



**BBS Concrete Barrier
Road Restraint Systems**

Fully CE Marked In-situ Vehicle Restraint System

SYSTEM OVERVIEW

The range of BBS Concrete Barrier (CB) profiles has been developed and tested over a number of years.

The factors influencing the choice of barrier type and profile include:

- Available central reserve width
- Level difference between carriageways and / or superelevation
- Obstructions in central reserve
- Requirement for lighting columns, signs, etc.
- First and long term cost

Starting from an original Dutch step barrier design, BBS developed and tested a complete surface mounted Concrete Barrier (CB) safety restraint system allowing true integration within any highway project.

The BBS solution comprises of several profiles such as variable, wide, trough wide, as well as transitions to other barrier systems and structures, signage and street lighting fixings, gates for emergency crossing points and expansion joints.

The system was first launched in 2005 by Britpave. Since that date Concrete Barrier (CB) has become an increasingly common sight within the UK and in Europe. BBS Concrete Barrier (CB) is designed, tested and installed in compliance with EN1317-5 providing H2 and N2 containment levels and an ASI B Impact Severity Level. Working widths vary from W1 to W3 dependent upon the specific barrier type. BBS Concrete Barrier (CB) requires minimal foundation and is constructed by a fully automated slipform process which provides high productivity and rigorous quality control.



In December 2010, BBS was awarded its EC Certificate of Conformity by MIRA Ltd, becoming the first company to successfully affix a CE Mark to an in-situ concrete product. BBS Concrete Barrier (CB) carries a CE certification on the installed 'as-tested' product and is supplied through a network of Licensed Installation companies as a fully CE marked barrier system.



CB Profile	Applications	Containment Level	Working Width	Impact Severity Level
CB (Concrete Barrier)	<ul style="list-style-type: none">Double-sided central reserve barrierDual barrier (lighting columns, signs, gantries, adjacent to structures, level difference between carriageways, bifurcation)Protection of obstruction located in verge	N2	W1	ASI B
CB (Concrete Barrier)	Same applications as above	H2	W2*	ASI B
CBW (CB Wide)	<ul style="list-style-type: none">Lighting columnsSigns, gantries	H2	W3	ASI B
CBTW (CB Trough Wide)	Cable duct for lighting columns, signs, gantries can be laid in trough	H2	W3	ASI B
CBV (CB Variable)	<ul style="list-style-type: none">Height difference between carriagewaysSuperelevation across carriageways	H2	W2	ASI B
CBWV (CB Wide Variable)	Combined applications of CBW and CBV	H2	W3	ASI B

*The barrier is within the parameters for H2W1 under the requirements of EN1317-5 with a vehicle intrusion of V12.
The complete CB system and ancillary products are fully detailed within the BBS Technical Construction File (TCF) which features drawings and guidance documents.

Key benefits of BBS (surface mounted) CB

A tested and complete solution

- CE mark on the installed 'as-tested' system
- Fully complies with EN1317-5
- Versatile – installation can be made almost anywhere
- Development of complete concrete barrier safety restraint solution including various barrier profiles and ancillary products such as lighting columns and fences
- Possibility to act as a kerb line for drainage purposes

Economic, sustainable solution

- Minimal maintenance
- Cost-effective solution with low whole life costs
- Rapid and easy installation
- Design life of at least 50 years
- Cost reduction by eliminating the need for expensive foundations
- BBS CB is a simple system with minimal components and no requirement for a stock of spare parts
- Permanent solution
- Space saving through operation with minimum working width – no deformation like steel barriers
- Reduced traffic congestion - fewer lane closures
- Only one concrete barrier is needed in the central reservation to serve both sides of the road
- BBS CB causes no pollution of water courses as can be caused by products from degrading steel systems
- Fully recyclable and can use recycled aggregates in its concrete

Developed to increase safety

- High containment (H2) reduces risk of crossover accidents
- ASI B rating
- Designed to redirect errant vehicles
- Accident frequency reduction
- Improved worker safety - fewer interventions for repair
- Reduced risk of impact injuries to motorcyclists because of its smooth face
- CE Marking means accurate manufacturing and high quality of production to replicate the tested system
- Concrete provides built-in resistance to fire

It is a BBS requirement that all Licensed Installers are independently audited for CE Marking.



- CE Marking ensures that the product which has been tested and certified under EN1317-5 is the product constructed on site.
- CE Marking reaffirms compliance to performance standard EN1317-5.
- CE Marking guidelines set requirement for annual Factory Production Control Audit (FPC Audit) and only Licensees who pass the audit are allowed to build the BBS CB.
- In-situ barriers carry a CE Mark for the manufacturing and installation process. Therefore the CE Mark on an in-situ product guarantees that the product is constructed 'as-tested'. Steel barriers by contrast CE mark only the manufacturing process of the components and therefore lack further checking/audit control over the installation of the factory produced product.

BBS CB - FULLY CE MARKED

CE Marking gives the assurance that the team at BBS Barriers is committed to providing the highest quality products.



WHY BBS CB?

BBS CB is designed to increase safety and durability whilst reducing maintenance



Shape

The advantages of the step profile compared to other shapes such as the New Jersey profile is to prevent the possibility of roll-over accidents and to significantly reduce vehicle damage and occupant injury. BBS CB is designed to redirect errant vehicles. It limits minor vehicle contact by the vehicle tyres and suspension systems to the base of the barrier, so that a slight impact will, in most cases, allow the vehicle to continue its journey safely.

Construction Process requiring minimal foundation

Primarily constructed by the slipform technique BBS CB is installed rapidly, under rigid quality control, to fine tolerances using state of the art equipment. Slipform paving is a wholly mechanised process which is free from manual handling and results in a reduction of cost compared to other construction methods. The slipformed concrete is laid onto a hard surface. As the concrete dries a bond to the surface develops and creates a friction connection. This friction connection means that when the barrier is hit it does not move. Therefore there is no need for further reinforcement or embedment which reduces construction time, cost, traffic management and material usage. The prescriptive specification, high strength concrete and rigorous audit system ensure that BBS CB will meet the design expectations of the system and the 'as-tested' performance.

BBS CB

The guarantee of quality products

Creation of a unique Technical Construction File (TCF) and Technical Query Service (TQ Service)

BBS has developed an unrivalled Technical Construction File (TCF) including a suite of detailed but easy to follow drawings and guidance documents. The Technical Query Service is a unique web-based support system giving

comprehensive response to questions raised by Licensed Installers covering all aspects of CB construction and implementation which ensures compliancy with BBS specifications and quality standards.



WHY BBS CB?

Development of the complete concrete barrier safety restraint solution

Through further development of the CB design BBS is able to offer a variety of CB profiles and more functionality such as the variable CB which is a single barrier with low working width across two different heights of carriageway. BBS CB also features transitions to other barrier systems and structures as well as ancillary products like sign and street lighting fixings, gates for emergency crossing points and expansion joints. Supply chain partners provide additional accessories making CB a complete solution.

All BBS products and profiles are fully certified and compliant with EN1317-5 and carry the CE Certificate of Conformity.

Constructed by highly experienced Licensed Installers

BBS CB can only be installed by Licensed Installers who have been qualified and approved by BBS as being competent, experienced and trained to install BBS products. To attain the Licence, potential Licensed Installers have to go through a regulated prequalification process with the highest level of quality control to ensure that the standards and extensive experience demanded by BBS are realised.

A Licence can be revoked at any time should a Licence holder fail to adhere to the design conditions set out by BBS. Licences are renewed annually. All BBS CB installations must be undertaken in accordance with the specifications and construction details provided in the current Technical Construction File. BBS Terms & Conditions categorises the level of non-conformance to the Technical Construction File and gives processes of rectification. All modifications to the systems must be reported to (BBS) and certified by the Notified Body under EN1317-5.

The Technical Construction File provides strict controls including material design, testing criteria, 'as-built' tolerances as well as quality and environmental certification. To ensure compliance with BBS specifications and general standards (EN1317, CE Marking), Licensed Installers are audited each year with review of both office and on site procedures carefully examined by the Notified Body Horiba MIRA. **It is a BBS requirement that all Licensed Installers are independently audited for CE Marking.**

QUALITY ASSURED

CB and the Environment

Concrete safety barriers make efficient use of natural resources and respect the environment during their entire life cycle.

They provide services to society in terms of mobility and safety by means of judicious choices regarding design, construction, maintenance and demolition.



Sustainable consumption & production

CB production involves a fully-automated, accurate process that ensures a high quality product in terms of functionality and appearance, using the minimum amount of material and producing the minimum amount of waste. Both recycled aggregates and cement replacement materials can be used in its construction, and the barriers provide a low-maintenance design life of at least 50 years.

Climate change & energy

CB out-performs competing solutions in terms of both embodied levels of CO₂ in the materials used and holistic impacts over the solution's whole life cycle. The average embodied quantity of CO₂ in a metre of surface-mounted CB can be as low as 19% of a similarly performing (H2) containment steel solution over a 50-year period. Further long-term benefits are due to CB's long low-maintenance design life that reduces CO₂ emissions and energy impacts related with routine repairs and traffic management, and the virtual elimination of potential delays and traffic congestion associated with these operations.

Delivering a safe, reliable future

BBS CB is a minimal maintenance safety barrier system offering high containment and, critically, the barrier system remains serviceable even following an impact. The risks to road users and maintenance workers will therefore be greatly reduced by wider installation of CB on the road network. Less maintenance work leads to reduced congestion on roads improving journey reliability. BBS CB offers a long serviceable life, uses recyclable materials, employs lean construction techniques, uses continuous steel strand and slipform processes to minimise waste. With no requirement for routine maintenance, BBS CB leads to a reduction in vehicle emissions associated with traffic congestion and from maintenance vehicles. In summary, BBS CB is a sustainable solution that encompasses social, environmental and economic benefits.

Environment	Economic factors	Society
<ul style="list-style-type: none"> 80% less embodied CO₂ than competing systems Minimum material usage and waste Non-polluting in service 100% recyclable Reduces traffic congestion and associated emissions 	<ul style="list-style-type: none"> Low maintenance 50 year design life Minimum space required Free of damage after even severe collisions High daily production of 400 to 800m possible CE marked 	<ul style="list-style-type: none"> Increasing safety for road user and worker No crossover occurrences at H2 containment level Minimal maintenance system increases road availability and reduces traffic congestion Safe solution for motorists

Natural resources & enhancing the environment

BBS CB can be constructed using a wide range of secondary and recycled materials, is non-polluting in service and is fully recyclable at the end of its 50 year design life. CB requires minimum maintenance so reduces potential sediment loadings to drainage systems, and takes up less space than its competitor barriers.

Creating sustainable communities

By restraining traffic effectively and withstanding impact damage, BBS CB provides for the safety and well-being of road users and construction workers alike, helps to keep traffic moving and has a neutral impact on vehicle noise.





Disclaimer

All advice or information herein is intended for those who will evaluate the significance and limitations of its content and take responsibility for its use and application. No liability (including that for negligence) for any loss resulting from such advice or information is accepted by either the authors.

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