

**TATA STEEL**



## **Vehicle Restraint Systems**



# THE TATA STEEL PROPOSITION

As a leading international steel producer, we have nearly 50 years experience in the design and manufacture of highway products. We offer a vast range of high quality precision-engineered systems backed by first class technical support.

# END TO END SOLUTIONS

Our vehicle restraint systems offer end-to-end solutions to meet the long term needs of the highways industry. Protect 365<sup>®</sup> and Vetex<sup>™</sup> are designed to work together to provide a seamless highways containment system.

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### Safety First

Our vehicle restraint systems whole-heartedly embraces the spirit and intent of the EN1317 Standard and the ethos of passive safety.

Through rigorous development and comprehensive evaluation and testing we have produced a suite of systems that are widely recognised as a major safety achievement. The high-energy absorption of both Vetex<sup>™</sup> and Protect 365<sup>®</sup> during impacts, has been proven to minimise injury levels and increase the safety of drivers and passengers.

### Flexible application

Our family of road restraint products has been expertly designed to integrate together effortlessly. Our fully compatible range has grown into a complete end-to-end system that uniquely blends parapet and safety fence with congruent transitions for use in a variety of areas where safety is critical.

The high-energy absorption design ensures that all our products are ideal for both refurbishment and new build projects.



### Lifetime Value

All our highways products offer lifetime value; our systems have been developed to perform with modern-day vehicles to stay ahead of tightening requirements for road restraint systems. Through careful selection of system components and fixing materials we have ensured minimal maintenance together with quick and easy post-incident repairs.

Combined with improvements to ease and aid installation, our family of vehicle restraint systems are products for today that will serve road users into the future.

### Tested and approved

We pride ourselves on rigorous research and development across our product range and continuously ensure that every aspect of our design is extensively tested to meet or exceed industry standards. In-depth product testing undertaken by MIRA Ltd has proven that all our Highways products are engineered to withstand a gruelling range of impact testing.

Those tests also proved the accuracy of the advanced computer modelling system that we have developed in order to optimise our product designs and give our customers the assurance that we have engineered our products to be safe and not just to pass tests compliant to EN 1317.

We utilised our core strengths in steel together with our considerable experience within the automotive and construction engineering sectors to develop vehicle restraint systems using rigorous methodology.

Both Vetex<sup>™</sup> and Protect 365<sup>®</sup> systems are recognised and approved by the UK Highways Agency and the National Roads Authority (Eire).

# A PIONEERING APPROACH

We pioneered our vehicle restraint system back in 1962. Nearly 50 years on, we are still leading the way. Our generation of systems provide enduring benefits for road users and the highways industry.

## Material Knowledge

In the drive to deliver performance, we have exploited our material expertise, drawing on the experience of Tata Steel Research & Development group with its state of the art materials testing facilities. Our expertise has enabled us to produce vehicle restraint systems that are value engineered and designed for high-energy absorption and maximum vehicle occupant protection.

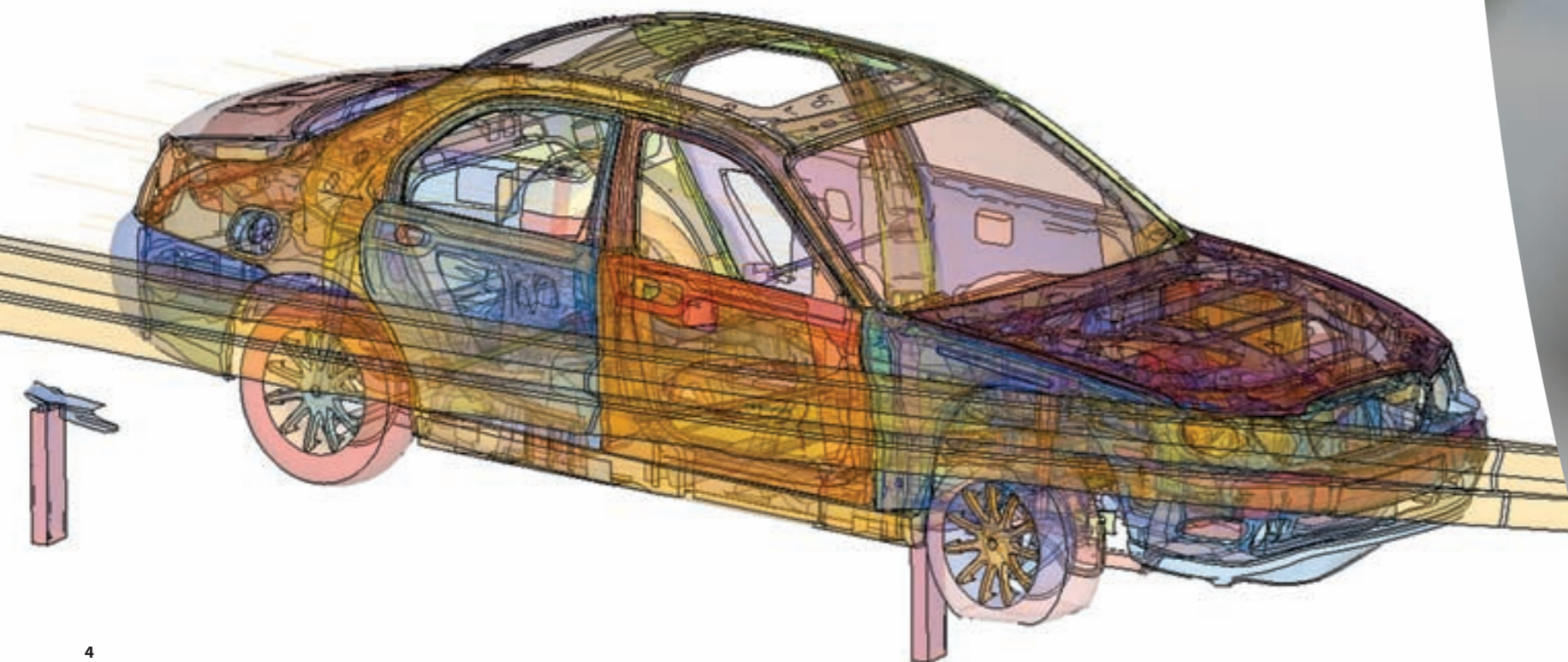
## Industry know how

Our material expertise has been combined with considerable experience of both the construction and automotive industries. Tata Steel Automotive Engineering, part of Research, Development and Technology, continues to play a key role in the optimisation of our product design. Located at the International Automotive Research Centre in the University of Warwick, this advanced engineering group provides automotive and material expertise to our customers.

This team use computer-assisted engineering and Finite Element Analysis to simulate performance and behaviour of steel within all elements of the our product design. This high-speed computer based environment has allowed us to simulate a multiplicity of impact scenarios and system combinations during the development of both Vetex™ and Protect 365° systems.

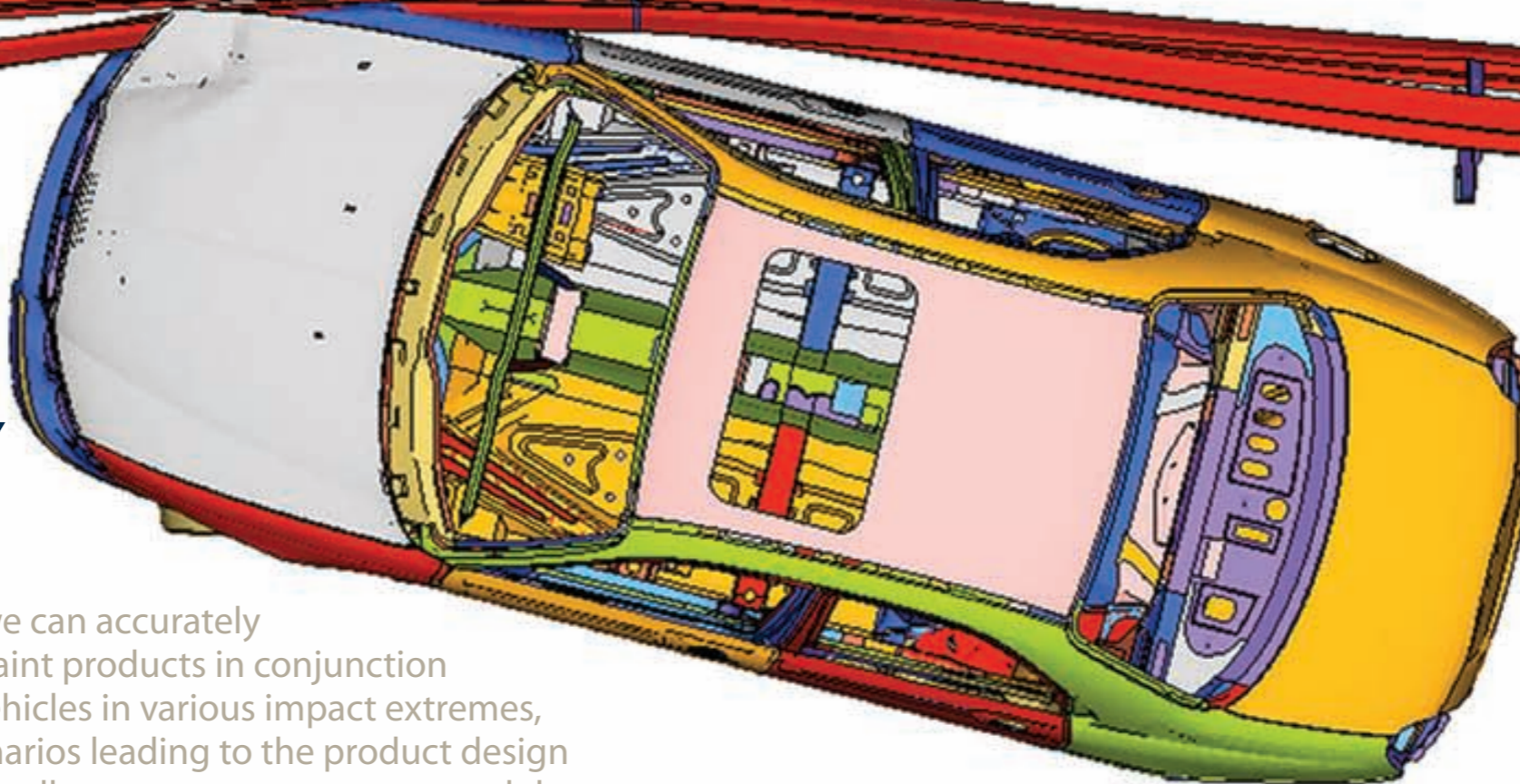
## Sharing strength

The EN1317 Standard is generic and open to interpretation. Our close involvement in safety standard working groups means we are in a strong position to appreciate its full intent. We are represented on the relevant national and European committees and take a proactive role in advancing the Standard requirements.



We have an established position within the road safety industry. This gives us a deep appreciation of your changing requirements.

# SIMULATION TECHNOLOGY



Using advanced simulation technology, we can accurately predict the behaviour of our vehicle restraint products in conjunction with modern simulation technology of vehicles in various impact extremes, evaluating all foreseeable worst case scenarios leading to the product design and future development. This ensures that all our systems meet or exceed the requirements of EN1317 test criteria.



### Using technology

We have an extremely advanced computer modelling systems in the highways industry. Using our expertise and close links with the motor industry, we have taken an industry standard software package and developed its use for a truly precise representation of modern vehicles and road restraint crash scenarios.

## OUR HIGHWAYS SYSTEM IS ENGINEERED FOR OPTIMUM PERFORMANCE AND TO MEET THE MOST DEMANDING CURRENT AND FORSEEABLE FUTURE VEHICLE.

### Challenging assumptions

In a bid to optimise our family of restraint products and generate absolute confidence in their performance, we have challenged assumptions. Material properties and tolerance variations were checked and proven – as were individual components and fixings.

All system configurations – including our range of parapet post centres – were modelled and proven in crash tests. Various impact points along the system were simulated in addition to the actual physical test impact point to demonstrate the complete system performance.

### Safety assurance

Analysis of test results prove that our parapet, safety fence and transitions offer an impressive combination, enabling consistent performance to help minimise impact severity irrespective of impact position.

### Tested with modern vehicles

All Tata Steel Highways systems are tested with cars less than five years old. Our development modelling and subsequent dynamic tests showed that cars with modern rigid passenger cell designs require the barrier system to have more energy adsorption than older (pre-NCAP tested) vehicles.

This is where our rectangular hollow section steel parapet restraint system really comes into it's own. The material provides a uniform and repeatable high impact resistance and affords excellent ductility. This ensures post and rail sections yield optimum performance to give our system a high-energy absorption performance and maximum occupant protection.



By absorbing energy within the construction in this controlled way, Protect 365° parapets not only reduce the level of injuries in crashes but also reduce anchorage forces acting on the bridge structure.

With increased vehicle speed, together with volume and weight on UK roads, we recognised the importance on passive safety performance and developed an industry leading product that has undergone extensive testing and development for modern roads.

All our safety barrier systems are compliant to UK regulations and are built to suit a range of applications on verge and central reservations, along with trunk and non-trunk roads. Off road barrier is also available for use within car parks, factory buildings and machinery protection.



CRASH SIMULATION VIDEOS ARE AVAILABLE TO SHOW OUR WHOLE PRODUCT RANGE IN ACTION.

# HIGHWAY ENGINEERING

Through years of experience in the highway engineering market we can offer a wide range of products and services to suit almost every situation. Diverse skills, knowledge and experience enable us to produce a wide variety of highway engineering products ranging from parapet and safety barrier through to end terminals, transitions and lighting columns. The Protect 365<sup>®</sup> family of restraint systems deliver passive safety benefits to all road users and are designed to perfectly integrate with Vetex<sup>™</sup> safety barriers for a complete end-to-end solution.

















## **Protect 365<sup>®</sup> Highways Restraint Systems**

A comprehensive system of high performance vehicle restraint products that have been specifically engineered to reduce injury levels and increase safety on modern highways. Fully compliant with the BS EN 1317 Standard, Protect 365<sup>®</sup> delivers passive safety benefits to all road users.

## **Vetex<sup>™</sup> Road Safety Barrier**

With nearly 50 years experience in the safety barrier sector, we have developed the Vetex<sup>™</sup> road safety barrier range. We have the engineering expertise to design and manufacture an innovative safety barrier system that helps to reduce impact severity.

# SYSTEM SELECTOR

Tata Steel Product	Performance Class	System Description	Image	Accident Severity Index	Post Spacing	Post Size	Surface Mount Option	Available	Post Foundation Options	Environmental Protection	Comments
<b>Protect 365® Safety Fence</b> Single or Double sided	N2 W1 N2 W3	<b>Normal Containment N2</b> Highways safety fence		B B	2m 4m	130x40 RHS	Y (part tested)	Y	Surface mount Socketed	Hot Dipped Galvanised to BS EN 1464	Surface mount tested system available Spring 2011
<b>Protect 365® N1 Parapet 3-Rail</b> Single sided	N1 W1 N1 W2	<b>Normal Containment N1</b> Highways bridge parapet - 3 Rail		A A	2.5m 3.75m	90x90 RHS	Y	Y	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® N1 Parapet Vertical Infill</b> Single sided	N1 W1 N1 W1	<b>Normal Containment N1</b> Highways bridge parapet - Vertical Infill		A A	2.5m 3.75m	90x90 RHS	Y	Y (untested)	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® N2 Parapet</b> Single sided	N2 W3 N2 W4	<b>Normal Containment N2</b> Highways bridge parapet		B B	2.5m 3.75m	100x100 RHS	Y	Y	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® H4a Parapet</b> Single sided	H4a W4	<b>Very High Containment</b> Highways bridge parapet		B B	2.5m 3.75m	200x200 RHS	Y	Y	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® H4a Parapet Transition</b>	N2 W3 N2 W4	<b>Protect 365® H4a Parapet to Protect 365® N2</b> Parapet Transition		B	3.75m	Various	Y	Y	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® N2 Parapet Transition</b>	N2 W3 N2 W4	<b>Protect 365® N2 Parapet to Protect 365® N2</b> Safety Fence Transition		B	3.75m	Various	Y	Y	Surface mount	Hot Dipped Galvanised to BS EN 1464	
<b>Protect 365® N2 Safety Fence Transition</b>	N2 W2	<b>Protect 365® N2 Safety Fence to Vetex™ N2</b> Safety Fence Transition		B	1.8m	Various	Y	Y	Surface mount Socketed	Hot Dipped Galvanised to BS EN 1464	Surface mount tested system available Spring 2011
<b>Vetex™ Single sided system</b>	N2 W2	<b>Normal Containment</b> highway safety fence		B B A	0.8m 1.6m 2.0m	110 x 49 Z Post 160 x 49 Z Post 210 x 49 Z Post	Y Y N	Y Y Y	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	210 x 49 posts surface mounted system available Spring 2011
<b>Vetex™ Single sided system</b>	N2 W3	<b>Normal Containment</b> highway safety fence		A	3.2m	210 x 49 Z Post	N		Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Single sided system</b>	N2 W4	<b>Normal Containment</b> highway safety fence		A	2.5m	110 x 49 Z Post	Y	Y	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Single sided system</b>	N2 W5	<b>Normal Containment</b> highway safety fence		A	5m	110 x 49 Z Post	Y	Y	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Double sided system</b>	N2 W3	<b>Normal Containment</b> highway safety fence		A	4.0m	110 x 49 Z Post	Y	Y	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Double sided system</b>	N2 W4	<b>Normal Containment</b> highway safety fence		A	5.0m	110 x 49 Z Post	Y	Y	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Single sided system</b>	H2 W4	<b>High Containment</b> highways safety fence		B	2.0m	125 x 90 Z Post	Y	Y (untested)	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	
<b>Vetex™ Transition</b>	N2 W3	<b>Normal Containment</b> highway safety fence to N2 bridge parapet		B	2.0m	210 x 49 Z Post	N	N	Driven Excavated Socketed	Hot Dipped Galvanised to BS EN 1461	

# PROTECT 365® VEHICLE RESTRAINT SYSTEM

The Protect 365® parapet systems have been developed to specifically reduce injury levels and increase safety for all road users. Fully compliant with the EN1317 Standard, Protect 365® delivers passive safety benefits on modern highways, and has also been designed to meet the long-term needs of the highways industry to ensure lifetime value. Low maintenance, ease of installation and repair are key features of the system.



Detail of Normal Containment Parapet support section

**Protect 365® Normal Containment Parapets N1 and N2 multi-rail systems**

Normal containment parapets are widely used on trunk and local roads, available with standard and anti-vandal mesh or solid cladding.

**Protect 365® Normal Containment Parapets N1 vertical infill system**

Normal containment parapets are widely used in urban areas with pedestrian protection built into the standard design.

**Protect 365® Very High Containment Parapets H4a**

A very high containment parapet for use in locations with high risk of consequential accidents.

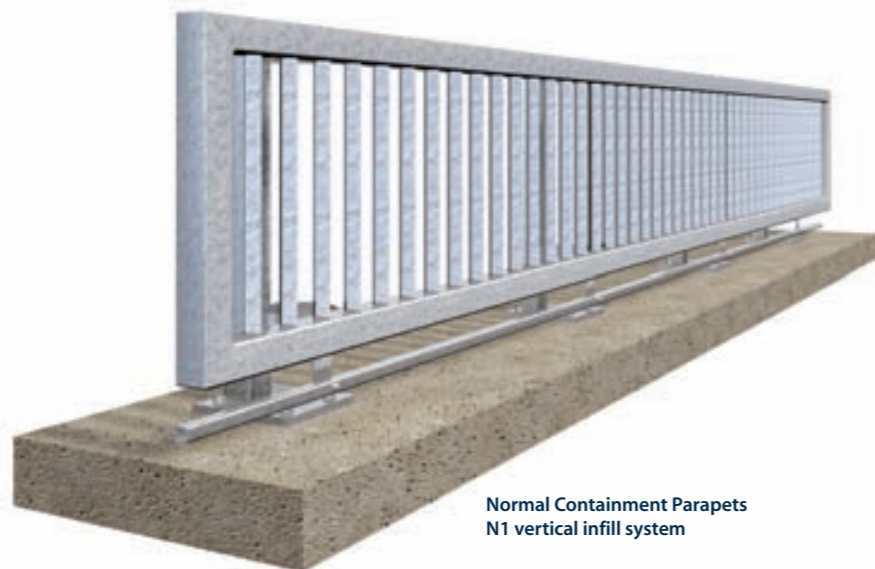
**Protect 365® Transitions for Road Restraint Systems**

A range of high-performance transitions for use in creating a safe connection between Protect 365® H4a and N2 parapets, Protect 365® parapets and safety fence, and Protect 365® and Vetex™ safety fence.

**Protect 365® N2 W1 Safety Fence**

A robust and versatile normal containment double sided safety fence, with a low working width, for modern highways.

PROTECT 365® IS ENGINEERED FOR OPTIMUM PERFORMANCE WITH MODERN DAY VEHICLES.



Normal Containment Parapets N1 vertical infill system



Detail of Normal Containment Parapet support section

# PROTECT 365® NORMAL CONTAINMENT PARAPETS

Normal Containment Parapets are widely used on trunk and local roads. All our normal containment parapets comply with EN1317 Standard and are approved by the UK Highways Agency and the National Road Authority of Ireland.

THE RECTANGULAR HOLLOW SECTION STEEL PROVIDES A UNIFORM PERFORMANCE, WITH REPEATABLE HIGH IMPACT RESISTANCE THAT AFFORDS EXCELLENT DUCTILITY.

## Flexible application

- The Protect 365® range includes N1 (for impacts up to 80kph) and N2 (for impacts up to 110kph)
- With post centres tested to a range of 2.5m-3.75m, Protect 365® is suitable for retrofitting and new builds
- Tested and proven for use on short bridges and bridges of lighter construction
- Protect 365® parapets offer reduced anchorage forces on the bridge structure
- A range of fully approved compatible Protect 365® transitions to Protect 365® safety fences and Vetex™ safety fences are available to meet overall road requirements
- Both N1 and N2 multi-rail parapets can be fitted with standard or anti-vandal mesh
- N1 vertical infill parapet system with pedestrian protection built into the standard design

## Built to last

- Protect 365® parapets are made from Tata Steel hot rolled rectangular hollow sections ensuring the highest quality steel
- All parapets are hot dipped galvanised to BS EN ISO 1461 giving a nominal life span of 30+ years (dependant on conditions with no need for painting)
- Stainless steel bolts enhance the long term reliability and durability
- All fabrication and installation of Protect 365® systems is carried out by Tata Steel approved installers, accredited companies with Highways Agency Sector Scheme approval and ISO 9001 or ISO 9002 assurance

## Assurance of safety

- All our parapets have been simulated extensively and tested to worse case scenarios to offer consistent safety characteristics irrespective of the impact position
- The MIRA tests have also proven that during impact the car wheels never protrude from the bridge deck during impact and the vehicle roll and yaw are well within the requirements set by the standard

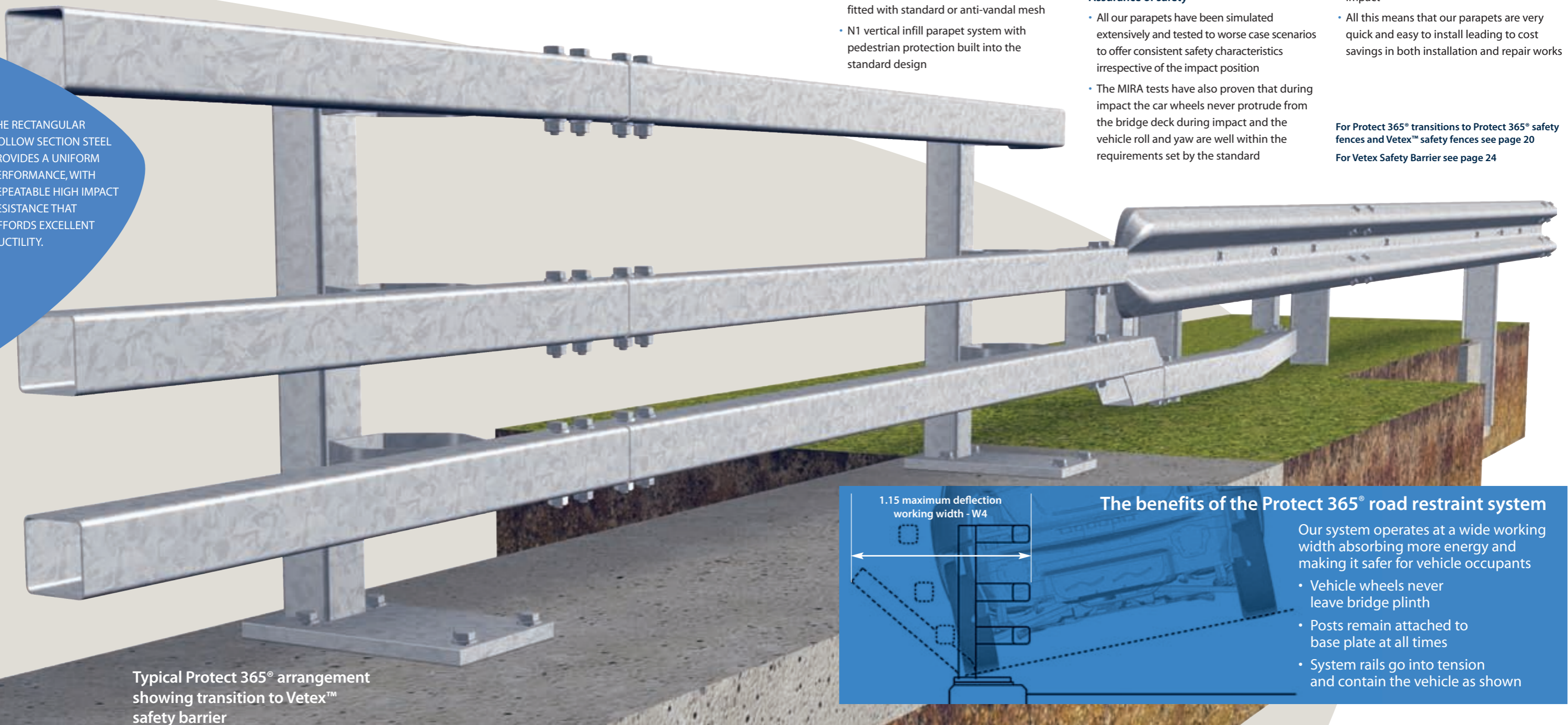
## Designed to perform

- Not only are both the N1 and N2 parapets tested in accordance with EN1317, as a leading UK manufacturer we have challenged the assumptions and simulated the parapets beyond the scope of EN1317 to ensure the highest performance standard and safety

## Easy to install

- Out-of position tolerances mean that any site variances can be amended without structural or system changes
- Pre-threaded holes allow quick and simple on site assembly
- Simple rail joints allow for quick repair after impact
- All this means that our parapets are very quick and easy to install leading to cost savings in both installation and repair works

For Protect 365® transitions to Protect 365® safety fences and Vetex™ safety fences see page 20  
For Vetex Safety Barrier see page 24



Typical Protect 365® arrangement showing transition to Vetex™ safety barrier

**The benefits of the Protect 365® road restraint system**

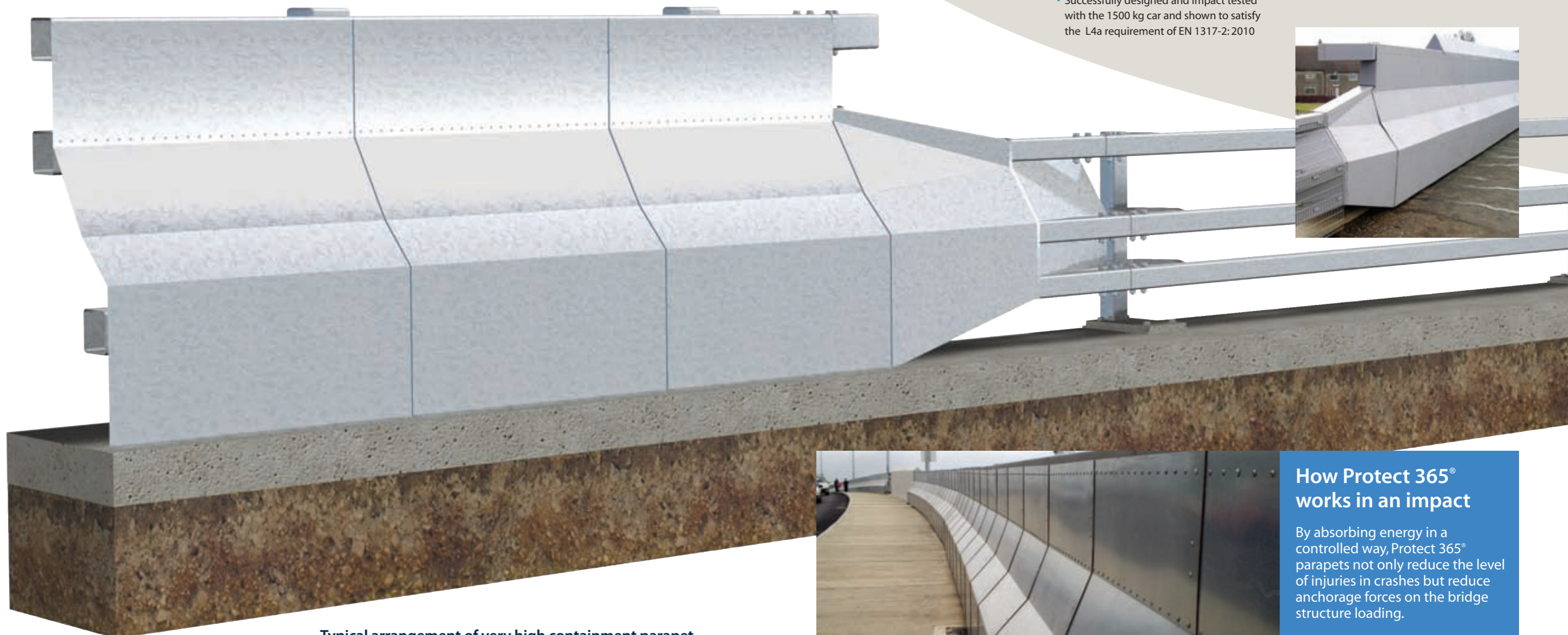
Our system operates at a wide working width absorbing more energy and making it safer for vehicle occupants

- Vehicle wheels never leave bridge plinth
- Posts remain attached to base plate at all times
- System rails go into tension and contain the vehicle as shown



# PROTECT 365® VERY HIGH CONTAINMENT PARAPETS

Approved by the UK Highways Agency and National Road Authority of Ireland this system is manufactured in accordance with EN 1317 standards and used on rail bridges where there is a high risk of consequential accidents.



Typical arrangement of very high containment parapet with transition to normal containment parapet

## Flexible application

- Suitable for all H4a very high containment situation applications
- A Transition to Protect 365® N2 parapet is available to meet the total road requirements
- Continuous steel cladding makes it ideal for situations where debris must be contained such as over high-speed rail lines
- The low bridge deck loadings and range of approved post centres make this parapet ideal for retrofitting to older bridges

## Durable design

- Although the Protect 365® H4a parapet fully complies with EN 1317 we have looked beyond this to provide a system that will perform well into the future
- In line with the principles of passive safety we have designed the H4a parapet to absorb a high proportion of impact energy increasing passenger safety and reducing bridge deck loadings
- The improved bracket design means that the H4a parapet will take the force of a 30 tonne truck or a medium or small car without putting the driver, or passenger, at any significant risk
- The stepped front sheeting on the parapet minimises the risk of head injury to the occupants of vehicles during impact
- Successfully designed and impact tested with the 1500 kg car and shown to satisfy the L4a requirement of EN 1317-2:2010

## Lifetime performance

- Protect 365® parapets are made from Tata Steel hot rolled rectangular and square hollow sections ensuring the highest quality of steel
- All parapets are hot dipped galvanised to BS EN ISO 1461 giving a normal life span of 30+ years (dependant on conditions) with no need for painting, although painting for aesthetic reasons is an option
- Stainless steel bolts gives the system long-term reliability and durability
- Installation of Protect 365® systems is carried out by a limited number of accredited and approved companies with Highways Agency Sector Scheme approvals and ISO 9001 or ISO 9002 assurance



## How Protect 365® works in an impact

By absorbing energy in a controlled way, Protect 365® parapets not only reduce the level of injuries in crashes but reduce anchorage forces on the bridge structure loading.

# PROTECT 365® SAFETY BARRIERS

Protect 365® N2 W1 safety fence has been developed and tested using rigorous methodology to ensure full compliance with the EN 1317 standard. Its low level of working width and its single RHS beam design make it a good option where other highway structures must be accommodated. Its streamlined shape and smooth edges also make it an ideal choice where aesthetics and pedestrian safety are considerations.

## Flexible application

- N2 containment level means the Protect 365® safety fence is suitable for impact speeds tested up to 110 kph in the UK
- The W1 working width makes it ideal in situations where highway structures, street furniture or trees need to be accommodated and the ability to move the working width to W3 by changing the post centres removes the need for transitions
- The single RHS beam design means Protect 365® safety fence is both single and double sided in application meaning it can be installed at the edge of the road or in the central reservation
- Its tubular design, with under-fixed posts, makes Protect 365® N2 safety fence an unobtrusive feature in areas of natural beauty
- The shallow profile of the rail also lessens the chance of a build-up of debris next to the fence
- Its smooth edges make Protect 365® safety fence a safe choice where pedestrians may be walking close by
- A range of transitions to Protect 365® parapets and Vetex™ safety fence are available to meet overall road requirements

## Designed to perform

- Not only is the Protect 365® safety fence tested in accordance with EN 1317 but we have also challenged the assumptions and simulated the safety fence beyond the scope of EN 1317 to ensure the highest performance and safety
- We have embraced passive safe principles using advanced computer modeling to test multiple scenarios
- The rectangular and square hollow section design of our safety fence allows it to absorb impact energy in a controlled way and ensures consistent containment of errant cars

## Assurance of safety

- We tested well beyond the traditional 80m (sometimes to 200m) to ensure that the system performs without additional support
- Strain gauge analysis has proved that the impact load is safely spread along the fence and taken to ground quickly and consistently

## Easy to install

- The unique 'propping' characteristics built into the design of our safety fence means it is easy to assemble on site by letting the posts take the weight of the beam freeing up both the installers hands to fix it into place
- Assembly tolerances allow for site variances without the need to change the system
- Smooth edges make Protect 365® safety fence safer to handle

## Built to last

- Protect 365® N2 W1 & W3 safety fence is made from our hot rolled rectangular hollow sections ensuring the highest quality of steel
- Protect 365® N2 W1 & W3 safety fence is hot dipped galvanised to BS EN ISO 1461 giving a nominal life span of 30+ years (dependant on conditions) with no need for painting
- Stainless steel bolts give the system a long-term reliability and durability
- All fabrication and installation of Protect 365® safety fence systems is carried out by a limited number of accredited and approved companies with Highways Agency Sector Scheme approval and ISO 9001 or ISO 9002 assurance



## How the Protect 365® barrier works in an impact

Hot-formed hollow sections are heat treated during the forming process to shape the section. This process releases the internal stresses in the steel and ensures uniform material properties throughout.

This results in excellent and predictable product performance in crash situations.

# PROTECT 365® PARAPET TO VETEX™ SAFETY BARRIER TRANSITION

The VT100 Parapet Transition is the shortest of its type, offering considerable cost savings without compromising safety. Using extensive knowledge of Safety Barrier development, we have produced an approved Transition tailored uniquely to the Protect 365® and Vetex™ product range.



## Parapet Transition

Utilising nearly 50 years experience in the manufacture of Highways restraints systems, we have designed and manufactured a unique transition that enables a perfect connection between both systems.

The system has been designed and verified using computer simulation and tested with modern vehicles to meet the stringent performance requirements of EN1317



Very High Containment Parapet Transition

TRANSITIONS ARE GUARANTEED TO MINIMISE IMPACT SEVERITY AND REDUCE THE RISK OF INJURY IN ACCIDENTS.

## Application

VT100 is a transition connection between Vetex™ N2 and Protect 365® N2 Parapet systems. The transition has been expertly designed to perform inline with industry standards and approved by the UK Highways Agency.

- EN1317 accredited
- Low maintenance to enhance life time value and performance
- Rapid connection to Protect 365® N2W3 & W4 Parapet saves labour intensive build
- Lower Kicker in case of ground erosion
- Reduced number of components to minimise installation time
- Optimising length to reduce cost

## Designed to perform

We have challenged the standard performance criteria and evaluated foreseeable worst-case scenarios to ensure our transition systems deliver optimum performance. The VT100 has been tested at different impact points along the whole transition length to ensure that we fully understood the strengths and critical areas of our system.

Its low number of components and its compact design makes this transition fast and easy to install and has low maintenance cost. This product is available in a hot dipped galvanised finish to BS ISO 1461 and is supplied and installed by a limited number of accredited and approved companies with Highways Agency Sector Scheme approval and ISO 9001 or ISO 9002 assurance.

VT100 Vetex™ barrier to Protect 365® parapet transition



# VETEX™ SAFETY BARRIER SYSTEM

We have been manufacturing safety barriers since 1962. With the introduction of the European Standard EN 1317, we launched our Vetex™ barrier system in 2005, a pioneering highway restraint product, precision-engineered to set best practice in the highways industry.

In the face of faster and heavier traffic on Britain's motorways, safety barrier systems had to evolve and we are leading the way with continuous product research and development.

Drawing on our extensive knowledge and expertise we constantly progress the design of our system to evolve with the needs of both road users and installers. Our barrier is value engineered to reduce costs and installation time on site whilst ensuring maximum safety performance.

Our barriers are designed and manufactured for verge and central reservation applications on motorways, trunk roads and non trunk roads.

**Vetex™ Normal Containment Systems**  
Vetex™ N2 is suitable for all high-speed road applications, where normal containment is required. It is designed to contain average sized vehicles with a mass of 1500kg. This type of barrier is used on motorways, trunk and non-trunk roads, in verges and central reservations.

**Vetex™ High Containment Systems**  
Vetex™ H2 represents an evolution in high containment barrier technology, designed to contain very large vehicles, such as coaches. These systems are used on motorways, in high-risk areas, such as bridges, gantries, concrete abutments, and off road to protect machinery and vehicles of up to 13000kg. It has been designed with collapsible elements to absorb impact energy assisting safety performance.

**End terminals**  
We offer a range of End Terminals to suit a variety of applications, ensuring the safety barrier is effectively terminated and anchored securely even when space is limited.



Normal containment barrier

VETEX™ IS ONE OF THE MOST EFFICIENT SYSTEMS ON THE MARKET AND SIMPLE TO INSTALL, SAVING OUR CUSTOMERS MONEY WITHOUT COMPRISING QUALITY.

# VETEX™ NORMAL CONTAINMENT BARRIER (N2)

Vetex™ Normal Containment (N2) system combines safety performance with installation convenience. Vetex™ N2 is an innovative, cost effective solution for safety barrier applications.

Typical Vetex™ barrier arrangement showing transition to Protect 365® parapet



## Expert design and engineering

We use advanced computer simulation technology to predict the behaviour of our barrier system with modern vehicles in various impact scenarios to safely engineer the best solution.

This innovative and thorough approach to barrier development means that we have an in-depth understanding of impact behaviour. This knowledge has enabled us to design Vetex™ as an evolutionary untensioned system, combining installation benefits with high safety performance.

## Application

Vetex™ N2 is suitable for all high-speed road applications, where normal containment is required. It provides a robust solution for new build projects and can be used with Vetex™ H2 and Vetex™ end terminals, to offer a complete highways containment solution.

It has also been specifically designed to fully integrate with traditional barriers. This makes Vetex™ an effective and efficient system for maintenance, repair and barrier extensions.

## Installation and maintenance

As an untensioned system, Vetex™ N2 represents an evolution in performance and reliability over the traditional TCB and wire rope systems. Installation is faster and simplified, with increased post spacing and longer beams creating installation efficiencies compared to traditional systems. Maintenance is greatly reduced, because routine re-tensioning is not required.

Vetex™ beams are engineered with long slots positioned to align with the Vetex™ post. This reduces marking out and enables single person installation with a bolted at the beam joint. Installing Vetex™ is fast, simple and highly cost effective.

Vetex™ has been designed with familiar components and therefore minimal installation training is needed. It can be integrated with existing runs and all Vetex™ components are clearly stamped for easy identification on site. Highways Agency Sector Scheme approved training schemes are available for all Tata Steel safety barrier systems.

Vetex™ N2 has been designed to yield major installation and maintenance benefits, offering a cost effective barrier solution without compromising safety performance.

## Vetex™ high safety performance

Vetex™ is the first barrier system to offer a 5m-beam solution for the popular N2W2, N2W3, N2W4 and N2W5 specifications. Combined with the wide 3.5m and 5m posts spacing, the 5m beams significantly reduces foundation work, while distance is covered efficiently.



Vetex™ double sided barrier system

# VETEX™ HIGH CONTAINMENT SAFETY BARRIER (H2)

Vetex™ H2 represents an evolution in high containment barrier technology. Designed to contain very large vehicles Vetex™ H2 is for use both on and off road in high-risk areas such as bridges gantries, traffic signs, crossover avoidance and safe protection from impact with obstructions and concrete walls.

## Installation and maintenance

With installers and road designers in mind, Vetex™ H2 has been engineered with familiar components, making it fast and easy to install with minimal training. All Vetex™ systems are lightweight, promoting safer handling and rapid assembly.

Our safety barrier system is untensioned excluding the need for tensioning during installation or maintenance. Our efficient design is a major improvement on traditional tensioned systems, such as wire rope and tensioned corrugated beam.

## Expert design and engineering

Vetex™ H2 has been designed with collapsible elements to absorb impact energy, maximising safety performance. The carefully engineered design prevents vehicle crossover providing maximum protection to all road users.

We have a pioneering approach to barrier development, using advanced simulation technology to design and simulate behaviour of the barrier and vehicle upon impact, enabling accurate prediction and improved safety performance.

The Vetex™ H2 system is an innovative solution, expertly engineered for high containment applications. We have engineered a robust product through extensive research development and testing to ensure maximum safety through optimum performance, creating a cost effective solution with installation efficiencies.



## Vetex™ high containment - doubled protection

Vetex H2 has been designed with collapsible elements to absorb impact energy, assisting safety performance. The Vetex H2 design protects occupants from vehicle crossovers and safely redirects the vehicle back onto its highway.



# VETEX™ END TERMINALS

Vetex™ end terminals are designed to offer a robust solution at areas where there is an increased risk of vehicle impact. They have been skilfully engineered to offer the optimum safe alternative to vehicle occupants and road users.

## Vetex™ P1 End Terminal

Vetex™ P1 end terminal effectively anchors and terminates barrier runs, its straight-ended design ensures it can be installed where space is limited. Fully compatible with existing UK barrier runs Vetex™ P1 is ideal for maintenance projects, repair and new build contracts.



## Performance

Tailored to suit the needs of the installer, the Vetex™ P1 is simple, quick and efficiently installed in as little as one hour with only one site visit necessary. The terminal requires no concrete fairing or tensioning, it is a driven terminal that can also be installed in concrete or sockets.

Where maintenance or repair is required, Vetex™ P1 end terminal is fully compatible with tensioned corrugated beam and open box beam barriers, in addition to Vetex™ N2 and H2 systems. The Vetex™ P1 is designed with familiar components with Highways Agency Sector Scheme approved training available to installers.

## Engineered efficiencies

Specially designed to assist in the redirection of ramped impacts, the Vetex™ P1 end terminal provides a safe and controlled diversion. A discrete, sloping end detail fixed below ground with a robust anchorage ensuring the key anchorage components do not create a hazard to errant vehicles.

The design allows a vehicle to mount the terminal smoothly, without snagging, and redirects it into the ground, giving an improved level of safety for vehicle occupants.

## Vetex™ P4 End terminal

We supply two types of P4 terminals, ABC and the Xtension. The terminals are proven on UK and European highways as robust and competitive end terminal solutions for areas where there is an increased risk of vehicle impact.



## Installation

P4 Terminal is designed to be easily transported to site. One complete unit can fit onto a standard pallet for transportation on a small works vehicles. Typical installation time of a P4 Terminal is two hours for a three-man crew using standard safety barrier installation equipment (excluding concrete foundations).

## Expert design and engineering

The P4 terminals Xtension has been tested to ENV1317-4. The Xtension is the only universal D1.1 system currently available and offers unique advantages to maintenance contractors and installers. The system consists of a universal head kit that is suitable for left hand and right hand applications (departure or central reserve). The terminal can be attached to W2, W3, W4 and W5 working widths.

The ABC terminal is a steel post, energy absorbing terminal for use with a corrugated beam safety barriers. Fully satisfying the CEN criteria described in ENV1317-4, the terminal is proven in 110kph, 100kph and 80 kph applications. The steel directional breakaway posts are designed to shear away from the ground-driven I sections, minimising ground disturbance. Energy adsorption is achieved through friction and deformation as the rail sections slide rearwards.

# OFF-ROAD SAFETY BARRIER

We offer a variety of off-road safety barrier systems that provide robust protection for property and public safety.



Our off-road systems are not designed for use on public highways and have been specifically tailored to accommodate the requirements of traffic control and pedestrian protection along alternative locations such as:

- Multi-storey and surface car parks
- Tunnel and bridge approaches
- Embankments
- Within industrial premises, surrounding plant, machinery and stock from surrounding vehicles
- Perimeter roads
- Alongside public foot paths, offices and public buildings
- Race tracks

Together with our off-road barrier, we also offer a range of corners, both internal and external in stock typically 90° and 135° configurations. We also offer wing terminals from stock in both galvanized and uncoated finishes.

**With a dedicated fabrication unit on site we can manufacture a range of bespoke barrier components including off-road column protection fabricated in either an open box or corrugated configuration tailored to suit individual applications.**

**Contact us for further information on 01633 290 011.**



# USING OUR RESTRAINT SYSTEMS WITH CONFIDENCE

Protect 365<sup>®</sup> and Vetex<sup>™</sup> systems are manufactured to high standards. We have gone to great lengths to ensure that our customers can use them with confidence and ease.

## Passive safety – here to stay

Our close involvement in evolving new standards for vehicle restraint systems means we are acutely aware of the growing desire to expand the safety benefits they can provide. For us at Tata Steel, the notion of passive safety embraces vehicle drivers and passengers – both in the errant vehicle and in other vehicles on the road. We believe it also extends to the safety of other road ‘users’ including system installers and maintainers.

Achieving passive safety benefits for all requires close attention to a large combination of factors. These include not only the characteristics of the restraint system itself but also how it and other structures interact with surrounding events.

It is important to ensure that Protect 365<sup>®</sup> works in a wide variety of event and installation scenarios. To help us in this aim during development, we adopted a philosophy and principles similar to those used by the car industry when evaluating crash performance of cars.

## Future thinking

Our expectations for Protect 365<sup>®</sup> were not limited or constrained by EN 1317 Standard requirements. We recognised that the new standard provided an opportunity to create a product that delivered something extra – lasting confidence.

Our idea was to provide a system that was evaluated through simulation so that we could fully test its robustness and ensure it was likely to meet future expectations of performance.

This meant considerable investment in a robust product development methodology for the entire restraint system family of products. The result is a range that stands out from the rest and performs in foreseeable worst case scenarios to deliver impressive results.

In addition to delivering safety benefits for drivers and passengers, our thinking has also included the safety of highways industry employees. All our systems have been designed for low maintenance and for swift and easy installation and repair. This means reduced on-site work time and exposure to risks. Together with the long life of our systems, it also means a reduced cost of system ownership – another big part of our thinking.

## Value in steel

Tata Steel is committed to delivering value in its steel products. We do this through ongoing investment in the research and development of materials and products for modern industrial use.

We offer well-engineered products that can be trusted to work in high specification environments. We apply our energy, our expertise and our thorough understanding of the ways in which steel behaves so we can apply its attributes to best advantage. We have developed our knowledge over many decades and our products have stood the test of time.

## A sustainable product

In a world of increasing concern about the environment, our passion for steel is fuelled by the fact that it is a material that can be recycled over and over again without loss of quality. Indeed, steel is the most recycled material in the world.

Steel highway barriers and components are similar in construction to the structural sections used in buildings – where recycling and reuse rates of 99 per cent are the norm in the UK. Our steel know-how has also been applied throughout the development of Protect 365<sup>®</sup> and Vetex<sup>™</sup> safety fence giving our vehicle restraint systems customer even greater choice and flexibility.

PROTECT 365<sup>®</sup> AND VETEX<sup>™</sup>  
- DELIVERING AN IMPRESSIVE  
SAFETY PERFORMANCE,  
FLEXIBILITY AND LIFETIME VALUE.



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**Tata Steel**

Llanwern Works

Newport

South Wales,

NP19 4QZ

United Kingdom

T: +44 (0) 1633 290011

F: +44 (0) 1633 464508

E: [cep.sales@tatasteel.com](mailto:cep.sales@tatasteel.com)

[www.tatasteelcp.com](http://www.tatasteelcp.com)