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TEST REPORT

Tier8 High Security Junction Box (HSJB)

Evaluation of the HSJB in accordance with the requirements of Tier 8 Testing Methodology and Compliance Document V1.1 and selected clauses of BS EN 50131-3

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1. Test report change history

Issue	Date	Modification details
1	13 April 2026	First release

2. Introduction

The High Security Junction Box (HSJB) was designed to upgrade a standard BESA conduit box into a high security junction box with integrated tamper detection. The HSJB was fastened to the top of the conduit box and includes built-in terminal blocks that facilitate secure cable connections. It was engineered specifically for Intruder Detection System (IDS) installations conforming to Grade 3 as set out in BS EN 50131-3:2009⁴.

The object of the evaluation described in this report was to assess the performance of the HSJB against the tamper security, mechanical impact resistance and ingress protection (IP rating) requirements prescribed in Tier8 document titled Testing Methodology and Compliance Document Version 1.1¹.

The evaluation was conducted for technical assessment purposes only and does not constitute certification.

3. Origin of request

The project was undertaken at the request of Tier8., under order number PO-0004, dated 29 September 2025 under the name of 7Central Ltd. Company Reg No. 11717969.

The evaluation began in March 2026 and was completed in March 2026.

4. Manufacturers details

Applicant and the design authority

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5. Abbreviations

The following is a list of abbreviations used in this report:-

ASA	Acrylonitrile Styrene Acrylate
EOL	End of line
HSJB	High Security Junction Box
I&HAS	Intruder and hold-up alarm system
IDS	Intruder Detection System
IP	Ingress Protection
IK	Impact Protection Rating
BESA	British Engineering Standards Association

6. Equipment and documentation submitted

The test samples, supporting equipment and documentation itemised in Table 1 and Table 2 were supplied by Tier8 for the purposes of conducting this evaluation.

Table 1 – Equipment submitting for testing

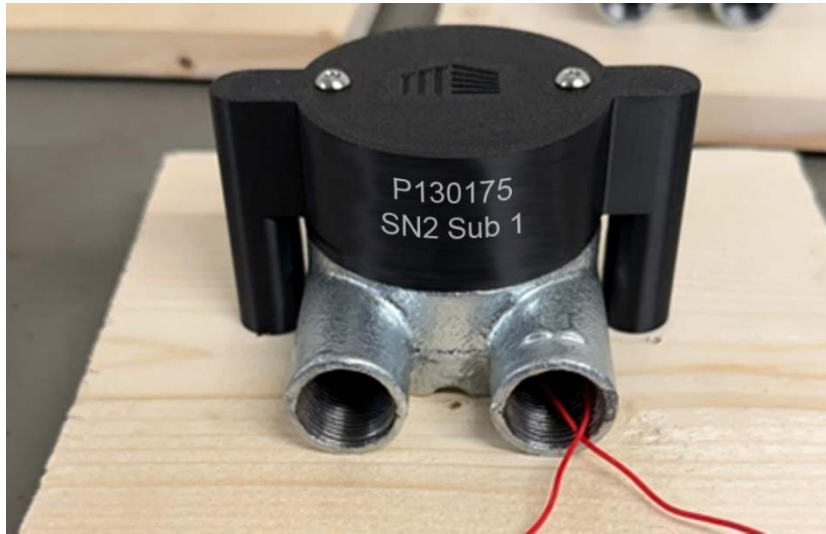
Quantity	Description
5	High Security Junction Boxes secured to a 3 way 'Y' type BESA conduit box and mounted on a wooden test board

Table 2 – Supplied Documentation

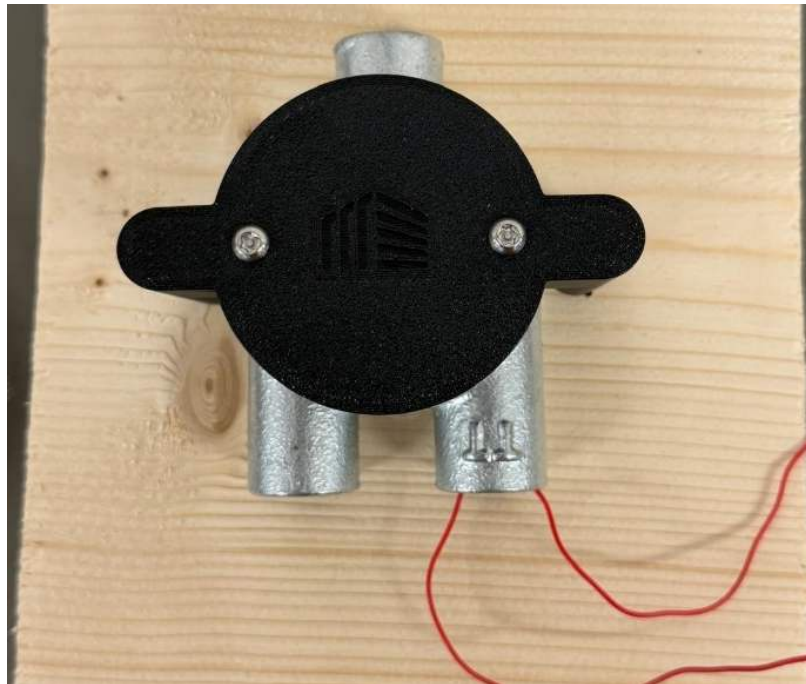
Document	Description	Revision
HSJB Manual	Testing Methodology and Compliance Document ¹	1.1

7. Photographs

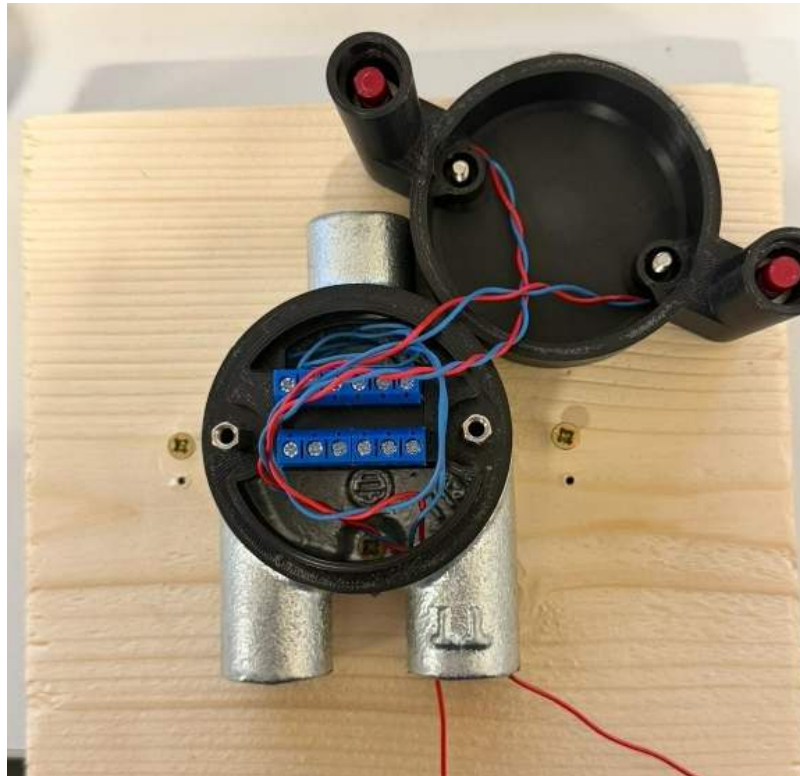
Photograph 1 Tier8 High Security Junction Box mounted, side view



Photograph 2 Tier8 High Security Junction Box mounted, top view



Photograph 3 Tier8 High Security Junction Box open showing the internal elements



8. Description of Equipment

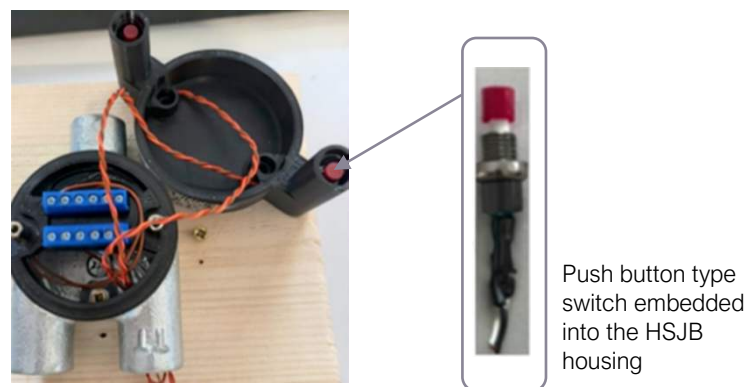
The Tier8 High Security Junction Box (HSJB) was designed to enhance the security of a standard BESA conduit box by incorporating tamper detection functionality within a protective housing.

The HSJB test sample housing was manufactured from an ASA thermoplastic polymer and mounted onto a standard 3-way 'Y' type BESA conduit box using two M3.5 tamper-resistant Torx screws (Also referred to as fasteners). The enclosure housed terminal blocks for cable terminations, ensuring that all electrical connections were contained within the tamper-protected boundary.

The device incorporates a mechanical tamper detection mechanism comprising two normally open push button type switches, that align and mate with standard No.6 countersunk head screws located in the mounting substrate. When pressed against the screwheads both switches form a closed electrical circuit. Tamper detection was activated by the removal of the HSJB housing or the separation of the whole assembly from the mounting surface causing the switches to operate and break the electrical circuit. Photograph 4.

The tamper switch circuit is intended to be connected to a supervised zone input of a Grade 3 Intruder and Hold-up Alarm System (I&HAS) control panel via an end-of-line (EOL) resistor configuration.

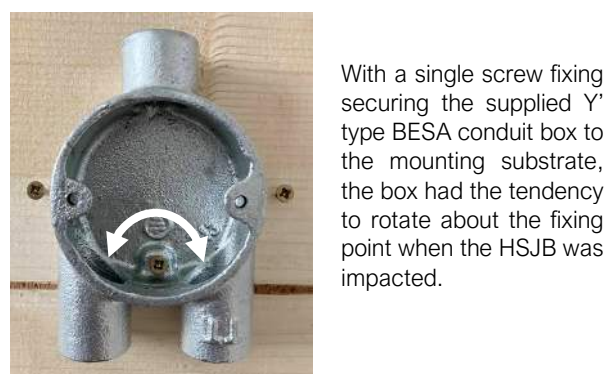
Photograph 4 Internal view showing one of the two tamper detection switches



During testing, the HSJB was mounted onto the conduit box and wooden test board except when performing the impact testing, where solid concrete block replaced the wooden test board.

The 'Y' type BESA conduit box supplied with the HSJB test samples included only a single mounting point, fastened to the mounting substrate using single fixing screw. During the impact testing the conduit box had a tendency to rotate around the fixing screw, which may have influenced the result. In a normal installation threaded steel conduit pipe would provide additional support to prevent movement of the conduit box.

Photograph 5 'Y' type BESA conduit box single fixing point



9. Test Programme

The test programme applied to the Tier8 was limited to the specific tests itemised in Table 3 as prescribed by Tier8 document titled Testing Methodology and Compliance Document¹ and in accordance with BRE Global Ltd Test Schedule P130175².

Table 3 - Test programme

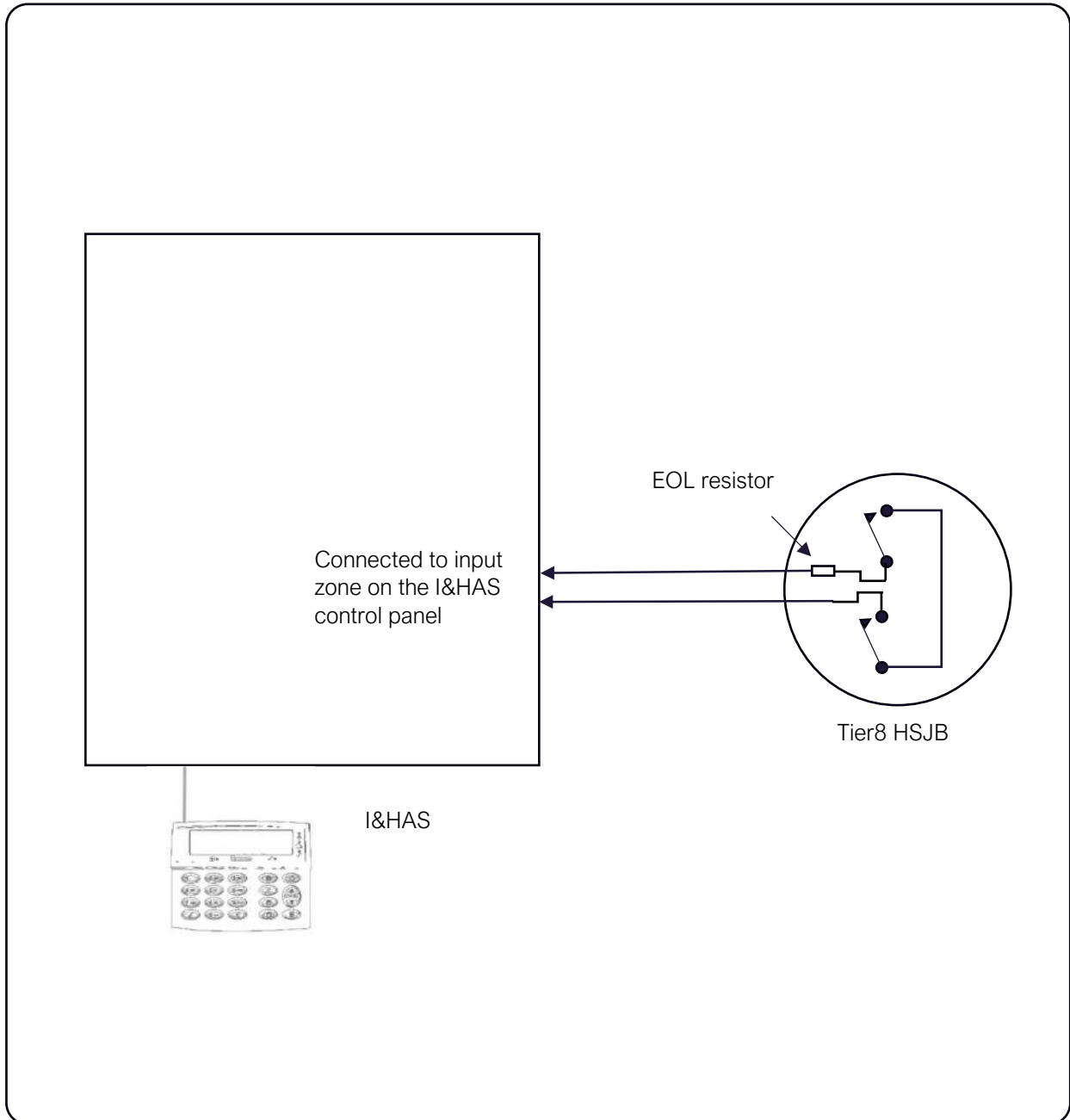
Clause	Description	Tier8 HSJB
BS EN 50131-3: 2009⁴		
8.7	Tamper security (detection/protection)	✓
8.7.1	Tamper protection [test 11.8.2]	✓
8.7.2	Tamper detection	
8.7.2.1	Access to the inside of the housing [test 11.8.3]	✓
8.7.2.2	Removal from mounting [test 11.8.4]	✓
BS EN 62262:2002+A1:2021⁵		
	Impact protection rating IK08 ^(a)	✓
BS EN 60529:1992+A2:2013⁶		
	Ingress protection rating IP40	✓

Table Notes

^(a) The impact test specified in both BS EN 50131-3⁴ and the Tier8 Testing Methodology and Compliance Document¹ referred to classification IK08 and the application of 5 Joule impacts using the method as described in BS EN 62262⁵. However, due to supply problems obtaining the specific design of 5 Joule strike element detailed in BS EN 62262⁵ it was agreed between Tier8 (customer) and BRE Global Ltd.(test house) a steel sphere of 50mm diameter and 511g in weight would be used as a suitable alternative. The drop height was adjusted prior to the test to provide potential energy at the point of impact of 5 joules.

10. Test Configuration

Figure 1 Tier8 HSJB connected to a Grade 3 I&HAS control panel



11. Results summary

A Summary of the test results is provided in Table 4

Table 4 - Results summary

Test	Reference	Result
Tamper Security (Detection/Protection)	cl.8.7 of BS EN 50131-3	PASS
Tamper Protection	cl.8.7.1 of BS EN 50131-3	PASS
Tamper detection – Access to the inside of housing	cl.8.7.2.1 of BS EN 50131-3	PASS
Tamper detection – Removal from mounting	cl.8.7.2.2 of BS EN 50131-3	PASS
Impact tests	-----	PASS
Ingress protection (IP40)	cl.13.2 of BS EN 60529	PASS

11.1 Tamper Security (Detection/Protection)

Test procedure

The Tier8 HSJB was evaluated by visual examination for compliance with the requirements of the Tamper Security of clause 8.7 of BS EN 50131-3⁴.

Observations

The terminations provided by the HSJB for use with the BESA conduit box were contained within the tamper protection boundary of the HSJB housing.

For the purposes of applying the tamper protection and tamper detection requirements in the context of this evaluation, the HSJB was categorised in accordance with in BS EN 50131-3⁴ requirements as: Type B ancillary equipment: Access to internal elements resulting from damage to the housing could enable the status of any part of the I&HAS to be changed or prevent the initiation of mandatory notification.

Assessment

The Tier8 HSJB met the requirements BS EN 50131-3⁴ clause 8.7 commensurate with Type B equipment.

11.2 Tamper Protection

Test procedure

The Tier8 HSJB was evaluated by inspection and test for compliance with the requirements of the Tamper Security of clause 8.7.1 of BS EN 50131-3⁴ using the test method described in clause 11.8.2 and modified by the corresponding section of Tier8 document Testing Methodology and Compliance Document Version 1.1¹.

The HSJB was mounted onto the Y type 3-way conduit box and the conduit box secured to a solid concrete block as described in Section 11.4 of this report.

The tamper circuit of the HSJB was connected to an input zone of a I&HAS control panel and monitored throughout the conditioning.

A functional test performed before and after the impact conditioning confirmed the HSJB was operating correctly.

Observations

The construction of the Tier8 HSJB housing met the tamper protection requirements of BS EN 50131-3⁴ determined by visual examination, i.e. All terminals were located within component housing and access to the internal elements of by normal means shall require the use of a tool, i.e. Torx driver suitable for use with tamper-resistant screws.

The construction of the Tier8 HSJB housing also met the impact 5 Joules requirements of BS EN 50131-3⁴ as appropriate to Type B ancillary equipment enclosures suitable for use with Grade 3 I&HAS. Refer to Section 11.4. The HSJB housings generally remained intact and mechanically secure and was not possible to insert the 1mm probe. On occasions where damaged was sustained a tamper alarm was generated before unauthorised access to the internal elements was possible.

Unless permanently damaged the HSJB the tamper detection device continued to function correctly after the entire series of impact conditioning.

Assessment

The Tier8 HSJB met the requirements of BS EN 50131-3 clause 8.7.1 and the corresponding section of Tier8 document Testing Methodology and Compliance Document Version 1.1¹.

11.3 Tamper Detection

11.3.1. Access to the inside of housing

Test procedure

The Tier8 HSJB was evaluated by inspection and test for compliance with the requirements of the Tamper Security of clause 8.7.2.1 of BS EN 50131-3⁴ using the test method described clause 11.8.3. and modified by the corresponding section of Tier8 document Testing Methodology and Compliance Document Version 1.1¹.

The HSJB was mounted onto the Y type 3-way conduit box, securely fixed to the wooden test board. The housing was fully assembled with the cover and fasteners secured.

The tamper circuit of the HSJB was connected to an input zone of a I&HAS control panel and monitored throughout the conditioning.

The HSJB housing was opened by normal means and attempts made to introduce the tools listed below (as specified in Table 9 of BS EN 50131-3⁴) into the HSJB housing without causing physical damage prior to the tamper detection device operating. Attempts were limited to 5 minutes each.

1 mm Ø Steel rod^(b)

5 x 0,5 x 300 mm flat bar

1 mm Ø x 300 mm Steel wire of tensile strength 650 - 825 MPa

^(b) The 1 mm Ø Steel rod was applied in accordance the probe and method described in BS EN 60529. Section 11.5 refers.

Observations

Unless creating obvious visible damage opening the HSJB housing by normal means was only possible by removing the M3.5 housing cover Torx screws.

Opening by normal means i.e. by removal of the two cover Torx screws securing the HSJB to the BESA conduit box, and lifting the housing cover to create an opening in which to insert a tool, immediately generated a tamper signal which was notified by the connected I&HAS control panel.

When fitted to a conduit box the construction of the Tier8 HSJB housing did not permit the introduction of any of the prescribed tools.

Assessment

The Tier8 HSJB met the requirements BS EN 50131-3⁴ clause 8.7.2.1 and the corresponding section of Tier8 document Testing Methodology and Compliance Document Version 1.1¹.

11.3.2. Removal from mounting

Test procedure

The Tier8 HSJB was evaluated by inspection and test for compliance with the requirements of the clause 8.7.2.2 of BS EN 50131-3⁴ Removal from mounting using the test method described clause 11.8.4 and modified by the corresponding section of Tier8 document 'Testing Methodology and Compliance Document Version 1.1'.

The HSJB was mounted onto the Y type 3-way conduit box, and placed on the wooden test board (i.e. with the fixing screw removed). The housing was fully assembled with the housing cover and fasteners secured.

The tamper circuit of the HSJB was connected to an input zone of a I&HAS control panel and monitored throughout the conditioning.

Using the tools specified in clause 8.7.2.2 attempts were made defeat the removal from mounting detection.

Observations

Lifting the HSJB from the wooden test board in a perpendicular direction to the mounting surface by a distance of 1mm created a tamper signal instantaneously which was notified by the connected I&HAS panel.

It was not possible to defeat the removal from mounting detection by sliding a 25 x 1 x 300 mm blade between the mounting surface and the HSJB. Nor was it possible to use pliers (of thickness 5 mm and reach 150 mm) to prevent the removal from mounting detection.

Note: The sensitivity of the tamper detection could be adjusted by altering the depth by which the tamper actuator screws were inserted into the mounting surface. Through exploratory testing it was found possible to trigger a tamper signal with movement of less than 1 mm whilst the HSJB remained immune to deliberate attempts to create a tamper by flexing or distorting the housing.

Assessment

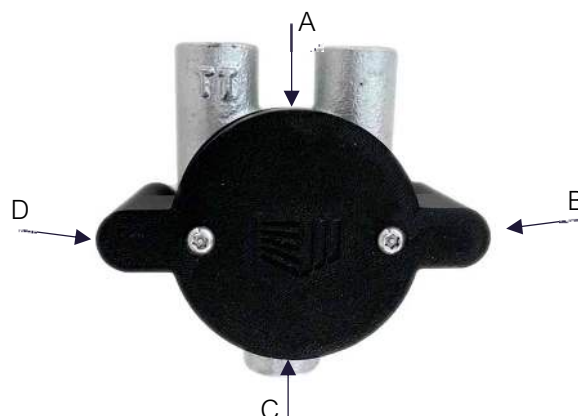
The Tier8 HSJB met the requirements BS EN 50131-3⁴ clause 8.7.2.2 and the corresponding section of Tier8 document Testing Methodology and Compliance Document Version 1.1¹.

11.4 Impact tests

Test procedure

The Tier8 HSJB was subject to a series of 5 Joule impacts commensurate with IK08 by dropping a 50 mm diameter steel sphere weighing 511 g from a height of 0.997 m onto preselected locations on the HSJB housing. Where possible a total of 5 impacts were applied to each face with a maximum of 3 impacts at any single point in accordance with the requirements of BS EN 62262 and the Tier8 Testing Methodology and Compliance Document¹. See Figure 2.

Figure 2 Impact surfaces



The drop height to provide a potential energy of 5 Joules at the point of impact was determined as follows:

$$\begin{aligned} PE &= mgh \\ &= 0.511 \text{ Kg} \times 9.81 \text{ m/s}^2 \times 0.92 \text{ m} \times 0.997 \text{ m} \\ &= 5 \text{ J} \end{aligned}$$

Where, PE= Potential Energy, m = mass, g = gravity, h = height

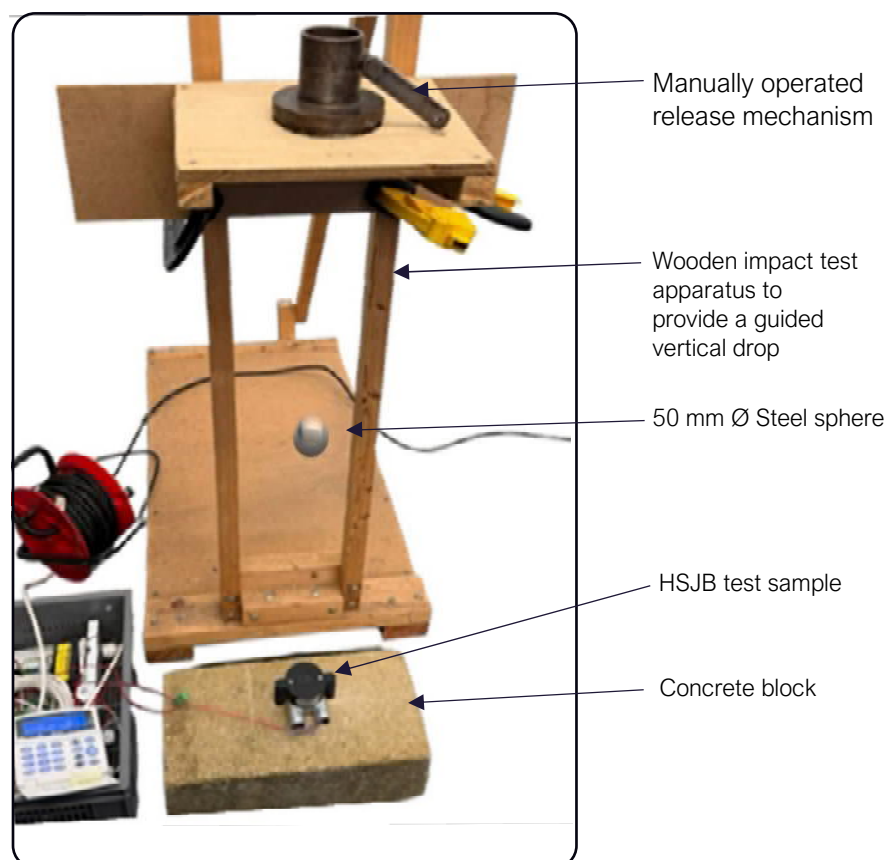
The HSJB test sample and conduit box were removed from the wooden test board and mounted according to the manufacturer's installation instructions on to a solid concrete block to ensure the full impact energy was absorbed by the HSJB.

The tamper detection circuit of the HSJB was connected to the input of a I&HAS control panel and monitored throughout the conditioning. Note. A I&HAS control panel was chosen over the multimeter described in Section 3 of the Tier8 document Testing Methodology and Compliance Document Version 1.1¹ because it was representative of the response time of an alarm input circuit compliant with BS EN 50131-3⁴.

Impacts were applied using a guided vertical drop method to ensure consistent impact energy and repeatability. As this was bespoke one-off project a wooden impact test apparatus was constructed. The steel sphere was dropped via a manually operated release mechanism from the controlled height to strike the preselected points on the HSJB enclosure. Care was taken to ensure perpendicular impact to the surface at each location. Figure 3.

Impacts were applied to each accessible surface which included the sides and top of the HSJB test sample. Access to the accessible surfaces was achieved by rotating the orientation of the concrete block to which the HSJB test sample was attached, relative to guided vertical drop test apparatus.

Figure 3 Impact test apparatus.



Unless permanently damaged by the steel sphere, each HSJB test sample was checked for correction operation after the impact and examined externally and internally for visible signs of damage.

Observations

Impacts to the top surface

Impacts to the top surface of the HSJB housing at points 1 to 5 shown in Figure 4 had no notable effects. An additional impact was made to one of the HSJB torx retaining screws (point 6), again with no notable effect. No tamper alarm signals were recorded during or after the application of the impacts.

There were no visible signs of cracking or structural failure of the plastic housing after the impacts. Close visual inspection revealed only superficial damage which amounted to slight indentations to the HSJB housing coincident with the points of impact, Figure 5.

Figure 4 Impacts to the top surface

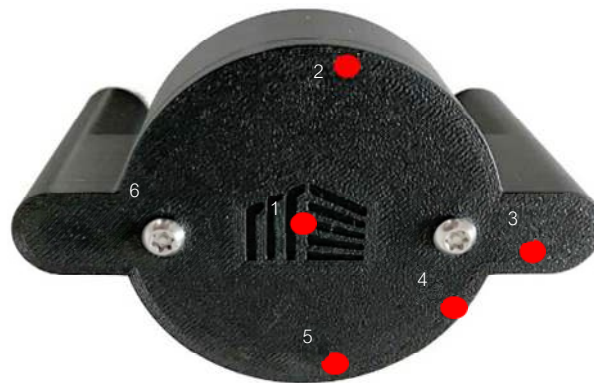


Figure 5 Superficial damage slight indentations to the HSJB housing



Impacts to surface A

Initially the third impact at point 1 shown in Figure 6 caused the single securing screw of the conduit box to detach from the concrete block resulting in the whole assembly including the HSJB and conduit box separating from the mounting surface. In response the HSJB generated a tamper signal. To prevent the conduit box separating from the mounting surface the fixing screw supplied with the test samples was replaced by one of a greater length.

The third impact at point 2 generated a momentary tamper signal.

A single impact at point 3 generated a momentary tamper signal. The impact caused the conduit box to rotate about its fixing and as result the HSJB housing split along a layer line of the 3D print at the point where the tamper detection leg of the housing was extruded from the main body of the HSJB, Figure 7.

Similarly, a single impact at point 4 generated a momentary tamper signal and the conduit box rotated, resulting the HSJB housing splitting along a layer line of the 3D print, Figure 7.

Figure 6 Impacts to surface A

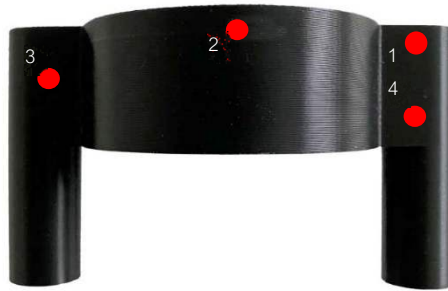
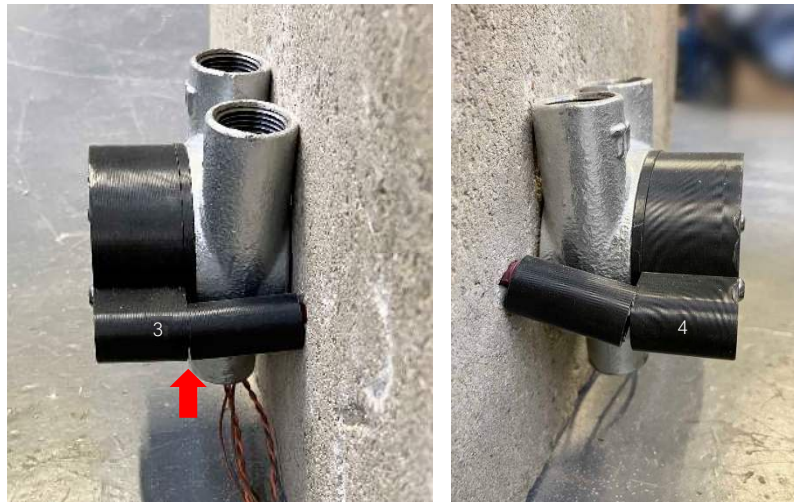


Figure 7 The HSJB housing splitting along a layer line of the 3D print



Although the support legs of the HSJB had been damaged and allowed access to the pushbutton tamper switches, tamper alarms had been notified at the connected I&HAS control panel before access to internal elements was possible.

Impacts to surface B

Following two impacts at point 1 shown in Figure 8, damage occurred to the push-button switch located inside the HSJB housing on the opposite side to the impact point. The cap of the push-button switch broke off, which resulted in the generation of a tamper signal, Figure 9.

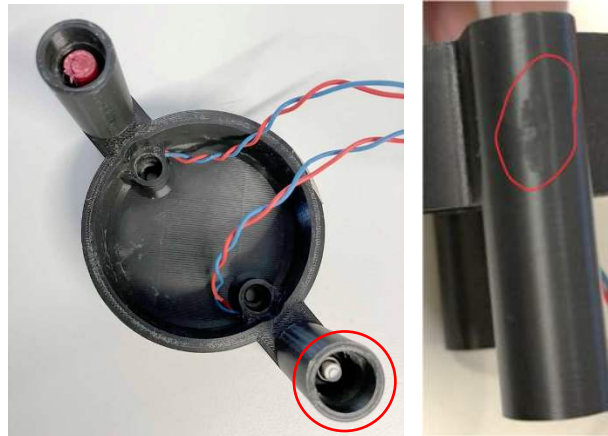
There were no visible signs of cracking or structural failure of the plastic housing after the impact. Close visual inspection revealed only superficial damage which amounted to slight indentations to the HSJB housing coincident with the points of impact.

Access to internal elements of HSJB remained mechanically secure.

Figure 8 Impacts to surface B



Figure 9 Damage to the push-button switch and slight scratching to the HSJB housing



Impacts to surface C

The third impact at point 1 shown in Figure 10 generated a momentary tamper signal.

Impacts at points 2 and 3 had no notable effects. There were no visible signs of cracking or structural failure of the plastic housing after the impacts. Close visual inspection revealed only superficial damage which amounted to slight scratching to the HSJB housing coincident with the point of impact at point 1, Figure 11.

Access to internal elements of HSJB remained mechanically secure.

Figure 10 Impacts to surface C

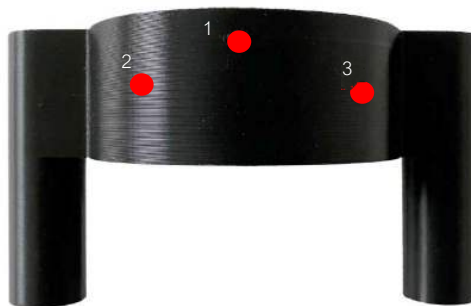


Figure 11 Superficial damage - slight scratch to the HSJB housing



Impacts to surface D

An impact at point 1 shown in Figure 12, created similar damage to the push-button switch located inside the HSJB housing on the opposite side to the impact point as described in the test for impacts to surface B. Figure 9 refers. The cap of the push-button switch broke off, which resulted in the generation of a tamper signal.

There were no visible signs of cracking or structural failure of the plastic housing after the impact. Close visual inspection revealed only superficial damage which amounted to slight indentations to the HSJB housing coincident with the points of impact.

Figure 12 Impacts to surface D



Assessment

Impacts to the top surface of the HSJB housing had no notable effects.

Impacts applied to the centres of side surface labelled A and C had no notable effects except a tamper alarm was notified at the connected I&HAS control panel on the third impact to surface C.

Permanent damage was sustained when the steel sphere struck the support legs of the HSJB housing during the applied impacts of surfaces A, B, and D. In each instance a tamper alarm was notified at the connected I&HAS control panel before unauthorised access to internal elements was possible.

Based on the above results it was concluded that the Tier8 HSJB met the requirements of the impact test as prescribed by BS EN 50131-3 Clause 8.7.1 for Type B ancillary equipment.

11.5 Ingress Protection

Test procedure

The test was conducted in accordance with the requirements of IP40 as described by clause 5.2 Protection of foreign objects using the test conditions of clause 13.2 of BS EN 60529.

The HSJB was mounted onto the Y type 3-way conduit box that was securely fixed to the wooden test board. The housing was fully assembled with all covers and fasteners secured.

The test probe was applied with force of 1 Newton (N) to all accessible surfaces, seams, and potential entry points of the HSJB for a duration of 20s at each location.

Observations

It was not possible to insert the 1 mm diameter object probe into the HSJB housing when applying a force of 1N.

When installed there were no gaps or apertures in the Tier8 HSJB housing or gaps between mating surfaces with the conduit box.

Note: During testing the entry/exit points of the conduit box were open. In service threaded steel conduit pipes would be fitted to the entry/exit points, therefore for the purposes of the test the entry/exit points were excluded.

Assessment

Tier8 HSJB met the ingress protection requirements of IP 40 when mounted on a BESA conduit box.

The test probe did not penetrate the housing.

12. Conclusion

The Tier8 High Security Junction Box demonstrated compliance with the following tests as prescribed by the Tier8 Testing Methodology and Compliance Document¹ and the corresponding clauses of BS EN 50131-3⁴ commensurate with security Grade 3

- Tamper Protection (Cl. 8.7.1)
- Impact test (5Joules)
- Tamper detection – Access to the inside of housing (Cl. 8.7.2.1)
- Tamper detection – Removal from mounting (Cl. 8.7.2.2)
- Ingress protection (IP40)

The evaluation identified that the HSJB provides effective tamper protection and tamper detection when installed in accordance with the intended application.

During impact testing, the HSJB enclosure generally remained intact and mechanically secure. On occasions where damage was sustained a tamper alarm was generated before unauthorised access to the internal elements was possible.

The mounting arrangement of a single fixing of the conduit box influenced the mechanical stability under impact conditions. Initially resulting in the detachment of the entire assembly from the mounting surface, and may have contributed to the damage sustained by the support legs of the HSJB. In all instances the tamper detection function operated correctly in response.

13. References

1. Tier8 Testing Methodology and Compliance Document – Product: HSJB (High Security Junction Box) Version 1.1. Dated 23 January 2026. www.Tier8.co.uk.
2. BRE Test Schedule No: 130175/1.3. Dated 11 August 2025. BRE Global Ltd. Bucknalls Lane, Watford, Herts. WD25 9XX.
3. BS EN 50131-1: 2006 +A3: 2020, Alarm systems – Intrusion and hold-up systems – Part 1: System requirements. BSI, 389 Chiswick High Road, London, W4 4AL, United Kingdom.
4. BS EN 50131-3: 2009, Alarm systems - Intrusion and hold-up systems - Part 3: Control and indicating equipment. BSI, 389 Chiswick High Road, London, W4 4AL, United Kingdom.
5. BS EN 62262:2002+A1:2021. Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code). BSI, 389 Chiswick High Road, London, W4 4AL, United Kingdom.
6. BS EN 60529:1992+A1+A2. Degrees of protection provided by enclosure (IP code). BSI, 389 Chiswick High Road, London, W4 4AL, United Kingdom.

Report ends