4

placed on the market by:

KISAN İNŞAAT MÜHENDİSLİK SAN. VE TİC. A.Ş.

**Karayollari mah. Kadir Akdogan Cad. 547/1 Sok. No:2- 34255 Küçükköy – Gaziosmanpaşa
ISTANBUL - TURKEY**

PERFORMANCE UNDER IMPACT:

a) Containment Level	H2
b) Severity Impact	A
c) Normalised Working Width	W4 (1.3 m)
d) Normalised Dynamic Deflection	1.2 m
e) Normalised Vehicle Intrusion	VI4 (1.3 m)

DRAWING:	TR H2-W4	of 2017/05/09
INSTALLATION MANUAL:	TR H2-W4	of 2017/05
TEST REPORT:	AISICO N° 1517_REV.1 (TB 11)	of 2019/11/19
	AISICO N° 1516_REV.1 (TB 51)	of 2019/11/21
DURABILITY:	GALVANIZED STEEL IN ACCORDANCE WITH EN ISO 1461	
RESISTANCE TO SNOW REMOVAL:	NPD	
DANGEROUS SUBSTANCE:	NPD	
CONDITIONS FOR USE:	CONFORMITY WITH I.T.T. CONFIGURATION	

enabled production plants:

KISAN İNŞAAT MÜHENDİSLİK SAN. VE TİC. A.Ş.

Sakarya 2.Organize Sanayi Bölgesi 2 Nolu Yol No.18 – 54300 Hendek Sakarya - TURKEY

determined by initial type-testing (I.T.T.); The Producer shall implement the Factory Production Control (FPC) which guarantees compliance with type examined and with the requirements of the Harmonized Standard conforming to System Procedure 1 – Annex V of Regulation 305/2011 (EU). This certificate attests to the application and compliance with the requirements of Annex ZA of the standard:

EN 1317-5:2007+A2:2012/AC:2012

permits the Manufacturer to place on the product the CE marking followed by the identifying of the Notified Body "2131".

The validity of this Certificate is subject to the regularity of the Surveillance on its FPC.

Any damage caused by product defects remains the responsibility of the Producer (85/347/ECC).

Issue date: 2020/01/17

This certificate consists of this page and Annex 1

Chairman
(Eng. Stefano Calamani)

ANNEX 1

TO THE CERTIFICATE OF PERFORMANCE

607_Rev.1/2131/CPR/2017

of the product:

ROAD SAFETY BARRIER FOR GROUND**LEVEL H2****MODEL: TR-H2W4**

placed on the market by:

KISAN İNŞAAT MÜHENDİSLİK SAN. VE TİC. A.Ş.**Karayollari mah. Kadir Akdogan Cad. 547/1 Sok. No:2- 34255 Küçükköy – Gaziosmanpaşa
ISTANBUL - TURKEY**

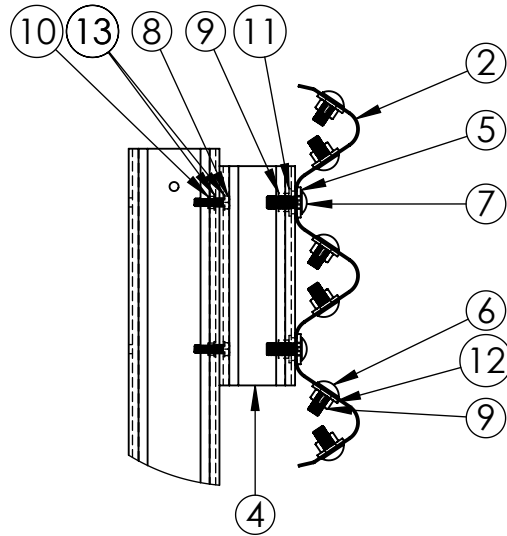
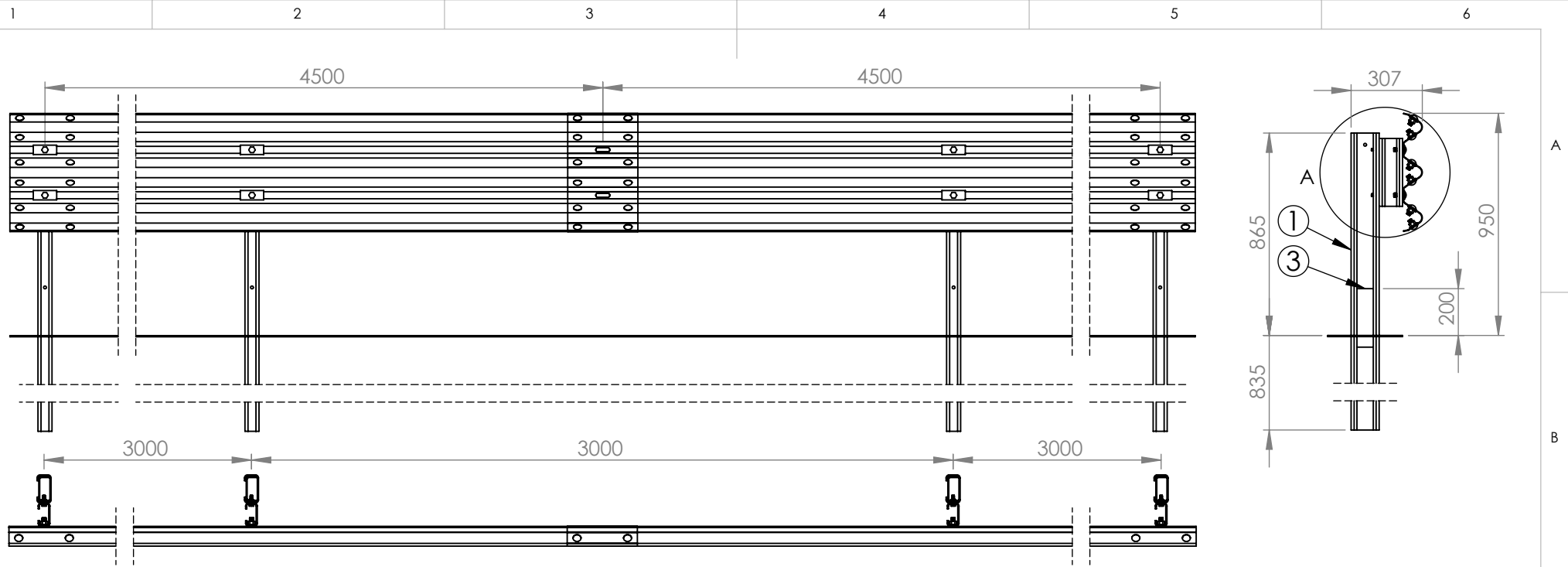
MODIFICATION: M1 Approved on 2020/01/13	Model: TR-H2W4 Description of modification: - addition of manufacturing mark (hole 14x18) on the upper of the post, on the post reinforcement and on the spacer - Inserting a $\phi 12$ hole at the bottom of the post Drawing: TR H2-W4 of 2019/11/25 P 23_mod1 of 2019/11/18 P 25_mod1 of 2019/11/18 P 03_mod1 of 2019/11/18 P 21_mod2 of 2019/11/25 Installation Manual: TR H2-W4 Installation manual of 2019/11 Integrative reports: KISAN: TR H2W4_Mod 01 Technical Report for the Modification of the C120 Post of 2019/11/25; KISAN: TR H2W4_Mod 02 Technical Report for the Modification of the Post Reinforcement of 2019/11/25; KISAN: TR H2W4_Mod 03 Technical Report for the Modification of the C100 Spacer of 2019/11/25; KISAN: TR H2W4_Mod 04 Technical Report for the Modification of the C120 Post for Terminal of 2019/11/25; AISICO: TH_Report130 of 2019/27/11
--	--

Issue date: 2020/01/17

Chairman

(Eng. Stefano Calamani)





DETAIL A
SCALE 1 : 10

#	Drawing No.	Revision No.	Product Description	Grade
1	KP 21		Post, C120x60x25, 1.700 mm, 5,00 mm	S355 JR
2	KP 12		Beam, profile 3W, 4.800 mm, 2,50 mm	S355 JR
3	KP 03		Post Reinforcement, U105x45, 250 mm, 4,00 mm	S355 JR
4	KP 23		Spacer, C100x50x25, 290 mm, 5,00 mm	S355 JR
5	KP 04		Connection Plate, M16, 100 mm, 5,00 mm	S235 JR
6	KF 03		M16x35 Round Head Bolt	8.8
7	KF 02		M16x45 Round Head Bolt	8.8
8	KF 05		M10x40 Hexagonal Head Bolt	8.8
9	KF 21		M16 Nut	Class 8
10	KF 25		M10 Nut	Class 8
11	KF 41		M16 Washer (Ø36 mm)	200 HV
12	KF 42		M16 Washer (Ø40 mm)	200 HV
13	KF 45		M10 Washer	200 HV

NAME	DATE	SCALE	1:25	PAGE	A4
DREW & APPROVED Kisan İnşaat A.Ş.	05.05.2017	TR H2-W4 Single Sided Ground System General Drawing			
KiSAN Yol Göstericiniz / Lead the Way					