Test Report - Commercial in Confidence
Y0019 Bailey Streetscene Ltd Inspira Protect Litterbin

Test Laboratory	**HORIBA MIRA Ltd**
Date of Report	**26/04/2021**
Client	**Centre for the Protection of National Infrastructure (CPNI)**
Test Item	**Litterbin on HVM Post**
Date of Test	**24/03/2021**
Test Number	**Y0019**
Report Number	**1223164-004-028-01**
Test Type	**Vehicle Impact**
Product Rating	**IWA 14-1:2013 Barrier V/1500[M1]/48/90:2.2**
Number of Pages	**25**

Prepared By:

Dave Johnstone

Consultant - HSPI Test Centre

Approved By:

Rachael Kennedy

Head of HSPI Test Centre

Date: 26th April 2021

1105

Tests marked "Not UKAS Accredited" in this report are not included in the UKAS Accreditation Schedule for this laboratory. Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation

Contents

1 Introduction

1.1 Test laboratory

Name	HORIBA MIRA Limited
Address	Watling Street, Nuneaton, Warwickshire, CV10 0TU. United Kingdom
Telephone number	+44 (0)24 7635 5000
Facsimile number	+44 (0)24 7635 8000
Internet address	http://www.horiba-mira.com
Test site location	At above address.
Accrediting body	United Kingdom Accreditation Service 21-47 High Street, Feltham, Middlesex. TW13 4UN
Accreditation details	HORIBA MIRA is designated as UKAS testing laboratory 1105, with approval dated 31 July 1992, subsequently renewed periodically, for details of the latest approval, and schedule of accreditation see: http://www.ukas.org/testing/lab_detail.asp?lab_id=826

1.2 Product Manufacturer

Name	Bailey Streetscene Ltd
Address	Adlington Business Park, London Road, Adlington, Cheshire, SK104NL
Internet address / email	barrie.woodcock@bsfg.co.uk
Type	Barrier
Model No	Inspira Protect Litterbin

1.3 Client

Name	Centre for the Protection of National Infrastructure (CPNI)	
Address	PPSD-HVM	
Internet address / email	N/A	
Additional information	Purchase order:	7088264
	Client Engineer:	----------

1.4 Test Area

The test was carried out on the Highway Safety & Protection of Infrastructure (HSPI) Test Area adjacent to the HORIBA MIRA Ltd Vehicle Proving Ground.
The test area was generally flat with a gradient not exceeding 2.5 %. It had a level hardened paved surface and was kept as clear of dust, debris, standing water, ice and snow at the time of the test, as was practicably possible.
Vehicle propulsion was by use of a computer controlled electric drum winch with guidance to the impact point by means of a tensioned wire system attached to the front wheel of the test vehicle. Both towing and guidance systems were detached approximately 3m prior to contact with the test article.

1.5 Test Procedure

Item	Requirement
Test Specification	IWA 14-1:2013
Target Speed (km/h)	48.0 +3.0 /-1.0
Target Impact Angle (deg)	90.0 ±2.0
Target test vehicle mass (kg)	1500 ±75
Product Classification	B-Foundation/Passive/Barrier
Target Impact Energy (kJ)	133.3

2 Test Set-up

2.1 Product Description

The tested item was an Inspira Protect Litter bin, manufactured by Bailey Streetscene Ltd. and installed by Trueline Midlands Ltd.

This consisted of a “One Part Anchor” core, a Bin Shell, a Back Panel, a Facia Panel and a Liner. The One Part Anchor was made up of a 100x100x8mm wall thickness SHS inside which was a 80x80x8mm wall thickness SHS welded around each end to give an overall height of 930mm. Placed over this was the Bin Shell constructed of 5mm sheet steel to form a cabinet measuring 600x480x750mm. The shell included a hinged door clad with19mm a timber panel. Screwed to the post was a formed 5mmm fascia panel and then the 120l notched liner was placed inside. The assembly conformed to supplied drawings. The installation gave the HVM post a height of 775mm above running surface. The bin was placed over the top of the post. Fixing expansion bolts were not fitted as there was no tarmac surface around the bin.

2.2 Foundation/Installation Description

The foundation construction comprised of an excavation 1300x1300x280mm with a compacted base of MOT Type 1 aggregate.

The core upright was located in a hole in a 750x750x10mm steel foundation base plate and welded from the underside. The plate and SHS steel were Grade S355JR. Around the post 4No. 650x130x10mm half lap gussets were chamfered and welded around the post, to each other and to the base plate. On the 2 sides of the base plate 100x70x10mm Levelling Plates were welded, 4No. each side, with holes through which 12mm diameter reinforcing bars with a length of 1090mm were placed. Over these a 12mm diameter reinforcing bar hoop of 1090x642mm was placed. The unit was placed on packers and levelled. Concrete then was poured to cover the top of the steel base plate. Once the concrete had set stone was placed around the installation and compacted to running surface level. Concrete mix used was C32/40 20mm aggregate with TOPROC Rapid 1 additive.

2.3 Concrete Crush Test Results

Item	Information / Measurement
Date Foundation Cast	16/03/2021 (8 days before test date)
Concrete compressive crush test results for 150mm sample (MPa). Compressive testing carried out at CTS at Doncaster UKAS Accredited Lab No. 4161 to EN12390-3: 2009 and EN12390-7: 2009.	
7 day	62.8
14 day	66.0
28 day	69.8
Test day (Day 8)	57.5

2.4 Test Vehicle Description

Item	Information / Measurement
Vehicle Make and Model	Ford Mondeo
Registration Mark and VIN	LD11GMV / WF0EXXGBBEBD82343
Engine	Diesel
Gearbox	Manual
Body Type	Hatchback
Delivery Mass (kg)	1538.5
Test Mass (kg)	1534
Test Equipment (kg), GPS, DAS, Towing & guidance	50
Components removed (kg) Rear seats and spare wheel	54.5

Test Vehicle condition	Test vehicle acquired with valid current MOT certificate. The roadworthiness of the following items was checked prior to test: Tyres and wheels, Suspension, Wheel Alignment, Bodywork, Brakes and Chassis. The engine was running for the test.

3 Test Results

3.1 General

Item	Information / Measurement
Test Number	Y0019
Test Date	24/03/2021
Impact Angle (deg)	90.4
Angle measurement method	V-Box GPS
Impact alignment (mm)	69 right
Impacted height (mm)	500
Impact velocity (km/h)	49.9
Velocity measurement method	V-Box GPS
Impact energy (kJ)	147.4
Vehicle penetration - dynamic (m)	2.2
Vehicle penetration - static (m)	2.1
Clear gap >1200mm at 600mm above ground?	No
Debris ejected?	10.5m (Detached Bin)
Vehicle immobilized?	Yes
Vehicle restrained or deflected?	Restrained

3.2 Test Sequence Description

The target impact point was the centreline of the vehicle with the centreline of the installed product.

The test vehicle impacted and the front bumper collapsed around the product. The airbags deployed and the bonnet crushed. The bin core bent rearwards, in the impact direction and the bin detached and slid along the floor. The front of the vehicle began to rise as it ran up the core post which was now exposed. The front of the vehicle continued to rise, and the rear bumper grounded causing the lower trim to detach. The rear access panel of the product and wooden trim released from under the front of the car and travelled forward in the direction of impact. The vehicle landed with the core post mid-way underneath the car, and hit the underbody forcing the car onto its steering axle and then onto its RHS wheels before coming to rest beached on top of the post.

3.3 Ambient Conditions*

Item	Measure
Rainfall (mm)+	0.0
Temperature (°C)	9.1

+ From midnight to time of test
*Weather records are not UKAS accredited

3.4 System Damage Description

The main bin structure was detached and ejected from the core post, landing 10.5m forward of the datum line with a piece of wooden trim at 7.9m and the facia panel at 5.6m. The core post was still connected to the foundation and was bent forward by 40°. The outer 100x100x8mm post had sheared through on the impact face exposing the 80x80x8mm post inside. There was some sign of movement in the surface in front of the product with slight cracking observed. Upon removal the concrete foundation below the compacted surface showed no visible signs of a cracking or damage.

3.5 Vehicle Damage Description

The front bumper was damaged. The cooling pack and radiator had been crushed and split in the centre. The slam panel was exposed, and the bonnet would not open due to deformation. All front airbags were deployed. The vehicle stopped running during test and was unable to be started post impact. The front underside of the car showed signs of contact with the post and the impact had pushed the floor pan to the rear of the passenger seat rails upwards. All four doors and boot could be opened but it was noted that the passenger seat had moved by contact with the passenger door and B -post. The rear footwell was lifted by 130mm and the centre console was pushed over into the driver's seat.

3.5.1 Assessment of Vehicle

Item	
Vehicle engine running post-test	No
Vehicle engine stopped during test but able to re-start	No
Vehicle able to move forwards/backwards post-test	No
Vehicle able to disengage from test item	No
Vehicle able to manoeuvre	No

3.6 Assessment of Occupant Injury*

Assessment of Occupant Injury was not required for this test.

4 Assessment of Performance Requirement

Item	
Vehicle prevented from advancing beyond VSB Datum	No
Vehicle redirected and kept on the non-protected side of the VSB	No
Vehicle brought to a halt beyond VSB Datum	Yes
Vehicle damaged, unable to progress under own power	Yes
Vehicle entangled with test item and unable to progress	Yes
Vehicle trapped/lifted and unable to progress	Yes

5 Conclusions

The Bailey Streetscene Ltd Inspira Protect Litterbin was assessed according to IWA 14-1:2013 and achieved the following classifications:

Product Classification	B-Foundation/Passive/Barrier
Performance Rating	IWA 14-1:2013 Barrier V/1500[M1]/48/90:2.2

6 General Comments and Disclaimers

The installation of the product was the responsibility of the product manufacturer or their representative.

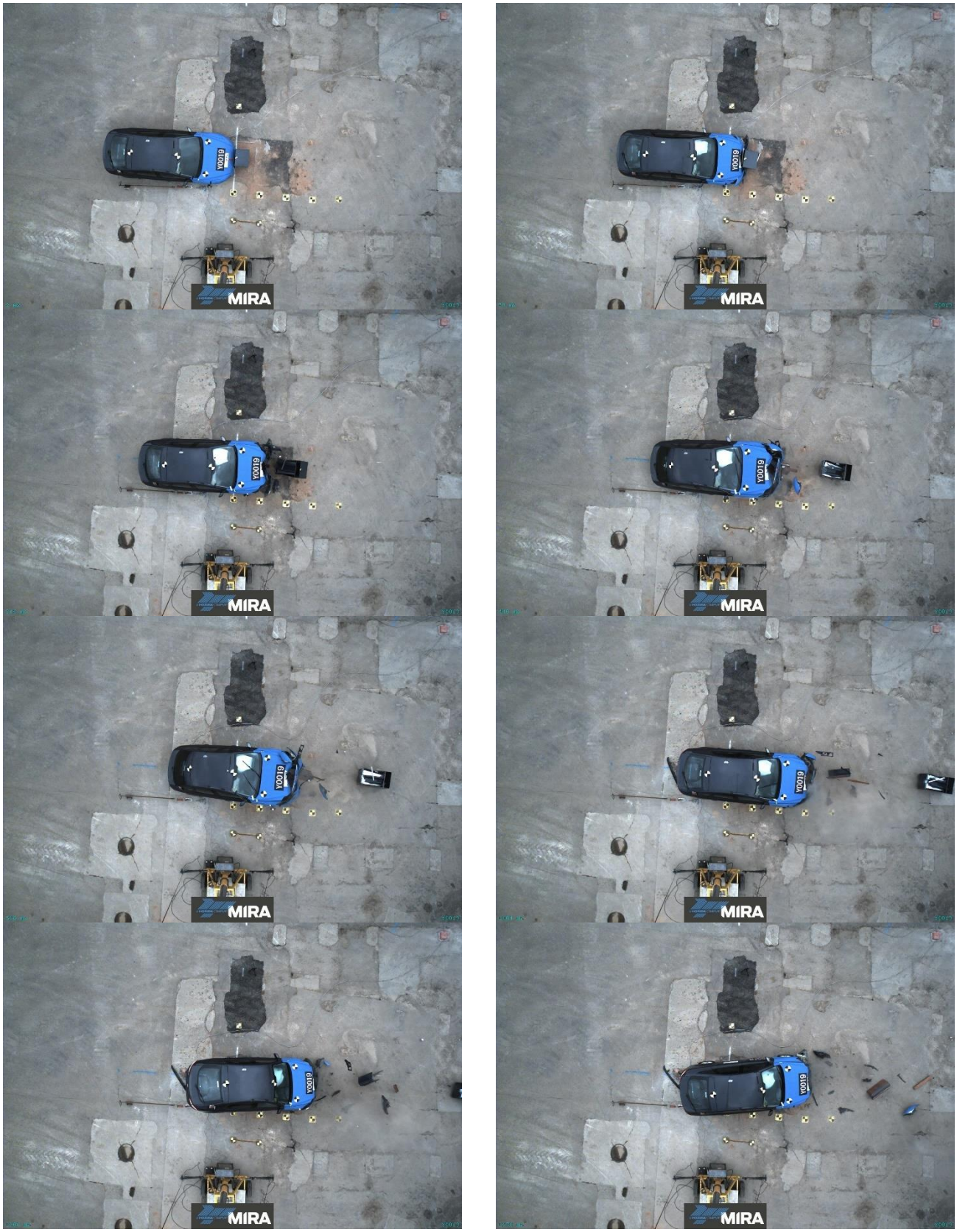
The test results in this report relate only to the product tested.

This report may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

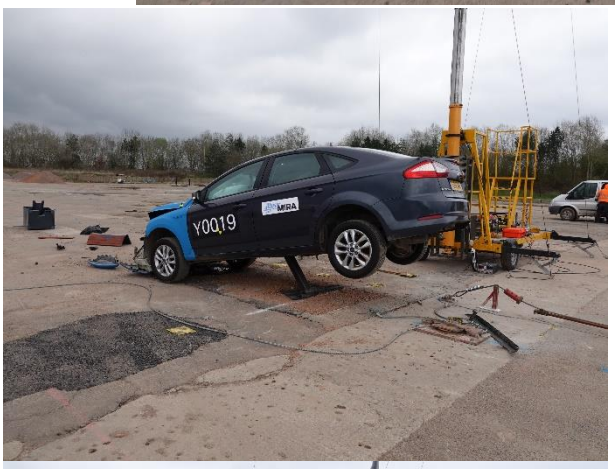
Opinions, interpretations and meteorological information included in this report are not part of the UKAS accreditation and are marked thus *.

7 Side Views from High Speed Videos

8 Overhead Views from High Speed Videos



9 Post Impact Product and Vehicle Images



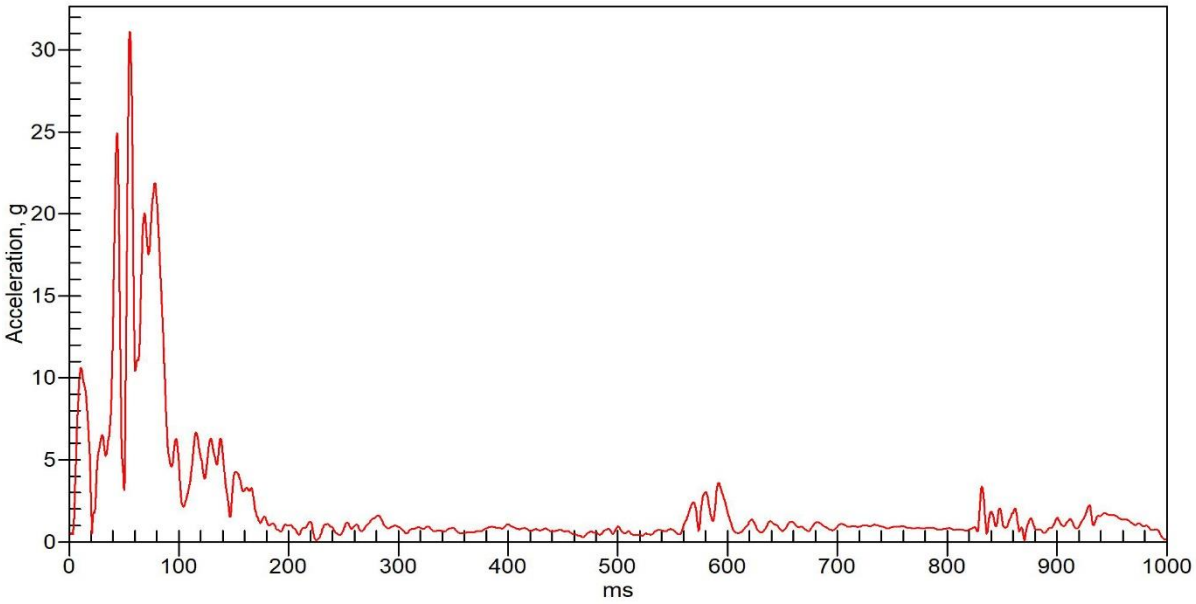
10 Data Plots from Vehicle Transducers

Test Number: Y0019
Project: 1223164-004-028

Legislation: IWA14-1:2013
Test Type: HVM-Barrier
Test Date: 2021-03-24

Vehicle 1: Vehicle CofG resultant

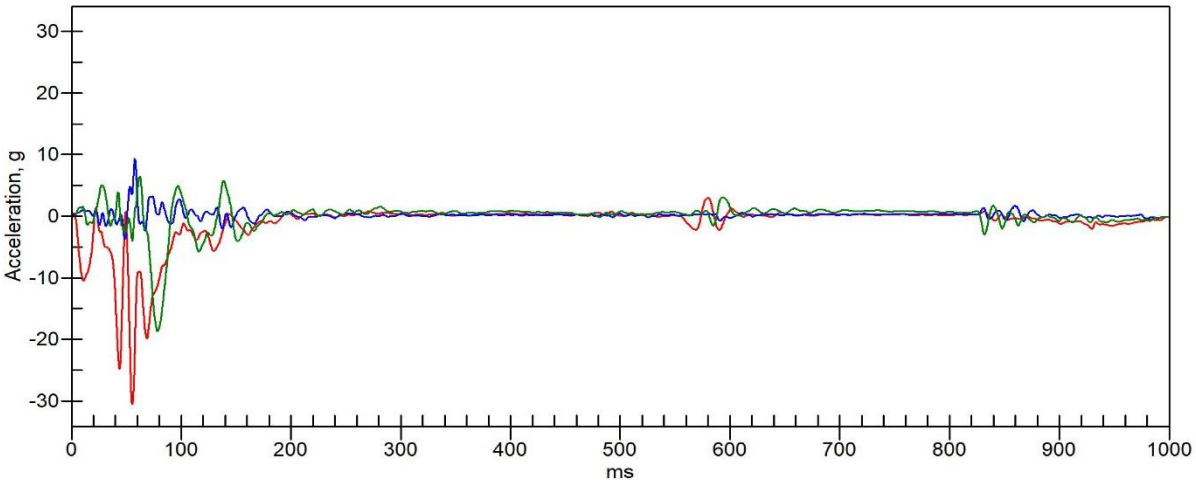
Resultant Acceleration



15VEHCCG0000ACRD
Max: 31g at 55.30ms

Component Accelerations

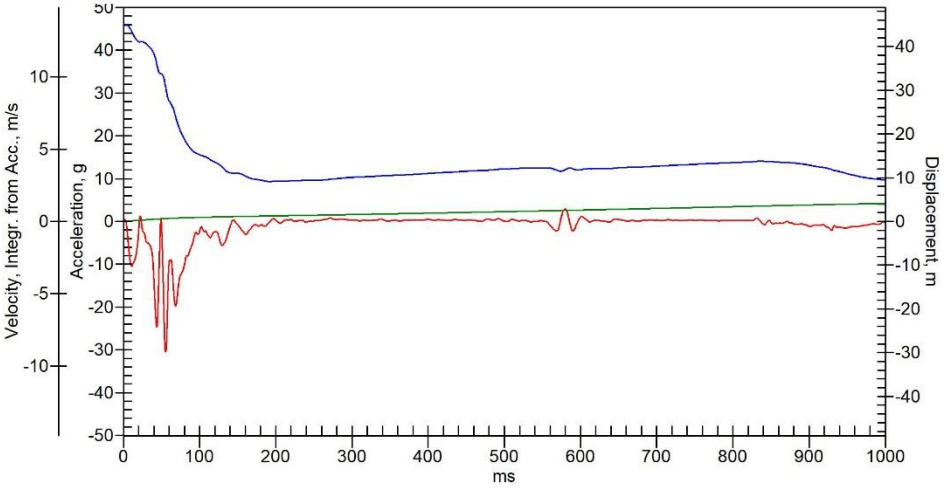
Max: 2.971g at 580.30ms, Min: -31g at 55.30ms 15VEHCCG0000ACXD
Max: 9.405g at 57.80ms, Min: -3.832g at 48.60ms 15VEHCCG0000ACYD
Max: 6.503g at 62.30ms, Min: -19g at 78.40ms 15VEHCCG0000ACZD



Test Number: Y0019
Project: 1223164-004-028

Legislation: IWA14-1:2013
Test Type: HVM-Barrier
Test Date: 2021-03-24

Vehicle 1: Vehicle CofG components



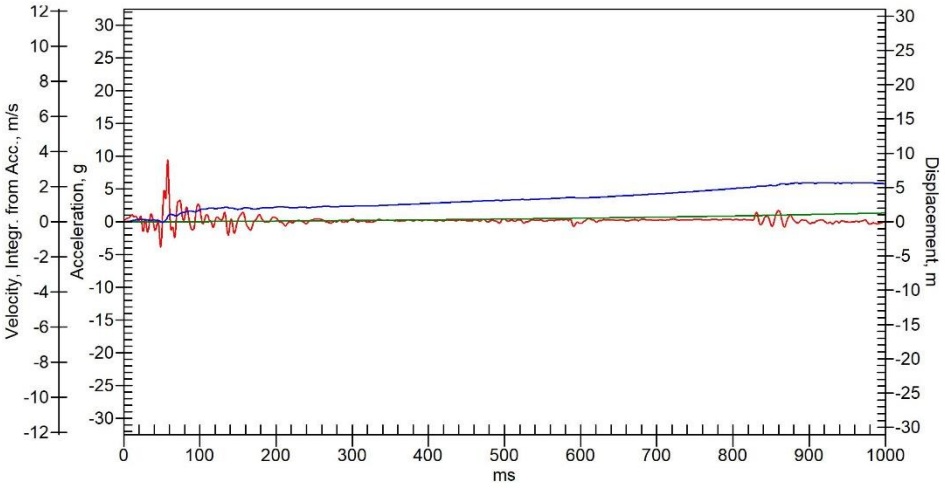
X-axis

QNo:
CAC: 2000

Acceleration
15VEHCCG0000ACXD
Max: 2.971g at 580.30ms
Min: -31g at 55.30ms

Velocity, Integr. from Acc.
15VEHCCG0000VAXD
Max: 13.58m/s at 0.00ms
Min: -10.97m/s at -5000.00ms

Displacement
15VEHCCG0000DSXD
Max: 45.50m at 1E04ms
Min: -23.58m at -2850.00ms



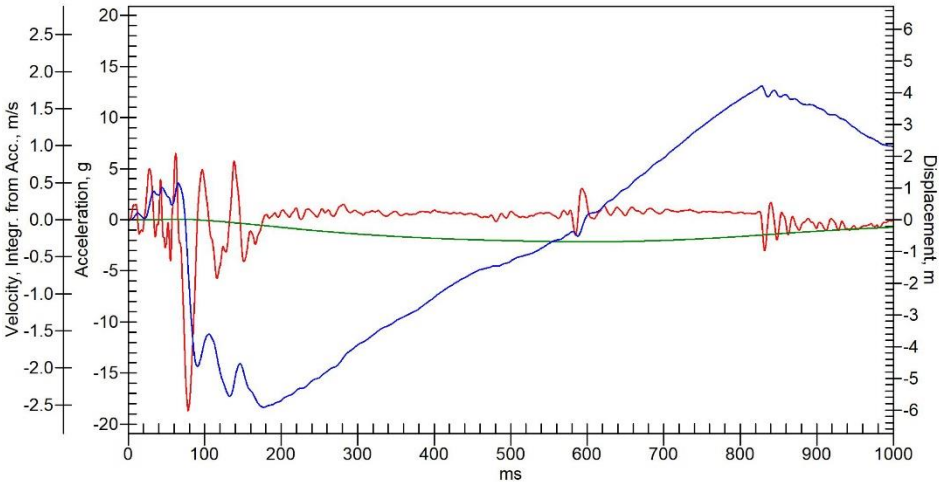
Y-axis

QNo:
CAC: 2000

Acceleration
15VEHCCG0000ACYD
Max: 9.405g at 57.80ms
Min: -3.832g at 48.60ms

Velocity, Integr. from Acc.
15VEHCCG0000VAYD
Max: 2.22m/s at 920.00ms
Min: -11.44m/s at -5000.00ms

Displacement
15VEHCCG0000DSYD
Max: 29.49m at -5000.00ms
Min: -1.67m at 1E04ms



Z-axis

QNo:
CAC: 2000

Acceleration
15VEHCCG0000ACZD
Max: 6.503g at 62.30ms
Min: -19g at 78.40ms

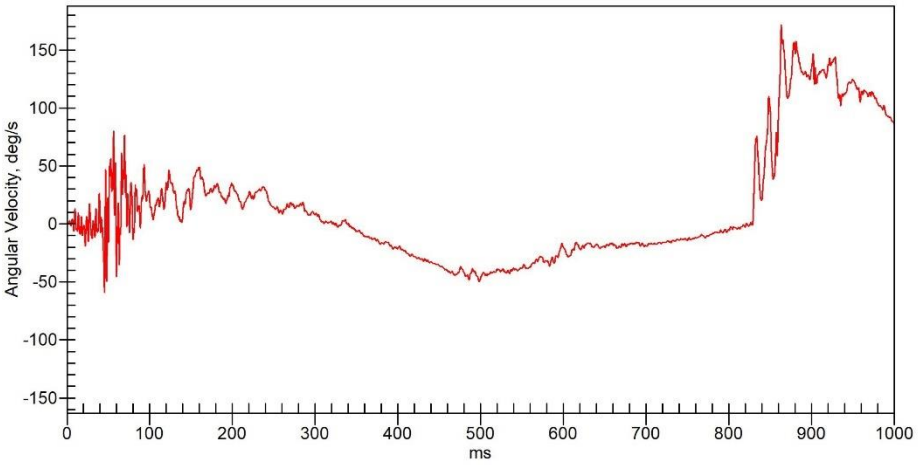
Velocity, Integr. from Acc.
15VEHCCG0000VAZD
Max: 2.63m/s at -5000.00ms
Min: -2.53m/s at 180.00ms

Displacement
15VEHCCG0000DSZD
Max: 0.42m at 7420.00ms
Min: -6.39m at -5000.00ms

Test Number: Y0019
Project: 1223164-004-028

Legislation: IWA14-1:2013
Test Type: HVM-Barrier
Test Date: 2021-03-24

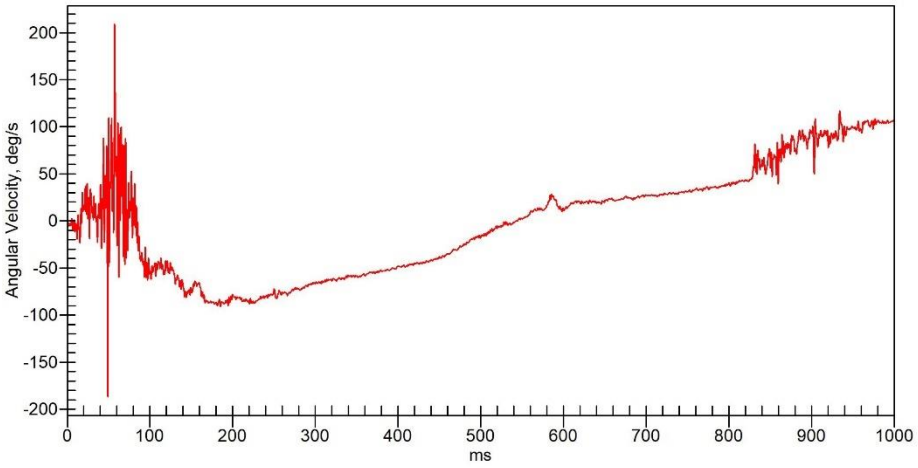
Vehicle 1: Vehicle CofG angular velocities



Vehicle CG Roll (CFC180)

QNo:
CAC: 600

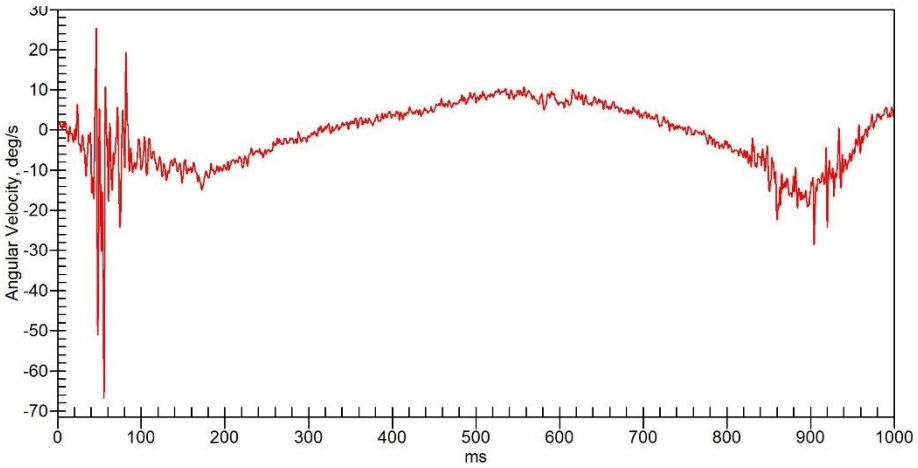
15VEHCCG0000AVXC
Max: 172deg/s at 860.00ms
Min: -147deg/s at 1250.00ms



Vehicle CG Pitch (CFC180)

QNo:
CAC: 600

15VEHCCG0000AVYC
Max: 209deg/s at 60.00ms
Min: -187deg/s at 50.00ms



Vehicle CG Yaw (CFC180)

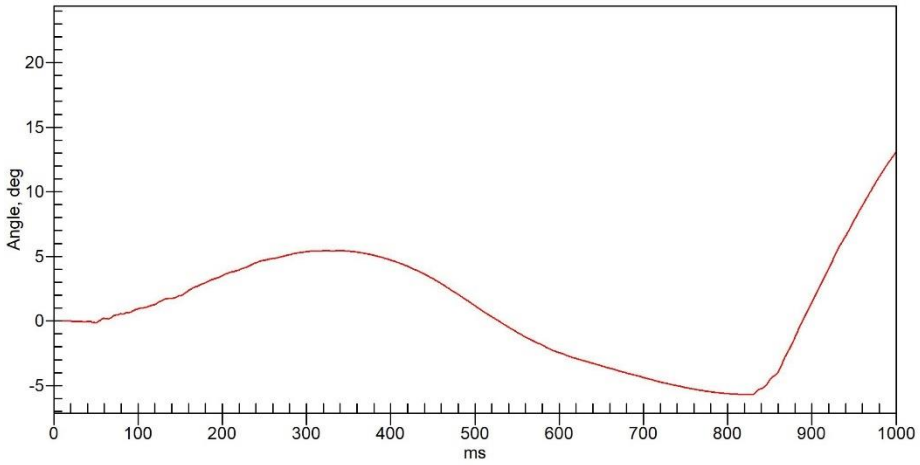
QNo:
CAC: 600

15VEHCCG0000AVZC
Max: 25deg/s at 50.00ms
Min: -67deg/s at 60.00ms

Test Number: Y0019
Project: 1223164-004-028

Legislation: IWA14-1:2013
Test Type: HVM-Barrier
Test Date: 2021-03-24

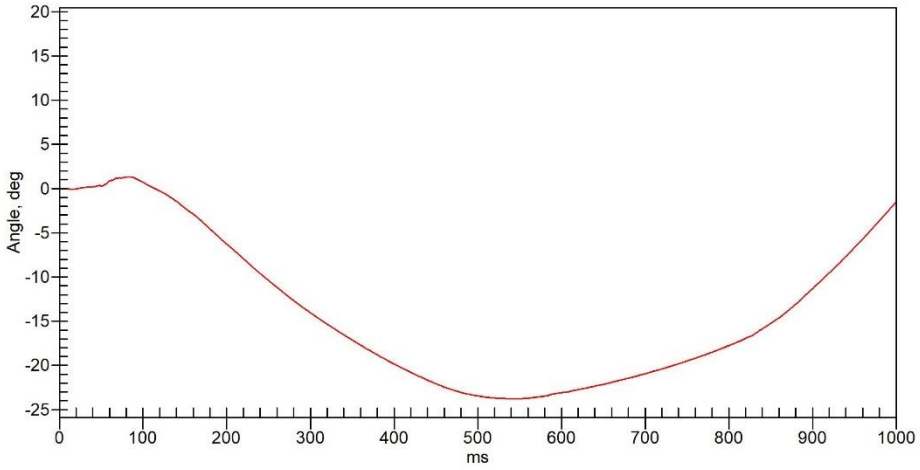
Vehicle 1: Vehicle CofG angles



Vehicle CG Roll Angle

QNo:
CAC: 600

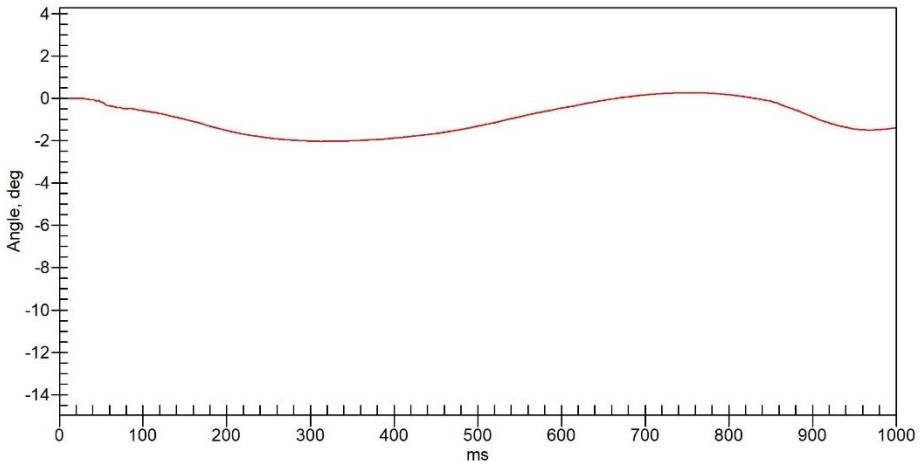
15VEHCCG0000ANXC
Max: 22.96deg at 2220.00ms
Min: -5.69deg at 830.00ms



Vehicle CG Pitch Angle

QNo:
CAC: 600

15VEHCCG0000ANYC
Max: 18.37deg at 1340.00ms
Min: -23.77deg at 540.00ms



Vehicle CG Yaw Angle

QNo:
CAC: 600

15VEHCCG0000ANZC
Max: 3.42deg at -5000.00ms
Min: -14.08deg at 1E04ms

Executive Summary

Manufacturer Details

Company Name	Bailey Streetscene Ltd
Company Address	Adlington Business Park, London Road, Adlington, Cheshire, SK104NL
Contact Name	Barrie Woodcock
Contact Email	barrie.woodcock@bsfg.co.uk

Test Item Details

Item Reference	Inspira Protect Litter Bin
Item Description	Litter Bin on HVM post
Depth/thickness (mm) "X"	1300 foundation
Width (mm) "Y"	100 post, 1300 Foundation
Height (mm) "Z"	704 post, 200 foundation
Material thickness (mm)	8 x 2 for Post
Foundation type	Depth <0.5m
Foundation depth (mm)	200
Installation Date	16/03/2021
Concrete strength	62.8 within 24hrs of test day

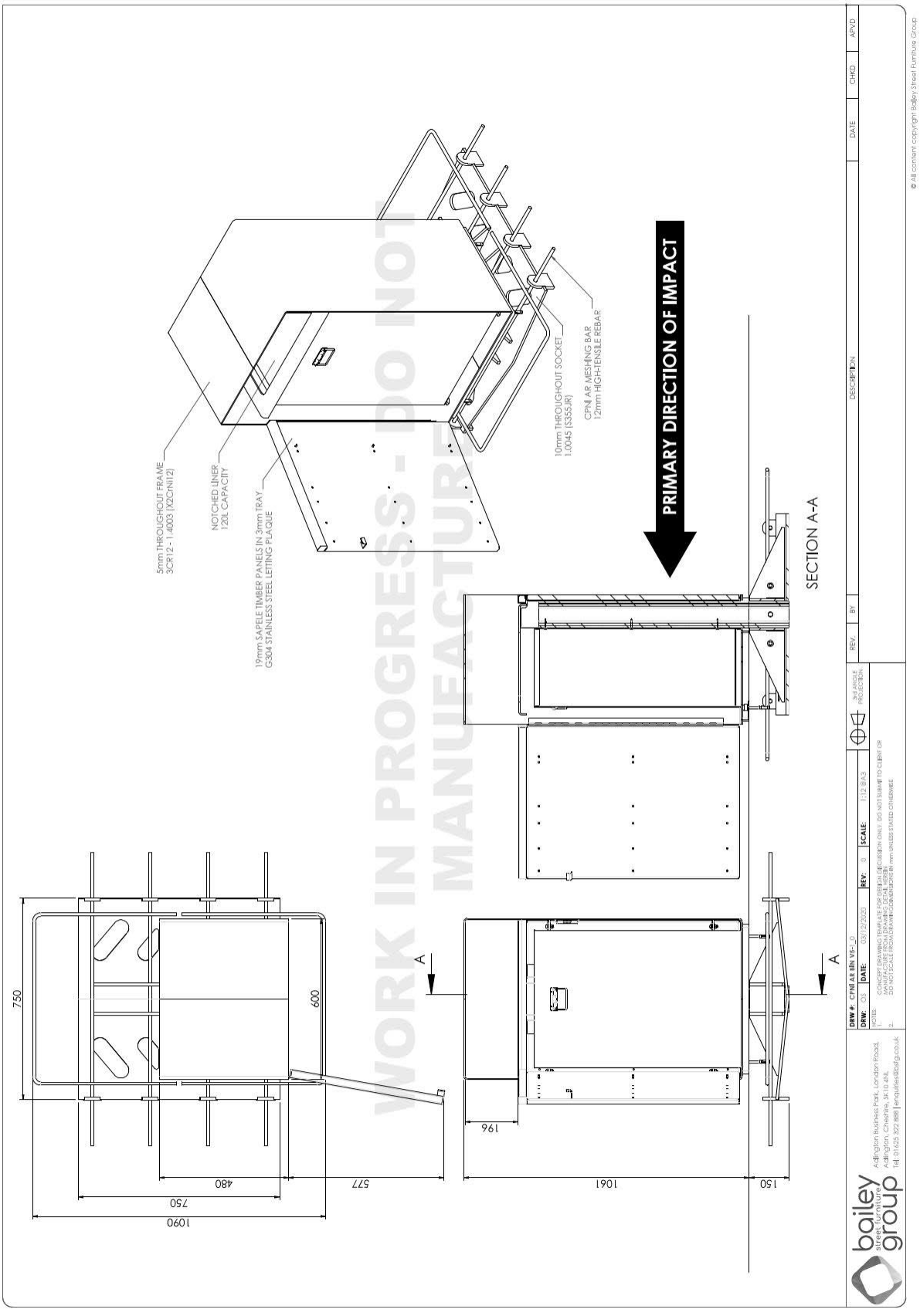
Test Parameters

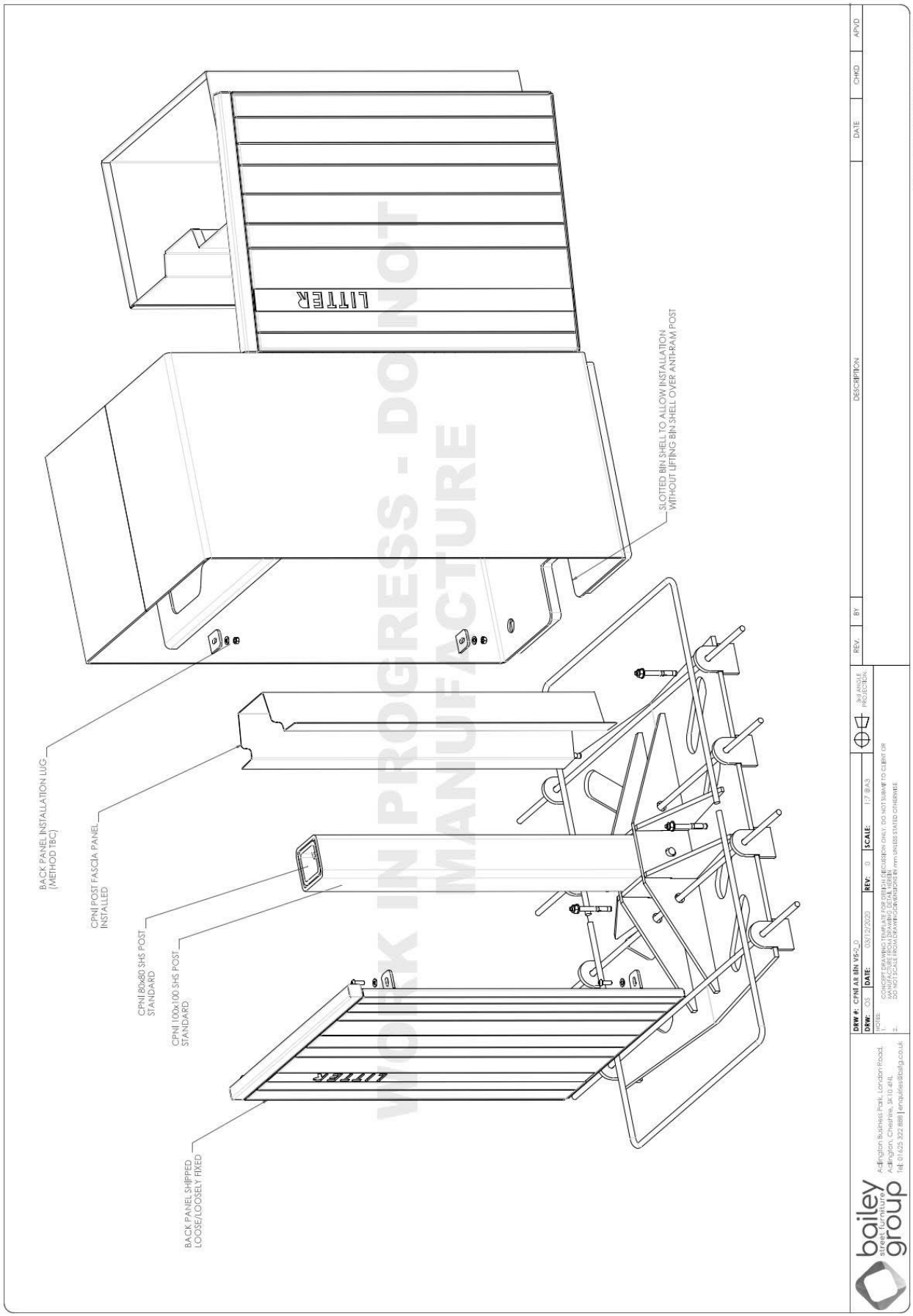
	Requirement	Measured Value
Test Vehicle category	M1	M1
Test Mass (kg)	1500 ±75	1534
Impact Speed (km/h)	48 +3/-1	49.9
Impact Angle (deg)	90 ±2	90.4
Alignment (mm)	0 ±150	69 Right
Vehicle penetration – dynamic (m)	-	2.2
Vehicle penetration – static (m)	-	2.1
Major Debris ejection distance (m)	-	10.5 (Detached bin)
Vehicle disabled?	-	Yes
Follow-on vehicle encroachment possible?	-	No
Follow-on pedestrian encroachment possible?	-	Not assessed

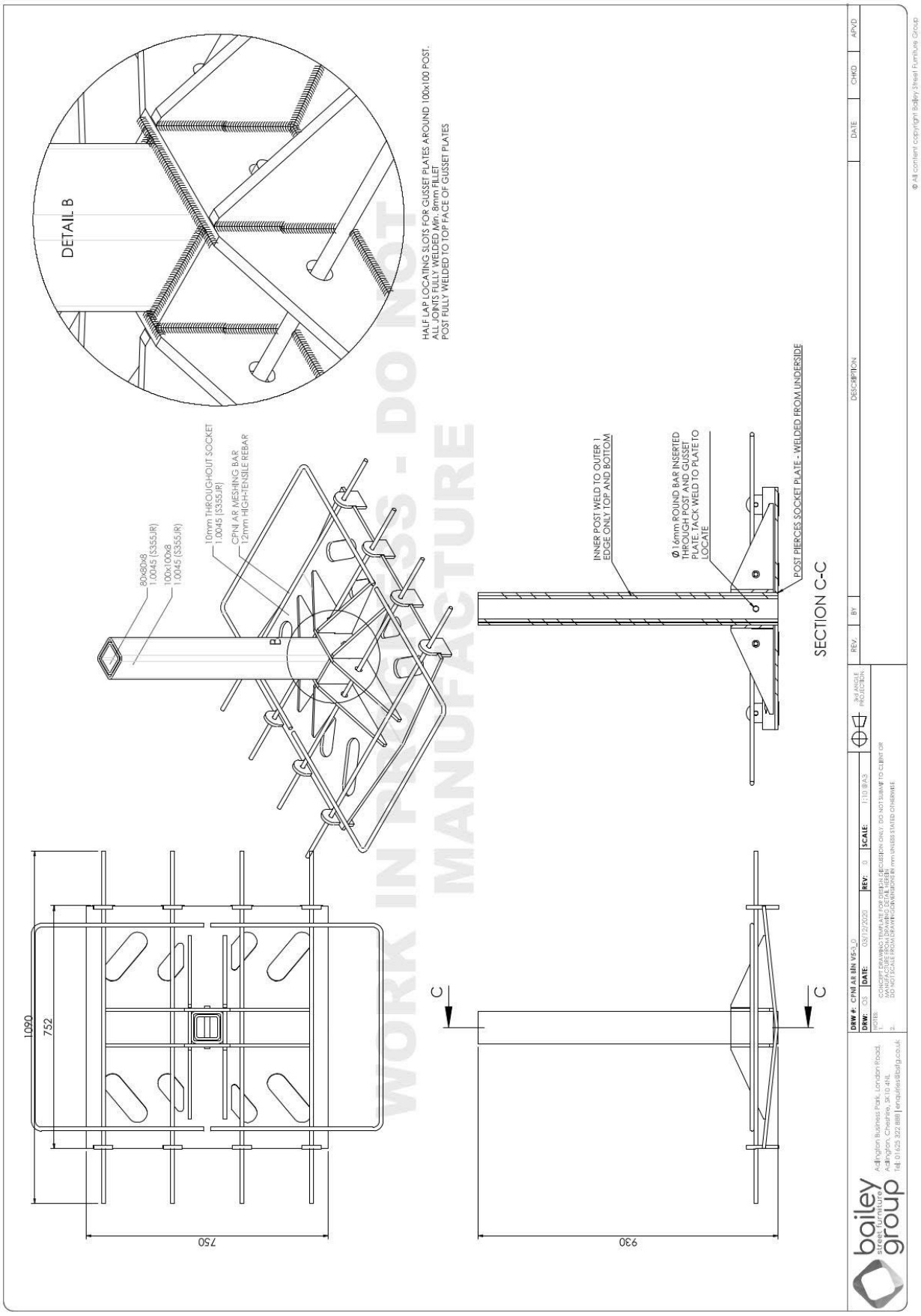
Performance Classification – Vehicle Impact

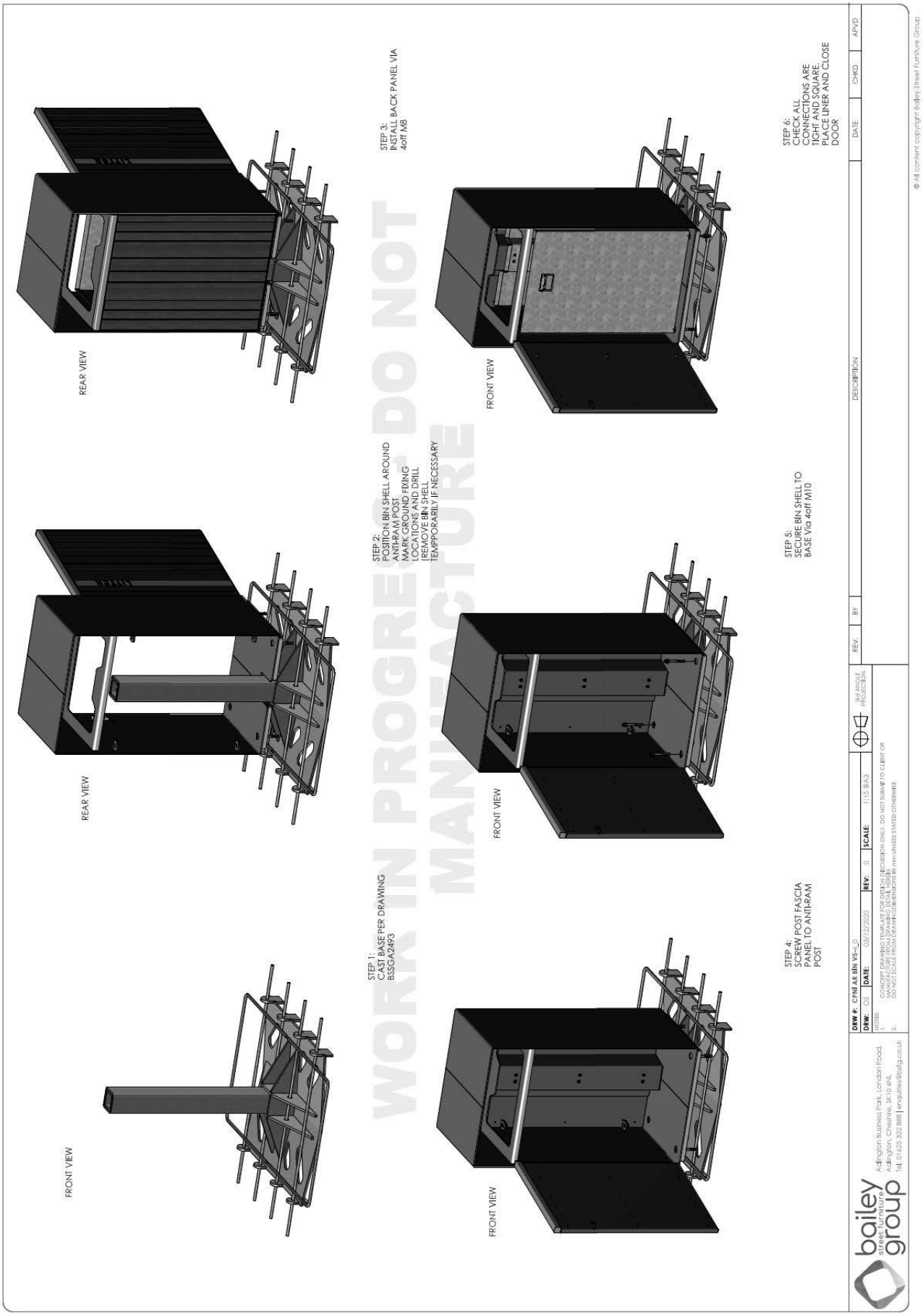
Performance classification	IWA 14-1:2013 Barrier V/1500[M1]/48/90:2.2
Product Classification	B-Foundation/Passive/Barrier

Appendix 1 Product Drawings and Details

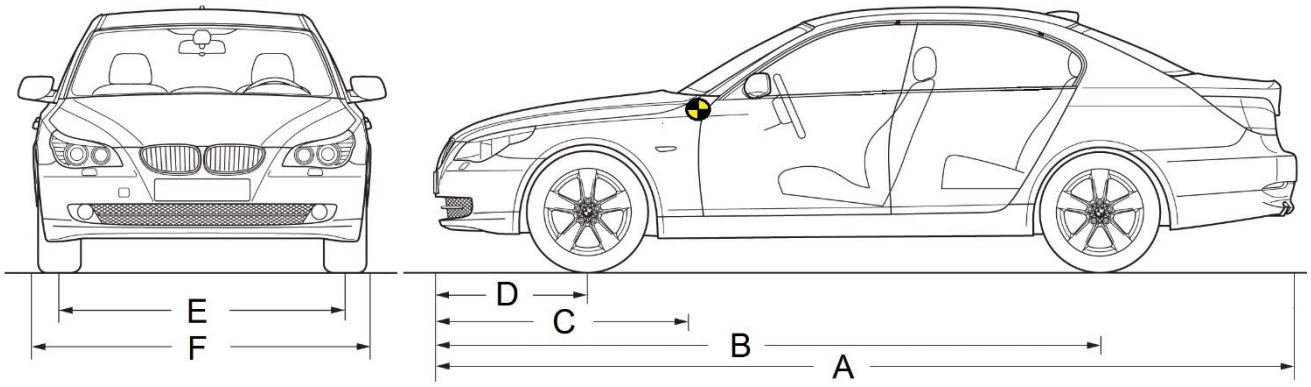



LITTER
SLOTTED BIN SHELL TO ALLOW INSTALLATION WITHOUT LIFTING BIN SHELL OVER ANTI-RAM POST
BACK PANEL INSTALLATION LUG (METHOD TBC)
CPNI POST FASCIA PANEL INSTALLED
CPNI 80x80 SHS POST STANDARD
CPNI 100x100 SHS POST STANDARD
BACK PANEL SHIPPED LOOSE/LOOSELY FIXED
WORK IN PROGRESS - DO NOT MANUFACTURE
DESCRIPTION
REV.
BY
DATE
CHKD
APVD
3rd ANGLE PROJECTION
DRW #: CPNI AR BIN V5-0_0
DRW: GS DATE: 03/12/2020 REV: 0 SCALE: 1:7.8 A3
NOTES:
1. CONCEPT DRAWING TEMPLATE FOR DEPICTION DESIGN ONLY. DO NOT SUBMIT TO CLIENT OR MANUFACTURE FROM THIS DRAWING IN ANY FORM.
2. DO NOT SCALE FROM DRAWING. DIMENSIONS IN mm UNLESS STATED OTHERWISE
bailey group
STREET FURNITURE
Adlington Business Park, London Road, Adlington, Cheshire, SK10 4NL
Tel: 01625 322 888 | enquiries@bgf.co.uk
© All content copyright Bailey Street Furniture Group





Appendix 2 Test Vehicle Details



Test Vehicle Details	
Vehicle classification	M1
Vehicle Registration No.	LD11GMV
Vehicle Identity No (VIN)	WF0EXXGBBEBD82343
Unladen Mass (kg)	1538.5
Test Inertial Mass (kg)	1534
Ballast Mass (kg)	-4.5
Number of axles x driven axle	1+1s
Tyre Size	215/55/16

Test Vehicle Measurements (mm)					
A	Vehicle overall length	4690	H	N/A	
B	Vehicle front to rearmost axle	3725	I	N/A	
C	Vehicle front to datum point	1420	J	N/A	
D	Vehicle front to front axle	850	K	N/A	
E	Front track width (between tyre centres)	1590		Centre of Gravity Longitudinal	
F	Vehicle width (excluding mirrors	1855		Centre of Gravity Lateral	
G	N/A			Centre of Gravity Vertical	

Appendix 3 Calibration Information

Instrumentation

Location	QA No	CAC	Cal Due Date
Centre of Gravity Acc X	050091	2000g	10/12/2021
Centre of Gravity Acc Y	050089	2000g	10/12/2021
Centre of Gravity Acc Z	050090	2000g	10/12/2021
Centre of Gravity Gyro Y	045066	600 deg/s	22/06/2021
Centre of Gravity Gyro X	045068	600 deg/s	23/06/2021
Centre of Gravity Gyro Z	045069	600 deg/s	22/06/2021
Vehicle CG X Backup	050086	2000g	09/12/2021
Vehicle CG Y Backup	050087	2000g	10/12/2021
Vehicle CG Z Backup	050088	2000g	10/12/2021
DTS Slice SPS00318	040611	N/A	27/11/2021

Other Tools

Item	QA No	Used for	Cal Due Date
Scales (LHF)	43053	Vehicle mass measuring	10/06/2021
Scales (RHF)	43054	Vehicle mass measuring	10/06/2021
Scales (LHR)	43055	Vehicle mass measuring	10/06/2021
Scales (RHR)	43056	Vehicle mass measuring	10/06/2021
Tape Measure	48643	Vehicle dimensions	17/06/2025
Tyre Pressure Gauge	47583	Tyre pressures	04/02/2022
Inclinometer	44613	Product and foundation angles	13/08/2021
Tape Measure	41047	Product dimensions	02/11/2022
Measuring Wheel	47365	Vehicle and debris position	17/07/2021
VBOX 3i GPS	36509	Vehicle impact speed and angle	30/03/2021

High Speed Cameras

Position	Camera QA No	Cal Due Date	Lens Type	Image Rate (pps)	X (m) to impact	Y (m) to impact	Z (m) to impact
OH Standard	41527	15/06/2021	12	500	0	0	-12.4
OH Close	41524	15/06/2021	16	500	0	0	-12.4
Side on LH	41523	15/06/2021	50	500	0	-23	-1.2
Downstream	41526	15/06/2021	Zoom	500	45	-1	-1.2
Oblique	41528	15/06/2021	50	500	12	12	-1.2

Appendix 4 Test Sign-off Sheet

Test No:	Y0019

Product Information & Documentation

In line with legislative requirements please ensure the following information is provided by completing and returning this form and supplying the requested accompanying documentation.

Client Details	
Company name:	Bailey Streetscene Ltd
Company address:	
Contact name:	Barrie Woodcock
Contact tel:	
Contact email:	barrie .woodcock@bsfg.co.uk
Product Details	
Manufacturer:	Bailey Streetscene Ltd
Unique Product Name/Designation:-	Inspira Protect Litterbin
Prototype or Production sample:	Prototype / into production if pass
What orientation is required:	90 deg
Test Details	
Legislation to be tested against:	IWA14-1:2013
Test Designation/speed class within	M1 - Car
Required Impact Speed(s):	48 +3 -1 km/h
Required Impact Angle(s):	90 +2 -2°
Required Test Vehicle:	M1 @ 1500 ±75kg

Please accompany this form with the following documentation. Please indicate below whether the documentation has been supplied, please also indicate if any information is not available or not applicable.

Product Documentation Supplied	
General Arrangement drawings (including tolerences and installation instructions):	X
Component drawings (including dimensions, tolerences and material specifications):	X
Factory Sub-assembly drawings:	x
Parts List:	X
Material specification certificates:	no
Operating Manual	no
Other relevant information (disposal/recycling, safety instructions)	n/a

Funding		Product	Install	Removal	Vehicle	Test	Report
Manufacturer		X	X	X			
3rd Party:	n/a				X	X	X
MIRA							

Test Sign-Off			
Please sign below Confirm that:-			
• The product and installation are to design intent and correct for test.			
• The target test parameters are correct.			
Comments/Agreed Deviations			
	Sign	**Print**	**Date**
On Behalf of Client:			
On Behalf of Manufacturer: (If applicable)		D. PRINGLE	24/03/2021
On behalf of HORIBA MIRA Ltd		D Johnstone	24/03/21

Test sheet sign off was agreed by email by CPNI

Appendix 5 Revision History

Report Number	Date	Comments	Sections Affected
1223164-004-028-01	26/04/2021	First Issue	n/a