PAS 13:2017 Safety Barriers within the Workplace

Neil Clifford - Managing Director - A Safe UK

Who are A-SAFE

- Established 1984
- Over 30 years polymer expertise
- Inventors of the first industrial polymer safety barrier in 2001
- Today producing 3rd generation polymer safety barriers
- Global leaders in workplace safety solutions and protection systems
- Full in-house engineering → Design, Test, Manufacture, Install, Consult
- Global and local – 15 wholly owned subsidiaries and over 30 partners
- Technical authors and sponsors of PAS 13:2017 in association with BSI

Agenda

1. Why have safety barriers
2. Why do we need safety barrier standards
3. What is PAS 13:2017
4. Designing in control measures
5. Safety barrier design
6. Methods of testing
7. Selecting the appropriate barrier
8. Questions

Risks & Incidents

- Health & Safety statistics show that approx. 50 people are killed each year and more than 5,000 injured in accidents involving workplace transport*

- Mixing vehicles and pedestrian increases the risk of potential accidents

- The movement of goods and materials involves the use of a wide range of vehicles and accounts for a large proportion of accidents in the workplace

*HEALTH AND SAFETY EXECUTIVE. ***Workplace transport safety, A brief guide***, INDG199 (rev2), 2013.

Why Have Safety Barriers In The Workplace?

Potential for immediate or cumulative damage

People

Compensation
& Fines

Production
Downtime

Brand
Reputation

Vehicle Damage
& Repair

Equipment
Damage & Repair

Barrier Damage
& Replacement

Floor Damage
& Repair

Why Do We Need Safety Barrier Standards

Evacuation

Hazardous

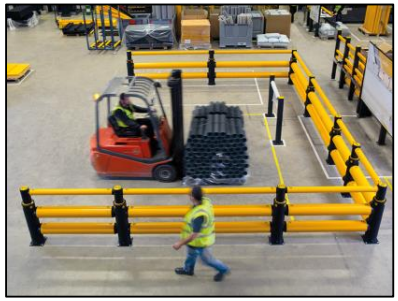
PPE

Fire

Guarding

Signage

Emergency Lighting



Safety Barriers

What is PAS 13:2017

Created by an independent group of companies and organisations to raise awareness & best practice in the use of safety barriers within the workplace

- PAS – Publicly Available Specification
- Code of Practice for safety barriers
- PAS can be adopted as a British standard

A-Safe Proud Sponsors of PAS 13:2017 and developed in conjunction with the following companies

In Summary What is PAS 13:2017

The industry has been crying out for a standard for workplace safety barriers for many years

There has been ‘No’ Standard until March 2017

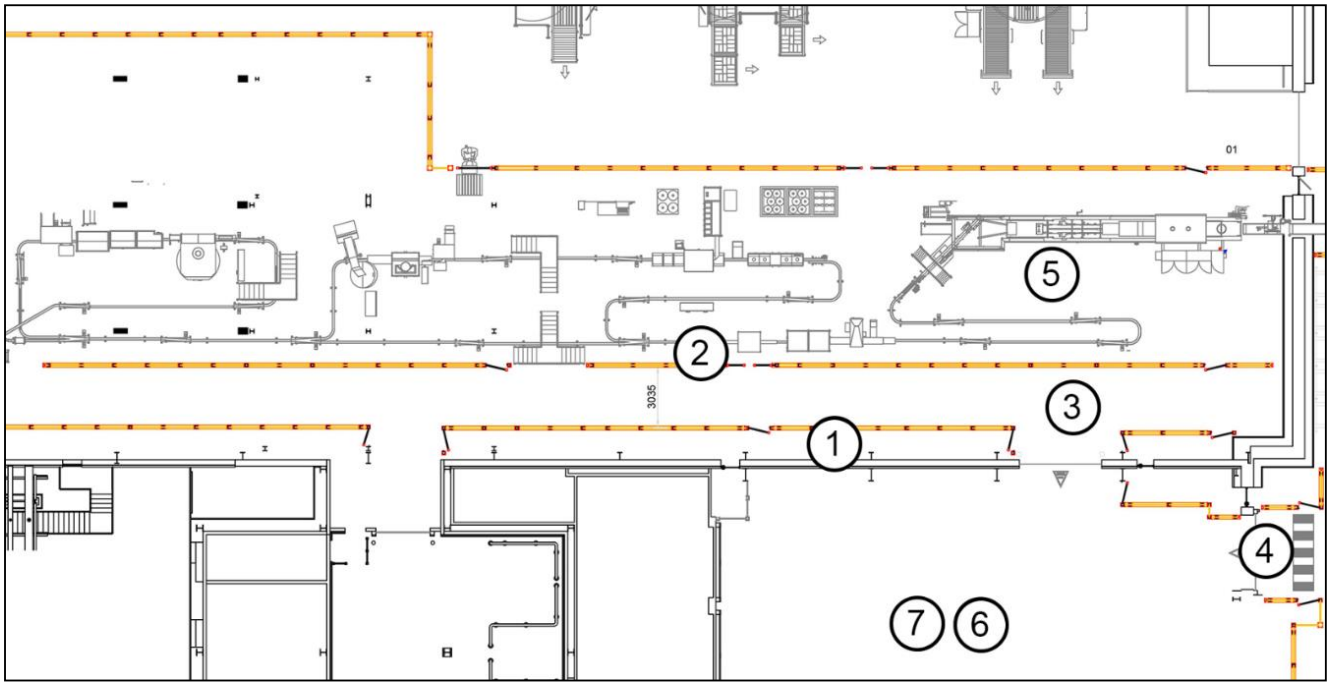
PAS 13:2017 Provides a Code of Practice for safety barriers within the workplace environment for:-

Architects – Provides best practice to assist in the Safety Barrier Design scope of a project & provide confidence in specifying the right products

Health & Safety Managers – to ensure best practice and compliance

Facility & Operation Managers – provide safe working environments for staff, reduce risk, costs. Improve operational performance with smarter & safer layouts and improve profits

Designing in Control Measures



1. Pedestrian Routes & Walkways
2. Pedestrian Zones & Work Areas
3. Vehicle Routes
4. Crossing Points
5. Critical Structures
6. Vehicle Parking Areas
7. Loading & Unloading Areas

Designing in Control Measures

When safety is ‘designed in’ risks are reduced or even eliminated completely

Control Measures to consider are:-

- Can the hazard be eliminated
- If not can the hazard be isolated from pedestrians
- Improve the workplace design & layout around vehicles & critical structures
- Are walkways wide enough for pedestrian movement
  - Minimum 600mm (1200mm if wheelchair access is required)
  - Emergency exit or fire route 750mm to 1050mm depending on the number of people using the route – this can include the deflection zone as available width
- Coloured walkways to define pedestrian routes
- Pedestrian areas to be entirely free from vehicles
- Crossing areas in relation to entrance doorways
- Suitability of the traffic route – Limit Speeds
- Administrative Controls – Signage, Demarcation & Toolbox talks

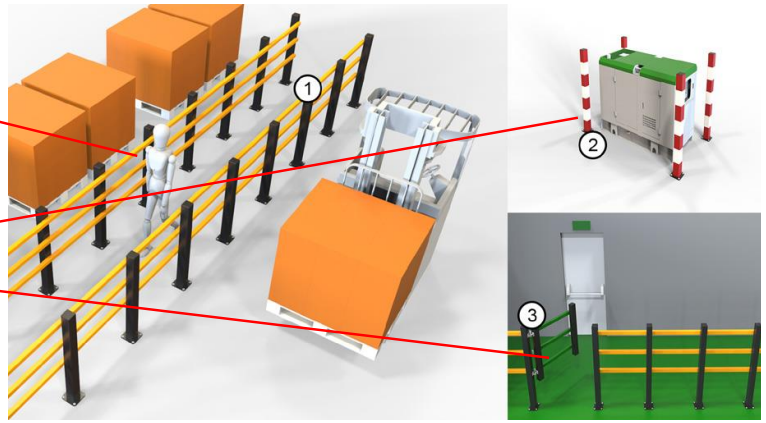
Safety Barrier Design

PAS 13:2017 states Safety Barriers should be tested to a performance rating using the ***dynamic*** test method described within the standard

- Vehicle safety barriers should be at a height where the vehicle can be contained
- Pedestrian safety barriers should be 1100mm high
- Ground level protection should be used when a fork vehicle has a 20m or greater travel run and/or critical structures require protection & have minimum height of 150mm
- Safety barriers should not deform beyond a marked out deflection zone defined by a white line

Safety Barrier Colours

- Yellow & Black – to signify a caution & pedestrian segregation
- Red & White – to signify a warning or danger
- Green – to signify exit points & safe conditions (floor, swing gate, fire exit sign)



Safety Barrier Design

Emergency Exit / Fire Route Dimensions

The minimum width of the walkway leading to the emergency exit is to be in relation to the number of people using the route

Maximum Number of People	Maximum Width of Walkway
60	750mm
110	850mm
220	1050mm
More than 220	5mm per additional person

* NOTE – The deflection zone counts towards the available width on emergency routes *

When to Use Safety Barriers

PAS 13:2017 states safety barriers should be used to segregate pedestrians from vehicles if:-

a) Motorised vehicles are in operation

b) There are no raised kerbs

c) The vehicle route is closer than 1m to the pedestrian zone

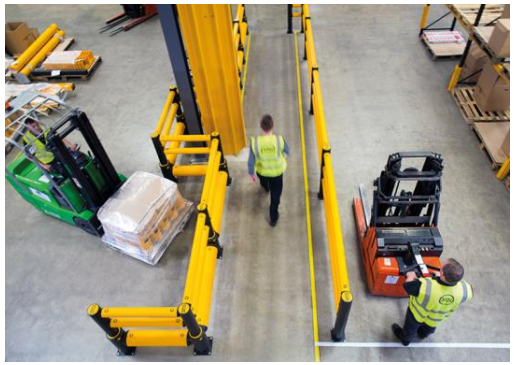
d) Entrance points should be controlled with safety barriers to prevent pedestrians walking into the path of vehicles

e) Safety barriers should be used to stop pedestrians taking shortcuts & ensuring they follow the designated walkway

f) Safety barriers should be used to protect critical structures and equipment

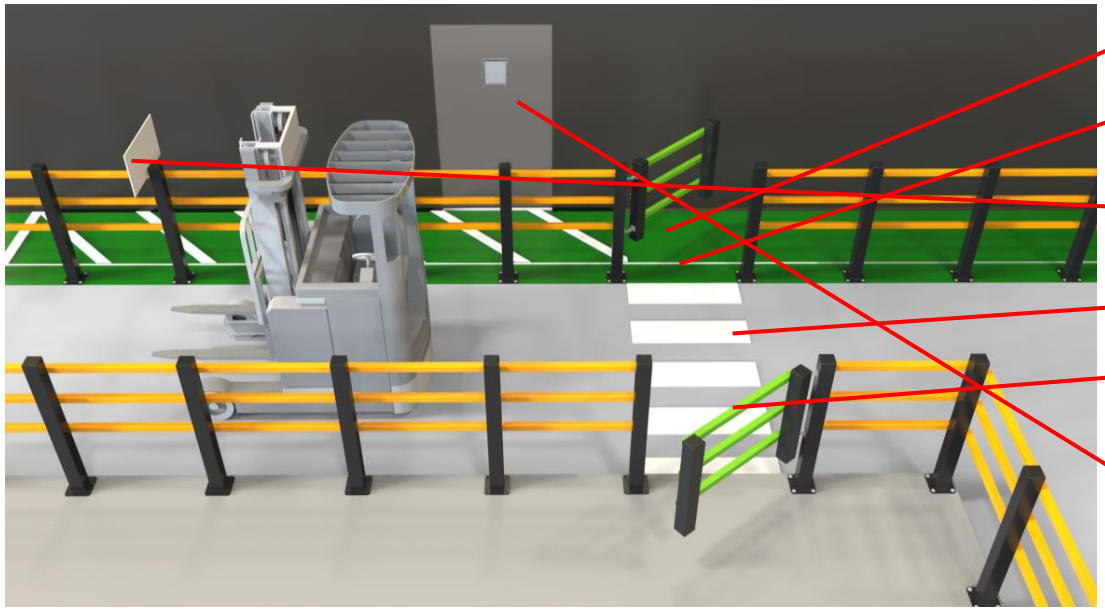
g) Safety barriers should be used to define traffic routes

To protect people



To eliminate or reduce risks

Safety Barrier Design - Pedestrian Routes



Pedestrian zone coloured green

Deflection zone added & marked with a white line

Signage to identify separate traffic pedestrian routes

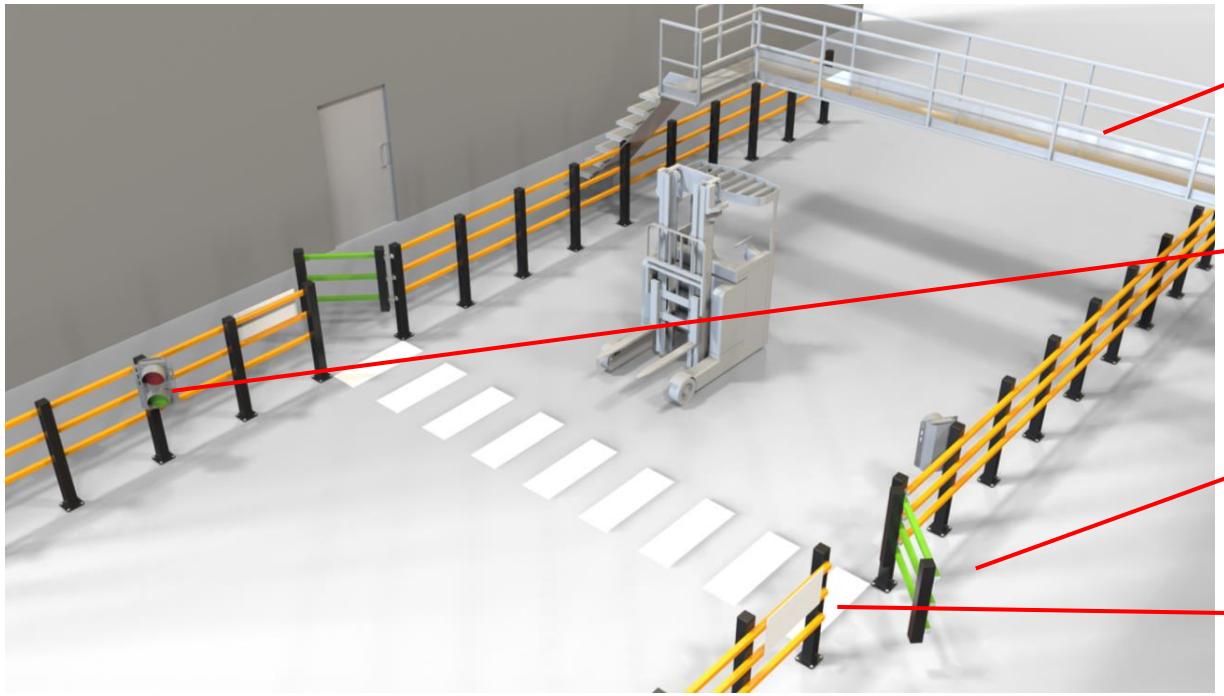
Marked crossing points

In swinging pull gates, slows pedestrian pace

Gates should be offset from doors, slows the pace of pedestrian traffic

Colour coded for fire exit

Safety Barrier Design - Crossing Points



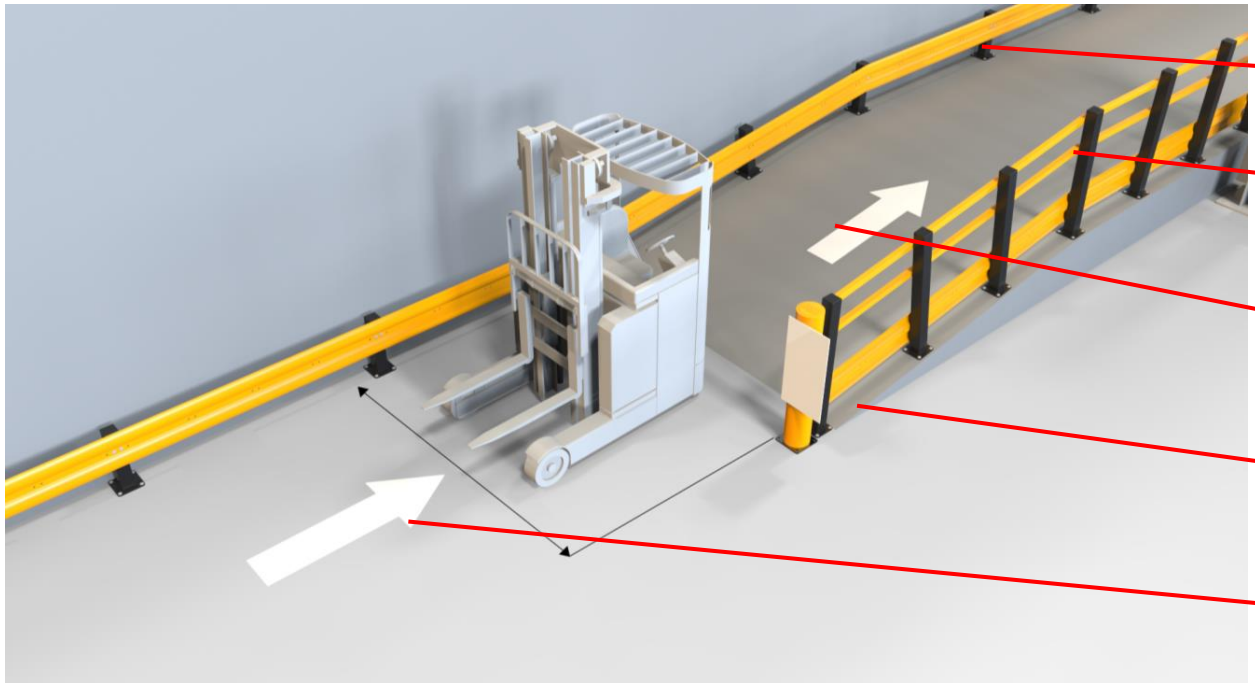
Overhead Walkways Preferable

Vehicle traffic light signal

Inward swinging gates for pause effect

Marked crossing points

Safety Barrier Design - Vehicle Routes



Wall protection

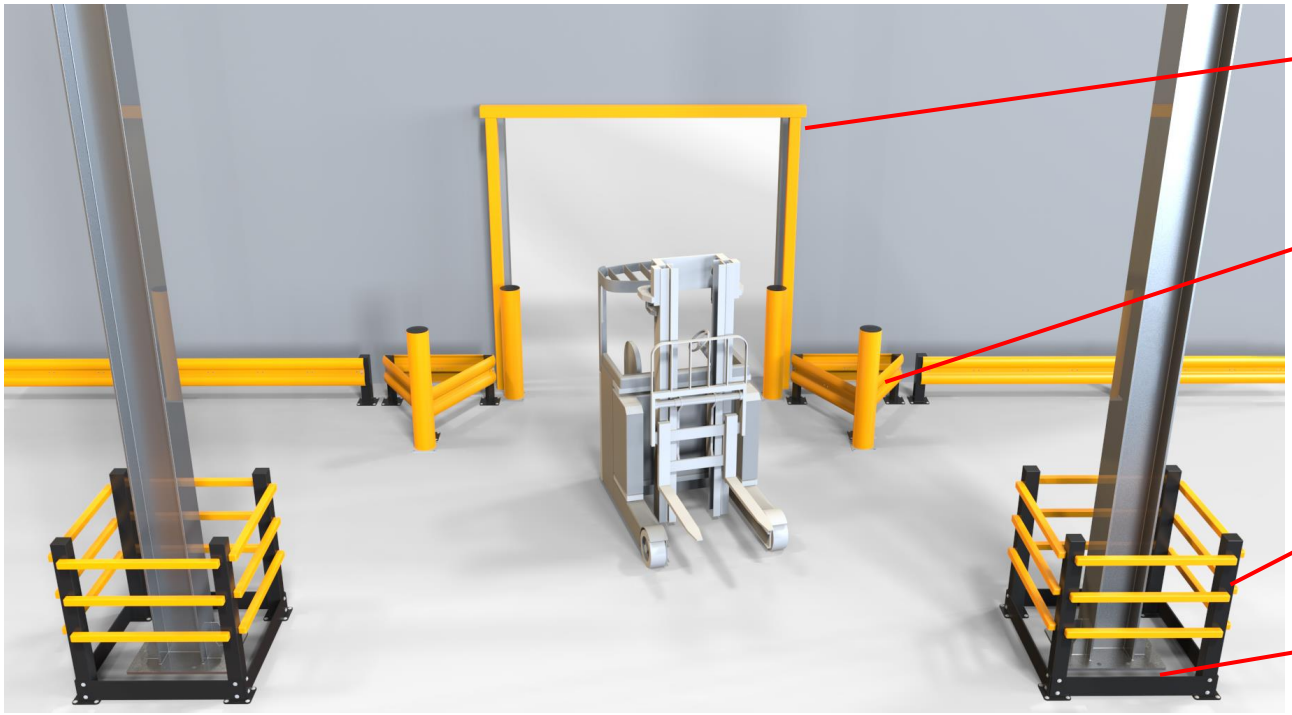
Higher barrier on raised edge

Wide enough for largest vehicle

Warning signage

One Way floor arrows

Safety Barrier Design - Critical Structures



Height Restrictor, protects door

Offset bollards to create funnel effect

Reduces 90º hazard

Creates a guide through the doorway

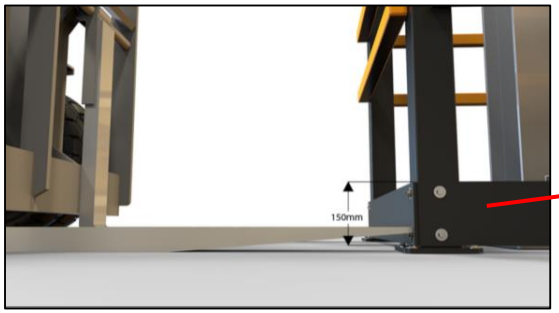
Column Protection

Ground Level Kerb

Critical Structures: Ground Level Protection

Longer than 20m straight run

Kerb barrier recommended



Kerb protects fork penetration

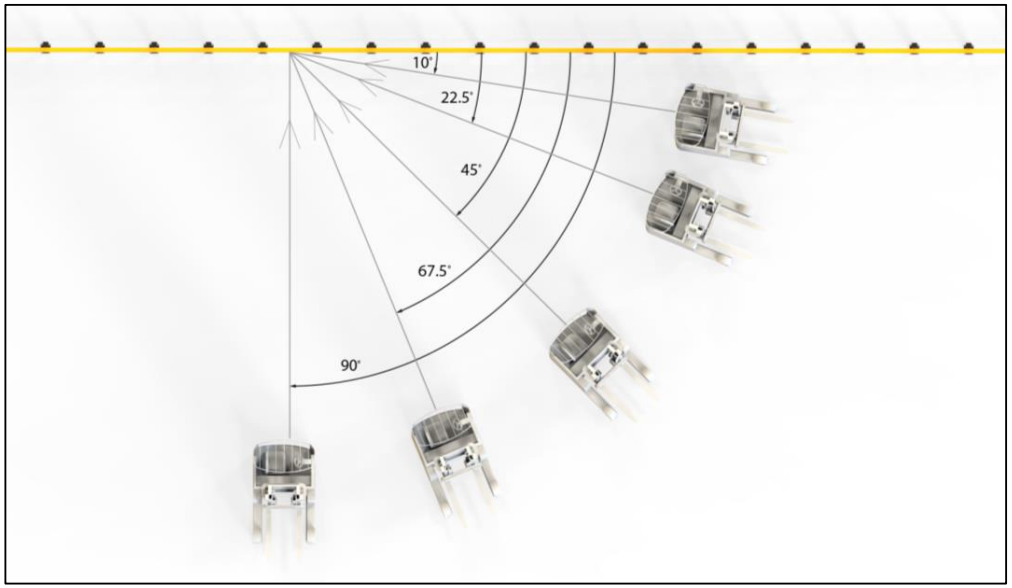
Safety Barrier Design - Selecting the appropriate barrier

1. Know your vehicle speed & mass
2. Observe and get to know the likely angle of impacts that may occur and likely impact zones
   > Base your barrier selection on the likely angles of impact
   > The larger the angle the higher the potential impact energy
3. Ensure the barrier height is correct
4. Check the barrier rating
5. Ensure the barriers are tested & certified
6. Design in control measures

Vehicle Type Fully Laden		Total Weight (kg) (lbs)	Speed (Km/h) (mph)	90° Angle Impact Energy (J) (ft.lb)	67.5° Angle Impact Energy (J) (ft.lb)	45° Angle Impact Energy (J) (ft.lb)	22.5° Angle Impact Energy (J) (ft.lb)	10° Angle Impact Energy (J) (ft.lb)
Heavy Goods Lorry		36,000 79,366	10 6.2	[illegible]	[illegible]	[illegible]	✓20,340 15,002	✓4,188 3,089
Engine Heavy Duty Forklift Truck		24,000 52,911	23 14.3	[illegible]	[illegible]	[illegible]	✓68,647 50,631	✓14,135 10,425
Heavy Duty Forklift Truck		13,050 28,770	15 9.3	[illegible]	[illegible]	[illegible]	✓16,590 12,236	✓3,416 2,519
Small Lorry		10,000 22,046	10 6.2	[illegible]	[illegible]	✓19,290 14,228	✓5,650 4,167	✓1,163 858
VNA		8,730 19,246	11 6.8	[illegible]	[illegible]	✓18,566 13,694	✓5,438 4,011	✓1,120 826
Electric Tow Tractor		8,250 18,188	9 5.6	[illegible]	[illegible]	✓11,498 8,481	✓3,368 2,484	✓693 511
Horizontal Order Picker		3,650 8,047	11 6.8	✓17,039 12,567	✓14,544 10,726	✓8,519 6,284	✓2,495 1,840	✓514 379
Lightweight Counterbalance Forklift Truck		3,570 7,870	12 7.5	✓19,833 14,628	✓16,929 12,486	✓9,917 7,314	✓2,905 2,142	✓598 441

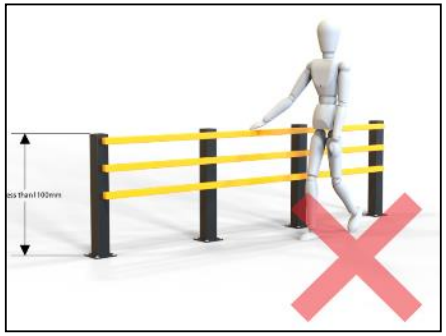
Potential energy is a function of speed and mass

Impact Angle: Kinetic Energy

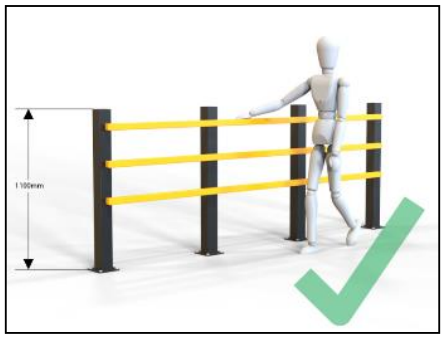


- Base your barrier selection on the likely angles of impact
- The larger the angle the higher the potential impact energy

Pedestrian Routes: Correct Barrier Height

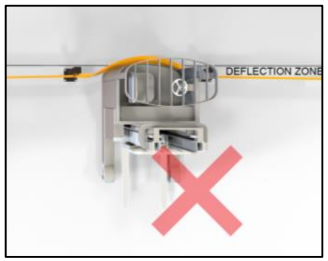


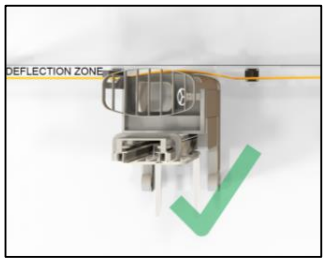
- Pedestrian Handrail can create a fulcrum
- Set too low, creates more hazards

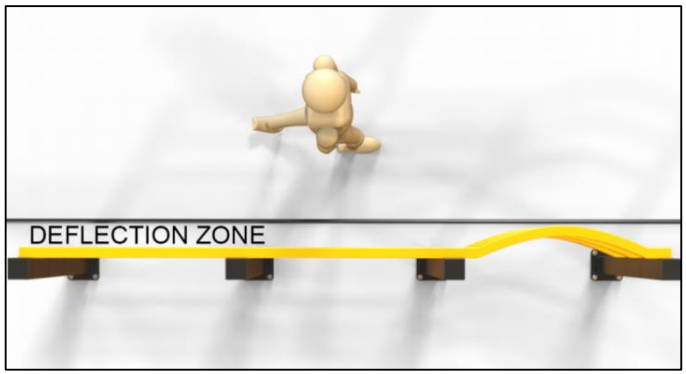


- Should be minimum 1.1m High
- Should support the weight of 2 adults leaning on it

Pedestrian Routes: Safe Zones



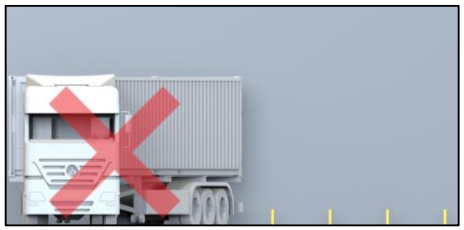




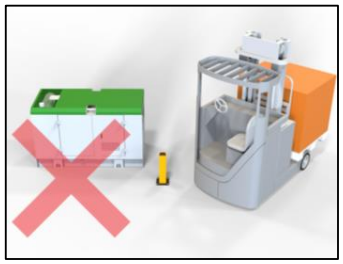
- Allow for Deflection
- Create a Safe Pedestrian Zone
- All Barriers Deflect on impact
- Hazard setting Barrier too Close to Walkway

- Shock absorbin g deflection
- Set barrier away from walkway
- Distance should be relative to impact & deflection

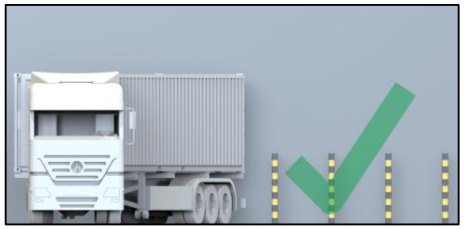
Vehicle Routes: Line of Sight



- Line of Sight
- Bollard too short
- No warning signs



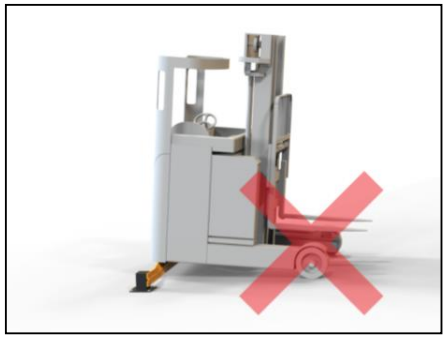
- Line of Sight
- Bollard too short
- No warning



- Bollard height increased
- Line of sight visibility
- Deterrent
- Warning

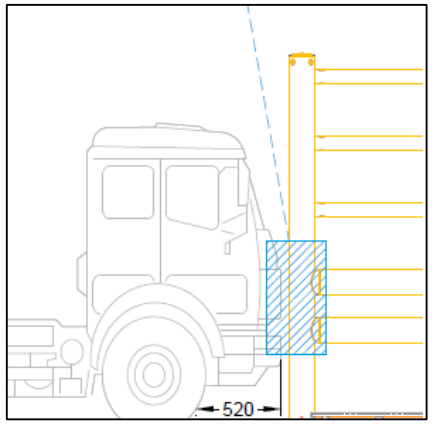
- Bollard height increased
- Line of sight visibility
- Deterrent
- Warning

Vehicle Routes: Barrier Height



- Barrier Set too low renders barrier ineffective
- Creates Topple Hazard

- Correct Height
- Effective protection

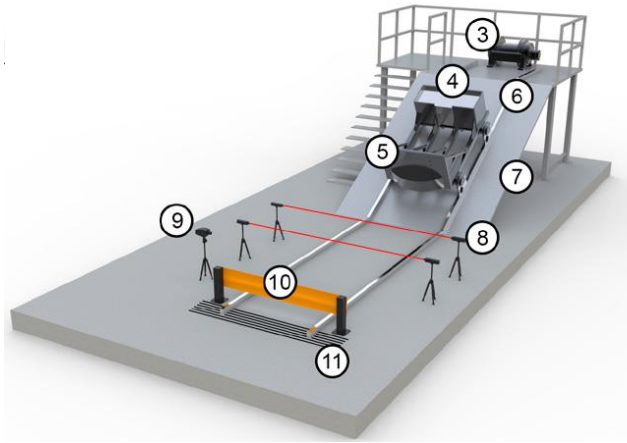


- Define Likely Critical Impact Zone
- Barrier Height Appropriate

Methods of Testing

Three types of test apparatus are acceptable:-

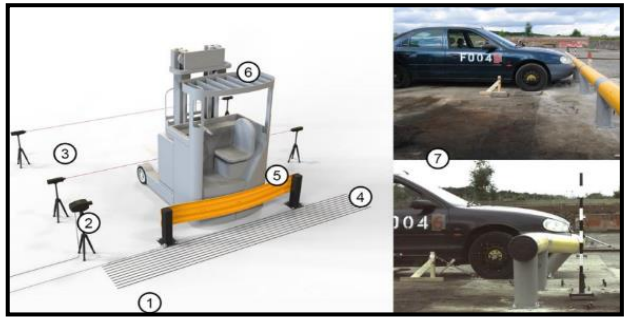
a) Pendulum
b) Vehicle
c) Sled & ramp

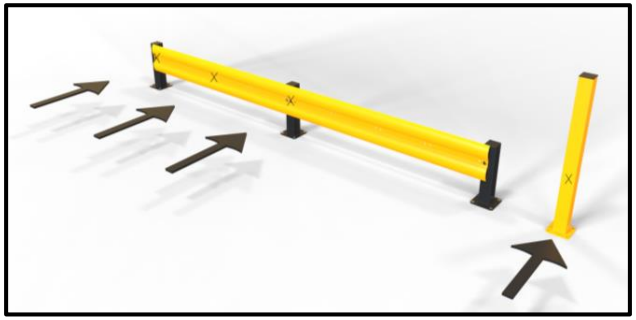


Methods of Testing

The safety barrier is exposed to a controlled dynamic motion impact and measures:-

a) Resistance
b) Deflection
c) Loads both in the fixings and the ground
d) The test should be repeated at least once with a new barrier ensuring the safety barrier performance rating and the results are consistent





Methods of Testing: Pass or Fail Criteria

Pass Criteria

a) The safety barrier has arrested the striker
b) The vehicle, sled or striker has not breached the safety barrier
c) There is no catastrophic failure in the safety barrier after the test
d) The fixing system is not damaged, remains in the substrate and has a lower pull-out force than the manufacturers rated pull-out force

Fail Criteria

a) The safety barrier does not arrested the striker
b) The vehicle, sled or striker breaches the safety barrier
c) There is catastrophic failure within the safety barrier after the test
d) The fixings fail as the tested measured force upon the fixings is higher than the manufacturers rated pull-out force

Safety Barrier Design - Selecting the appropriate barrier

Polymer or Steel

Steel / Armco

Polymer

Polymer or Steel - Protecting Profits

Minimising Material Damage

- Vehicle impact force absorption and dissipation
- Concrete floors are preserved
- Reduced risk of damage to vehicles and equipment
- Massive cost savings

Maintenance & Manpower Savings

- No re-painting
- No flakes or corrosion
- Moisture resistant
- Chemically resistant
- Food hygiene approved
- Freezer grade option
- UV stabilised

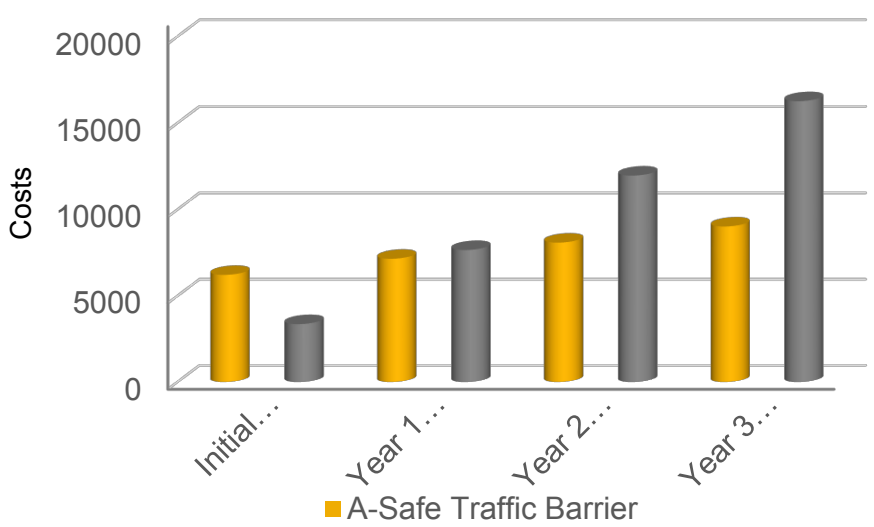
Maximising Hygiene & Aesthetics

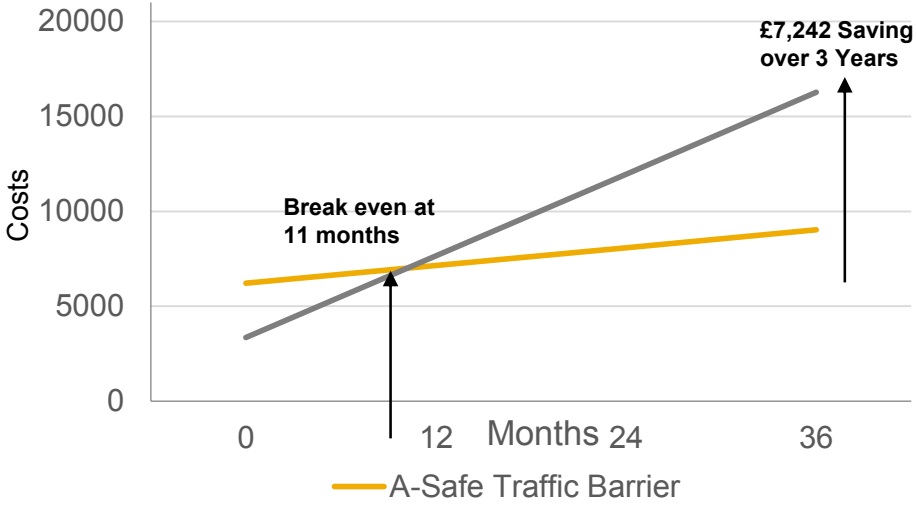
- Hygiene seals
- No joints
- No dirt, dust or debris ingress
- Self coloured throughout
- Uniform cylindricality for a pleasing aesthetic

Polymer or Steel - Protecting Profits

Gatwick Airport

£100,000 annual maintenance costs reduced to just **£3,000** over **5 years**





Calculation based on 50m of a Steel Heavy Duty Uncoated Traffic Barrier versus an iFlex Traffic Barrier in a High Traffic environment

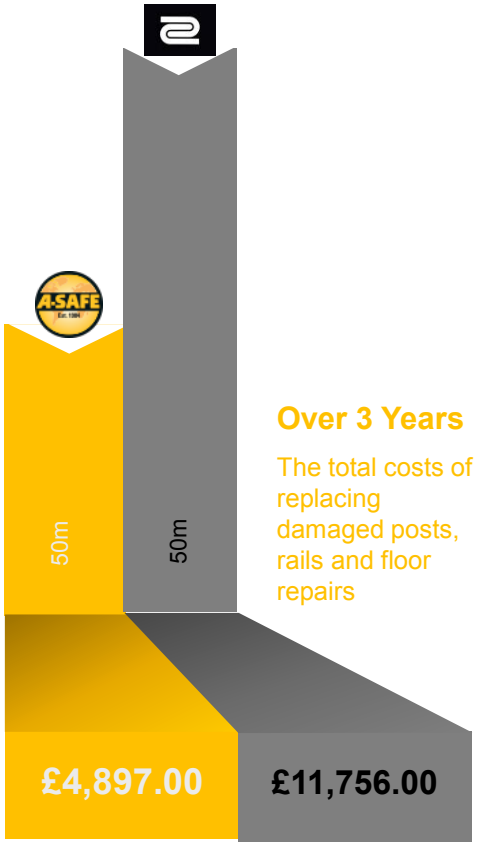
Polymer v Steel - ROI

Initial Cost

50 meters of A-SAFE Pedestrian barrier installed into a low traffic movement area

Initial Cost

50 Meters of steel Pedestrian barrier installed into a low traffic movement area



Over 3 Years

The total costs of replacing damaged posts, rails and floor repairs

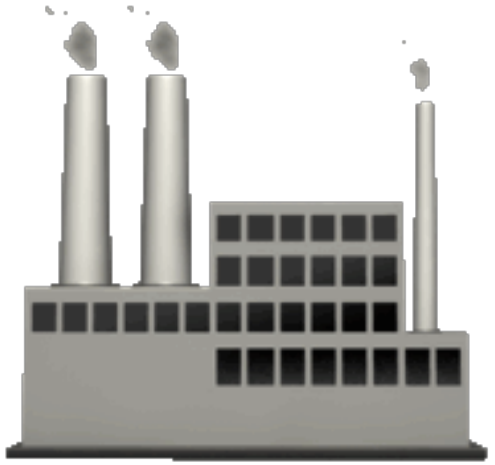
Over 3 Years

The total costs of replacing damaged posts, rails, floor repairs and painting

Polymer the Greener Option

A carbon footprint is defined as:

- The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO_2).



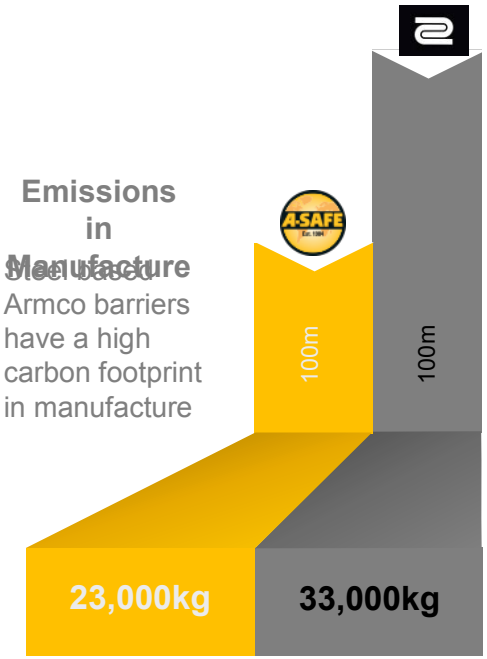
Polymer v Steel – CO_2 The Environmental Impact

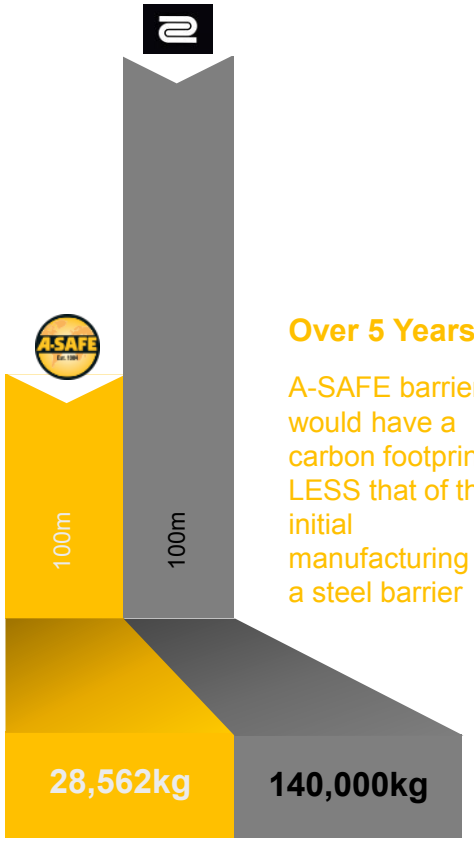
Emissions in Manufacture

A-SAFE produce considerably lower CO_2 emissions in manufacture

Emissions in Manufacture

Steel based Armco barriers have a high carbon footprint in manufacture





Over 5 Years

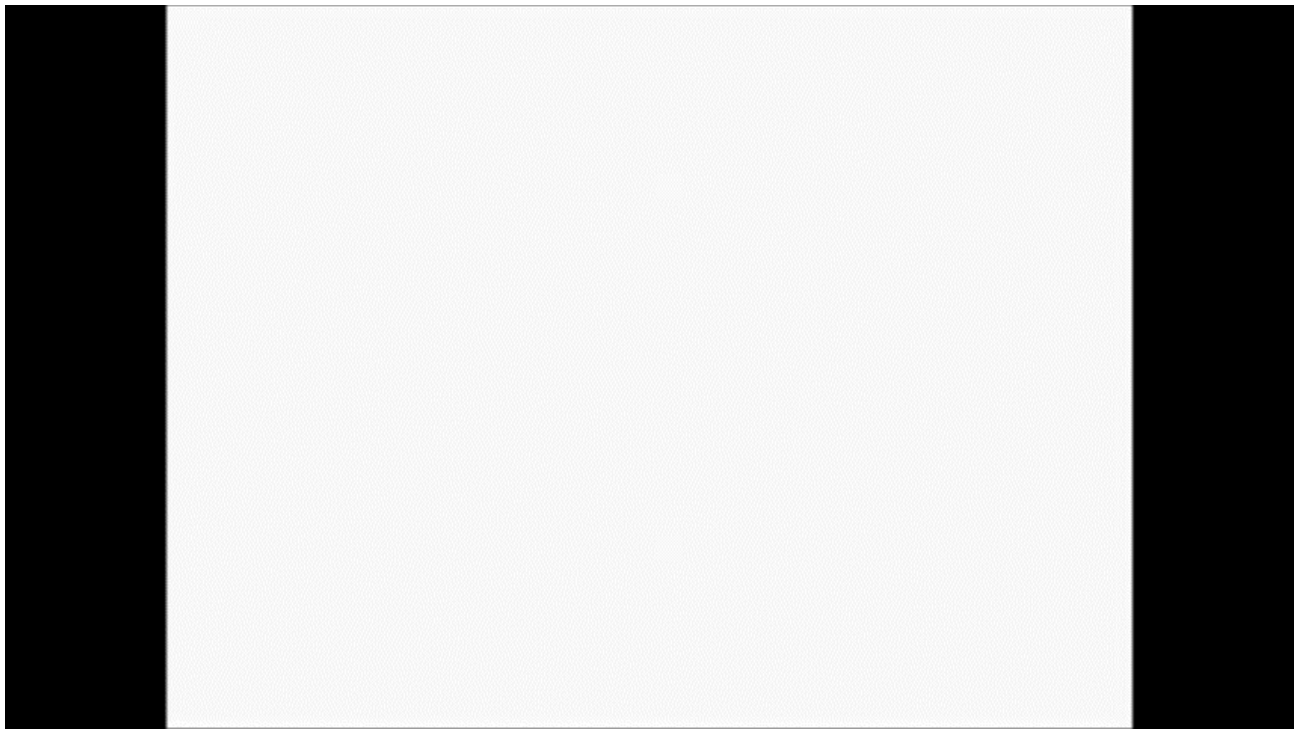
A-SAFE barriers would have a carbon footprint LESS that of the initial manufacturing of a steel barrier

Over 5 Years

Steel Armco barriers will have created over 4½ times more CO_2 than the A-SAFE barrier

In Summary

- Mixing vehicles and pedestrians increases the risk of potential accidents
- PAS 13 outlines best practice in order to:
    - Analyse workplace traffic
    - Identify risks
    - Design in safety measures
    - Correctly specify and install safety barriers



Thank You & Any Questions