Inspecting Personal Fall Protection Equipment

United Kingdom 2nd Edition

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The Brexit effect

As of 31 January 2020 the United Kingdom is no longer a Member State of the European Union. This has a significant effect because until now the manufacture, testing and supply of all types of PPE was subject to directly-applied EU law, the **PPE Regulation (EU) 2016/425**. The CE Marking scheme for product safety is European, and non-member countries are restricted in how they can use it, for example testing labs that issue CE Marking Conformity Certificates must have a presence within EU borders. The UK has created its own domestic approvals scheme and symbol, the **UK Conformity Assessment Mark** (UKCA), however during the Transition/Implementation period the UK will remain aligned with relevant EU law, so products with a CE Marking continue to be accepted into the market exactly as they were before. It is unlikely that global PPE manufacturers will quickly re-brand all their products with the new UKCA symbol, especially if there is limited space available, such as on a karabiner.

EuroNorm (EN) standards are set by EU agencies (CEN and CENELEC), and while they can be used by anyone anywhere in the world, there are specific rules in place for EU Member States. The UK *was* legally bound to publish national "BS EN" versions of every EN standard, and now it is not. It used to be prohibited from recognizing contradictory standards (such as from the USA), and now it can.

Untangling the UK's statute law framework from the EU is not a trivial task. EU *Directives* are agreed by the European Parliament but are then implemented by each Member State as domestic legislation, so for the UK they were written into Acts or Statutory Instruments, and these remain in place but with references to the European Union removed. EU *Regulations* (such as GDPR) have direct legal power, so there was never any domestic legislation required other than some tinkering around to allow for enforcement or to repeal older laws. All relevant EU Regulations have now been copied across into UK statute law, *but only as they were written on Exit Day*. The official text of all those EU Directives and Regulations has been "frozen" by the National Archives, and whenever a UK law refers to them, it now refers to that frozen copy. The most significant piece of new domestic legislation for us is ***The Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019*** [SI 2019:696, further amended by SI 2019:1246]. This updates LOLER and the PPE Regulations, along with around 30 other workplace safety laws. It creates the UKCA system and ensures that during Implementation we can continue to buy and use European products.

However the UK Government has indicated it wishes to diverge from EU rules and regulations, and since the UK is bound to its "frozen" copy of EU law we may diverge because Europe makes changes and the UK doesn't. It could be that as part of future trade deals, completely different schemes and levels of product safety could be allowed into the UK PPE market. Only time will tell. If and when the final picture is clear, a third edition of this book will appear!

- **UK Acts and Statutory Instruments are free to view at www.legislation.gov.uk**
- **EU laws as written on Exit Day are free to view at webarchive.nationalarchives.gov.uk/eu-exit**
- **BS/EN standards can be sourced from the British Standards shop at shop.bsigroup.com**
- **General guidance and enforcement advice is provided by HSE at www.hse.gov.uk**

Declarations and Certificates of Conformity

Before PPE can be placed on the market in the UK (either new PPE made by a manufacturer established in the UK or PPE, whether new or second-hand, imported from a third country), it must satisfy the Basic Health and Safety Requirements [BHSR] that used to be in EU Regulation 2016/425 and are now part of PPE2002. As the name suggests these are the absolute minimum levels of performance allowed, and they run to ten pages of text.

Some BHSRs are very simple, such as "*PPE must be as light as possible without prejudicing its strength and effectiveness*" and some are extremely specific, such as "*PPE intended to prevent falls from a height… must be designed and manufactured so that, under the foreseeable conditions of use, the vertical drop of the user is minimised to prevent collision with obstacles while the braking force does not attain the threshold value at which physical injury or the opening or breakage of any PPE component which might cause the user to fall can be expected to occur.*"

For Category I PPE the manufacturer can write a "Declaration of Conformity", a simple document that states they believe their design meets the BHSRs, though they should have documents on file to back up their claims and they must operate a quality control system for manufacturing. They can stamp on the UK/CE Marking without asking anyone else for permission. This keeps the cost of "trivial risk" PPE at a sensible level.

For Category II and III PPE they have to *prove* it complies by sending plans, raw material specs, production process instructions, etc. and several samples to a government-regulated lab called an "Approved Body" (in the EU the phrase is "Notified Body") for testing. If it passes, the lab issues a Type Examination Certificate [TEC], saying that the item performs acceptably and is therefore legal to place on the market. The TEC allows the manufacturer to apply the UK/CE Marking, but with one important caveat—***the lab's serial number must always be shown immediately next to the Marking***. The manufacturer's quality control system must be watertight and for Category III there are regular audits.

There are two routes for testing a new product. If a relevant "designated standard" exists, which for the time being effectively means a EuroNorm EN standard, then the lab simply performs the tests described within it. Passing those tests gives *presumptive conformity* to the BHSRs, and the certificate is issued.

If no such standard exists, for example if the product is a completely novel design or the relevant standards have been revoked, then the manufacturer has to submit using the ***technical file route.*** They must assemble documents that show their product directly meets the BHSRs, and the lab then devises whatever tests it sees fit to check those claims. It is a very long and expensive process compared to testing against a standard, but it's often necessary.

TECs last for five years, or until the standard(s) against which the tests were performed get revised. **The TEC is a single piece of paper that covers an entire production run and is sent by the test lab to the manufacturer**. Remember that – it's important. The user has no right to see the TEC, only law courts and government agencies have. The idea is that the UK/CE Marking and lab serial number is enough proof that somewhere in the manufacturer's office there's a certificate with impressive lettering and signatures. There is some logic in <u>not</u> publishing the TEC, since if you can see what it looks like you could fake your own copies!

Some manufacturers include a "statement of conformity" in the instructions, and this can really confuse people, especially insurance brokers as they tend to assume this is a copy of the TEC – but it's not. As far as the user is concerned the only slip of paper legally required in the box is the usage instructions. Sometimes the instructions and the box are one and the same!

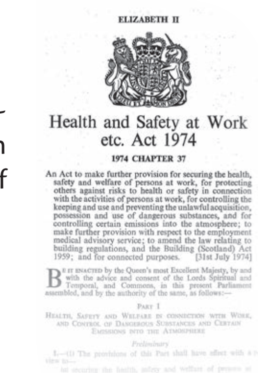
> **A "Certificate of Conformity" for lifting equipment under SMSR is an entirely different matter. Lifting equipment is often individually proof-tested so you can be given the actual hand-signed original piece of paper, and must keep it safe. See page 16.**

Workplace laws about PFPE

So far we have basically be talking about product safety and free trade; to ensure that (hopefully!) you can buy a helmet or a lanyard and be confident that the safety claims aren't fake, and that it is compatible with your other gear. *In theory* it means you cannot go out and buy an American lanyard designed to OSHA standards, but the Internet will sell you pretty much anything you want. On a good day the "import" will be stopped by customs and you'll be prosecuted by Trading Standards. On a bad day it'll get delivered and when you fall off the roof your anchor point will snap. Did we mention that OSHA lanyards create larger forces than EN anchors are designed to support?

For anyone using PFPE outside of the workplace, that is pretty much it. For workers there are a few pieces of legislation that have a lot to say about what happens next:

Health & Safety at Work etc. Act 1974



HSWA enshrines the responsibility of employers, employees and the self-employed regarding health, safety and welfare in a workplace setting. In addition to the many subordinate Statutory Instruments, the Act itself defines very important duties which apply to every UK workplace and worker.

Employers must:

- ☑ ***Provide and maintain machinery, and equipment***
- ☑ ***Provide and maintain safe systems of work.***
- ☑ ***Ensure that substances are used, handled, stored and transported safely.***
- ☑ ***Provide the necessary information, instruction, training and supervision via method statements, policies, product instructions and staff training.***
- ☑ ***Provide and maintain adequate facilities and arrangements for employees' welfare.***
- ☑ ***Maintain a workplace that is safe and without risks to health.***

Employers and the self-employed have a responsibility for the health and safety of ***visitors*** (whether authorized or not), who may be affected by their work activities.

Employees (and the self-employed) also have a legal duty to;

- ☑ ***Take reasonable care of themselves and others.***
- ☑ ***Co-operate with their employers on matters of health, safety and welfare.***
- ☑ ***Follow company procedures.***
- ☑ ***Use PPE correctly and appropriately.***

Any person who erects or installs any article for use at work must ensure that, *so far as is reasonably practicable*, nothing about the way in which it is erected or installed makes it unsafe or a risk to health when properly used.

Inspecting metal components

Apart from things like rope, all your items of PFPE will have metal in them somewhere. A harness may only have a few buckles, but a karabiner or pulley is pretty much nothing else. In this section we'll look at the general things that can happen to metals and how they can impact on safety – what we say applies just as much to those buckles as to the pulley. In later chapters we'll expand on some of the information when we discuss individual types of equipment, but whenever we talk about rust, it's the same rust we're looking at here!

Left alone and in perfect conditions, the metals used in PFPE don't degrade over time. A steel Maillon Rapide stored in a totally dry environment will be identical in 100 years. The problem is that stuff is never stored "perfectly", and using it will cause damage too—either from accidents or general wear and tear. The items you'll be inspecting are rarely new, so it's your job to decide if that wear and tear is **acceptable or not**, and that can be harder than you think since the processes are very slow. Is the item safe today? How about tomorrow? ***Next week?*** Things rarely break into bits while they're on your desk, so you can be looking at a pulley with a ***very tiny*** wobble and trying to decide what "too wobbly" means. With metals it's surprising how bad they can look and still be safe, and how unsafe they can be and still look like new. The biggest point in your favour is that manufacturers know this too, and design their equipment to be several times stronger than it needs to be.

PFPE tends to use only a few types of metal, partly because of the need for strength but also because a lot of the product standards demand very high resistance to corrosion. You can make a karabiner out of steel if you want to, but not without galvanising or electroplating it. We tend to see steel (both conventional and stainless) used a lot in 'industrial' PFPE where the weight and style isn't a major concern, and people want something that lasts as long as possible for as little cash as possible. Sport climber prefer alloys (aluminium-based in most cases) as they're sexier and lighter, even though they don't last as long in harsh use. Very occasionally you find titanium which is incredibly hard and strong, but also incredibly expensive. Copper and brass sometimes sneak in for things like rivets or bearings, but they're not strong enough for use in the load-bearing body itself.

We'll look at four main things in this section, **Corrosion, Wear, Deformation** and **Fatigue.**

There are other things that can cause problems but which are either impossible to inspect for (like internal faults in the metal only visible on an X-ray) or which wouldn't happen to the item because of the way it's used – if you throw a karabiner into a cauldron of molten steel it's not going to work properly, but hopefully you know that already!

Protection against 'invisible' faults such as a bad casting is provided by the manufacturer's quality control and testing before sale, and also the way an item is used – for example in rope access we will always use two points of contact just in case one of them fails unexpectedly. It very rarely happens but it's possible in theory because the items are being loaded every day. Fall arrest devices don't need a backup as they're not loaded in normal use, so aren't susceptible to fatigue. They can still degrade over time, but that's what all this periodic inspection stuff is for!

Corrosion

Apart from textile damage, corrosion will be the most common 'problem' you encounter when inspecting PFPE, and so we need to look at the process in some detail but even so we're only scratching the surface. [Puns-R-Us™ apologises for that sentence]. There are many textbooks dedicated to corrosion but even their authors admit they don't know everything. At school, it seemed simple; iron reacts with water and oxygen, and turns into rust. In reality it's a lot more complicated. For example did you know that a karabiner will rust faster if it's in a room where someone is smoking? Did you know that contact with plastics and wood can corrode metals? That a smooth surface lasts longer than a dimpled one?

The chemical reactions can be deeply complicated and we'll skip over the formula as it's not vital to know the molecular pathways of corrosion in order to inspect a pulley. Here we only care about what ***effect*** corrosion has on an item of PFPE. The somewhat strange answer is that the most dangerous types of corrosion are often the ones that look unimportant, but a karabiner completely covered in rust may well still be safe.

Until the diamond karabiner is invented it'll never be possible to entirely prevent corrosion in some environments (such as with salt water spray), but there's no reason why a karabiner or harness buckle used in normal conditions, including a dash or two of nasty weather, can't be kept rust-free for decades. Corrosion problems arise when someone uses the wrong type of material, or puts materials in contact which don't agree with each other. Most of the time that'll be you, but occasionally it's a manufacturer. Knowing how corrosion works will help you avoid spending money on a product with a design fault!

We'll start with a definition, which will hopefully make you think for a moment:-

Corrosion is a process whereby the surface characteristics of a material are changed by the action of an external chemical or environmental influence.

The thoughtful will notice we didn't use the words "metal", "rust" or "oxygen" – because corrosion happens to plastics as well as metals, and rust is only one small subset. Oxygen is often involved but doesn't have to be. Corrosion also doesn't have to be a bad thing, as anyone who's seen a copper-clad roof will know. Sometimes corrosion makes surfaces harder (as in the oxide layer on a piece of aluminium), sometimes it makes them bigger (as in the rusting of iron), but whether it's a **problem** depends on what you use the item for! Without the artificially-induced oxide layer on aluminium parts (called anodising but nothing more than intentional corrosion) they would corrode in days and be useless as…anything. The same layer forming unexpectedly on the fuel cells inside early Magnox nuclear reactors nearly resulted in catastrophe.

Ever wondered why you aren't allowed thermometers on planes? Mercury blocks the formation of that oxide layer, and also reacts with the aluminium metal to form a powdery amalgam and an incredibly toxic gas. ***A single drop of mercury can corrode its way through a 6-inch block of solid aluminium***, like something from Alien.

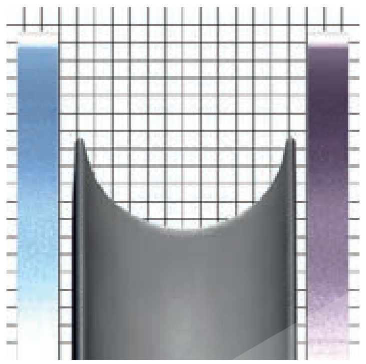
So, with that comforting image in mind let's take a tour of the various types of corrosion, starting with the one you're most familiar with…

Next, you should check the surface of the sheave for wear. Despite the sheave rotating, it is still subject to wear from the rope or wire running over it, and over time it will get smaller.

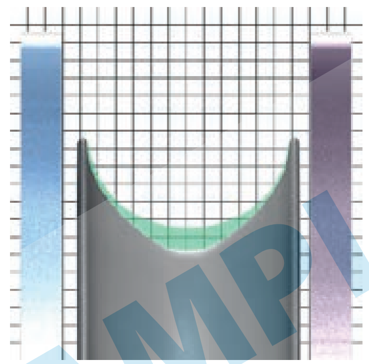
Pulleys have three basic wear problems to look for:-

Diameter limits

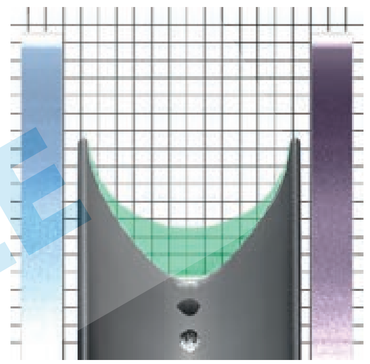
A sheave is a cylinder with a hole in the middle, so if you wear the edges away eventually you'll expose the bearings. Pulleys have a sheave with a groove (for PFPE this is always semicircular in cross-section to fit the rope) so a major loss of diameter will cause the bearings to break through at the centre of the groove. Although you cannot normally see the size of the bearings (unless the cheeks have perforations), the manufacturer should indicate in their instructions what acceptable level of wear is permitted. Any sign that the bearing's case material has broken through is grounds for destruction, but it's also important for the cross-section of the groove to match the cross-section of the rope – this is what maintains rope strength in use. If a pulley is used on rope with too small a diameter, the groove is worn into a narrow V-shape and will present wear problems if used in the future on a 'correct' size of rope. When to fail a worn pulley is a matter of judgement, but a significant change in sheave profile is always a concern.



Original profile of sheave (shown in green on right)



Some wear, but within acceptable limits



Excessive wear. Bearing is becoming visible.

If the rope is too *large* a different effect occurs, called **knife-blading**, where the edges of the sheave are worn thinner and thinner, even though the overall diameter may not change by much. This eventually leads to the edges being polished into razor-sharp peaks, and you have two spinning knives instead of a pulley. Not good.

Sheave contact wear

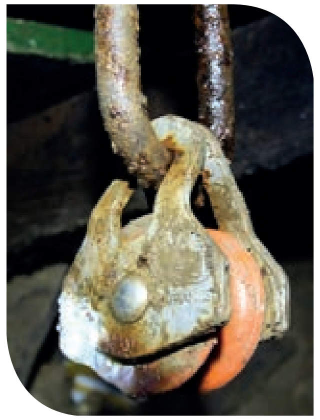
Normally the sheave only touches the rope and its bearing; never the cheek plates or other objects, and so is free to rotate. However in some situations it's possible for something to press against the sheave (typically it's another item of PFPE such as a karabiner), and if the load on the pulley is high enough the sheave will still rotate. The result is very aggressive wear of the sheave (again a knife-blading process) at the edges of the rim, which can produce an extremely sharp corner in a matter of minutes. This again presents a real risk of damage to the rope and to the user. Some pulleys are more susceptible than others, as it depends how far the cheeks extend beyond the sheave. Undamaged pulleys should have smooth radiused edges, in the photo you can see the sharp square profile caused by the aluminium sheave rubbing against a concrete wall.

With swingcheek pulleys there needs to be clearance for the cheeks to rotate, and even with modern manufacturing this can vary a bit. As a result, some swingcheeks are looser than others. It's actually not a major problem as in use the cheeks can't move even if they wanted to. Some swingcheeks, when closed, touch together and others don't.

Tyre-treading

This happens when an alloy pulley sheave is used on steel wire, and the softer metal of the sheave is impressed with the weave of the wire, resulting in a tread pattern. **If it's only a slight marking then it's not a problem**, but deep tyre-treading can create sharp points on the surface, which will increase wear on textile ropes. If a pulley has been badly marked by tyre-treads, either scrap it or reserve it for use on wire rope for the rest of its life. You can buy pulleys with steel sheaves specifically for use on wire rope, so if you find an alloy pulley with damage it can be argued that as well as causing a problem for future users, it's also a misuse of work equipment. Product instructions will specify what types of rope or wire can be used with a particular pulley, and the user is ***supposed*** to abide by them!

Deformation is often the only sign a pulley has been overloaded. Fixed pulleys are easier to check as they're more likely to suffer from it—under load the two cheeks are squeezed towards each other as they are pressed into the curve of the karabiner supporting them, and they can become permanently bent. Designers allow for this by making the shell of a fixed pulley thicker and incorporate embossed curves, but it's still possible. A batch of the same model of fixed pulley should all have identically-shaped bodies, give or take half a millimetre of tolerance. A swingcheek pulley's cheeks are ***already*** touching each other, and so under high loads have no reason to bend. The only signs of deformation you are likely to see are caused by the stress placed on the cheeks by the pulley axis – under load it can bend the cheeks slightly, so they no longer lie parallel. On a double-ended 'becket' pulley this can exhibit as a difference in clearance as the cheeks are rotated 180 degrees.



Corrosion of pulleys is similar to connectors – mild surface corrosion of the cheeks and sheave isn't important, but invisible corrosion of bearings and axis pins certainly is. It's rare to find a PFPE pulley with all-steel construction, and the vast majority use aluminium both for the cheeks and the sheaves (though steel-sheaved pulleys are used for running on wire rope as we've already mentioned). Axis pins and roller bearing are always steel, and bushes will be alloy or plastic. It's a little more common to see 'plain' alloy sheaves where the anodising isn't deep or coloured, so surface corrosion of the metal can often be seen where a pulley has been stored in damp conditions – but again this isn't critical as it has no impact on strength. A pulley which shows significant (or volumetric) corrosion as in the photo should be scrapped both for the potential loss of strength and because the bearings are almost certainly ruined!

Summary checklist for pulleys and edge rollers

- ☑ *Are the markings present and legible?[not applicable for edge rollers]*
- ☑ *Does the sheave/roller rotate smoothly, freely and without noise?*
- ☑ *Is the pulley free from areas of wear that have removed noticeable amounts of metal?*
- ☑ *Are the sheave diameter(s) within the manufacturer's specified limits?*
- ☑ *Are the sheave rims smooth and without burrs or sharp corners?*
- ☑ *Are the sheave surfaces smooth and unmarked by tyre-treading etc.?*
- ☑ *Do swingcheek sides rotate as expected and are they free from distortion?*
- ☑ *Is the item free from contamination that affects operation or presents a hazard to the user?*
- ☑ *Is the item free from significant problems of corrosion other than light surface tarnishing?*

Lifting shackles and chain

We're going to be quite specific here, and consider only products that are likely to be intermingled with PFPE, for example in rope access and rigging. The principles of inspecting steel shackles and chains are the same for all sizes, but the person signing the Thorough Examination for a 500-tonne shackle is going to need approval from their boss and their broker, if nothing else because replacing it will cost at least £10,000.

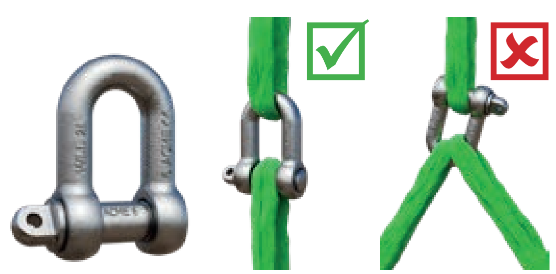
EN13889 Grade 6 lifting shackles

Forged steel shackles are the de-facto standard connector for all general lifting operations. They are rugged and reliable if used correctly. ***Type X*** shackles have a hexagon-head bolt, nut and cotter pin, for use in permanent installations, and ***Type W*** shackles have a collared pin with a finger grip that is screwed in by hand. The pin on a type W shackle must not be tightened using tools, and should be easy to fasten. Sticking threads indicate the pin or shackle has been deformed and must be scrapped.

Shackle bodies must be marked with the WLL in tonnes (often it says SWL but that's wrong), the material grade number "6", a manufacturer's symbol or name and a traceability code. The pin must be marked with the grade number and the manufacturer's symbol or name. **Pins and shackles should always be kept together as a pair, since the LOLER records will not refer to them separately**.

There are many specialist designs of shackle for connecting to unusual shape hooks or lifting eyes, and some that include swivels or quick-release mechanisms. Here we only consider the two basic styles:

Dee shackles are designed for loading in one direction only, so are used to connect two parts together (e.g. a sling and an eyebolt). They can be fractionally lighter and cheaper than a bow shackle for a given WLL, but have no other real advantage.



Bow shackle bodies can hold two or more connections but the angle between them must be less than 120°. The pin itself should only support one link. Bow shackles are the most common general-purpose rigging connector given they have the widest range of usage patterns.

Shackles can be joined together body-to-body, body-to-pin or if necessary pin-to-pin. Often the pin of a shackle links to a crane hook or the eye of a hauling rope. If the shackle is large, it will have a tendency to rotate off-axis. Although not essential, it is recommended in EN13889 that spacing washers are used to keep the load in the centre of the pin, especially if the attachment is permanent.

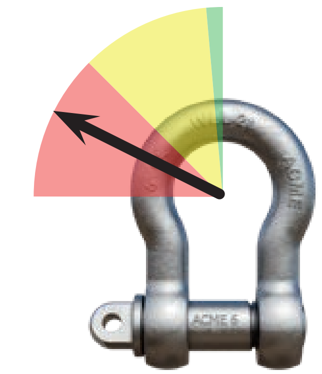
The length and diameter of the pin is defined by EN 13889 for each WLL, so if a shackle is not wide enough to fit around something, the only option is to select a shackle with a larger WLL.

De-rating bow shackles loaded off-axis

A shackle's marked WLL is for an inline pull. In some situations, such as when fastened through a pad-eye, it may be unavoidable that the load is slightly off-axis and this creates a bending force on the pin, reducing the effective SWL by the factors shown here.

Only use bow shackles off-axis!

Load angle degrees	De-rate SWL to
0 — 10°	100%
10° — 45°	70%
45° — 90°	50%



EN818-4 Grade 8 chain slings

Lifting chain slings have factory-fitted connectors on each end (hooks, clevis pins or rings) and must never be joined directly through the links. Chains for lifting undergo extensive testing, and are very different from the general-purpose chain you can buy in DIY stores. They often come with factory-fitted hooks as in the photo top left.

For metal lifting accessories and chains, the Grade number gives the ultimate breaking strength in hectonewtons/mm². This means that for every square millimetre of cross-section, a Grade 8 component will support 800 Newton, or 80kg. Grade 10 supports 100kg, and so on. This strength depends on the alloy, how pure it is, and how it has been heat-treated; so the higher the grade, the stronger it is. Chains for lifting must be at least Grade 8, and steel shackles at least Grade 6. In America the ASTM standards multiply by ten, so an EN 818-4 Grade 8 chain would be ASTM G80.

EN1677-4 Grade 8 master links

These are oval forged or welded steel rings, used to bring together several parts of a lifting system into a single point, often the "root" of a bridle or anchorage. They must be marked with the grade number "8", manufacturer's product code and name and a traceability code but they are ***not*** marked with a WLL. That information is in the user instructions. They are used in factory-made lifting bridles, where several can be joined together as shown here. Since they are solid objects, all connections made on-site require shackles. ***Do not attach fabric lifting slings or ropes directly to a master link***. Because they have a relatively small cross-section, they can act as a sharp edge.

The equivalent in fall protection PPE is the **rigging plate**, a solid metal plate with a series of holes, designed to keep karabiners separated from one another so they can be unclipped even if others are under load. There is no EN standard for rigging plates but they will have a UK Marking via the technical file route. As items of PPE they are marked with an MBS but they can be used for lifting purposes with a suitable factor of safety (at least 4× to comply with SMSR). Provided the plate has radiused edges, ropes and slings can be directly attached to a rigging plate.

Type C devices — “horizontal wires” and Type D devices — “horizontal rails”

These are by definition “installed systems”, and so should be selected and designed by a trained professional engineer. Often they will use the same type of fixing as for Type A (anchoring the wire or rail at the ends and various points along the route), but the details of inspection and testing are different. There is no absolute requirement for a tensile test unless the manufacturer specifies one, so the periodic inspection is normally a visual and tactile examination of the system, including all brackets, fixings, and any end-line energy absorbers or shuttles supplied with it. You need to be fully aware of the user instructions, and follow all the rules they set down.

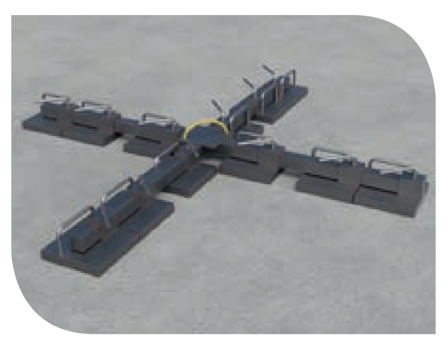
The energy absorber fitted to the end of a Type C system is not the same as the absorber on a lanyard. It is there to protect the system anchorage points from overloads. Type C systems must always be used with an approved fall arrest lanyard. They cannot be used for work positioning or suspension, so they never have Thorough Examinations.

In contrast a Type D rail system is often used for rope access and so it requires a TE and shorter intervals between inspections. The labels for Type C and D, as with Type A, must clearly explain the permitted uses for the system and the number of users it can support.

Type C and D systems are permanent, so they must NOT have a UK/CE Marking. They are not PPE.

Often manufacturers will state that inspector training is required, particularly for Type C where it is common to be told to measure tensions, dismantle components and pull-test the fixings as part of periodic inspections. Also, because of the wide variation in design and installation, only a trained inspector/installer can confirm the system is configured correctly. Are the spacings between intermediate brackets too wide? Is this the correct swaged ferrule? Does a two-person system need a different energy absorber? ***Don’t be afraid to admit you aren’t competent.***

Type E devices — “deadweights”



Deadweight anchors are often neglected as they are physically cumbersome to move about, and so spend their lives exposed to the elements and unloved. They should have corrosion protection of course, but it can never be perfect. Eventually the pins or bolts holding each section together will corrode, and part of the periodic inspection should include checking each one (and lubricating if required). The other obvious point is to check if the device is all there or not—many are based on a set of metal weights secured to a steel frame, and they often go missing. Some have a range of assembly configurations depending on use, so consult the instructions for details.

It’s possible (but rarer) to use a liquid or granular material as the ballast (water, sand, etc.) in which case the device should be failed if it shows any signs of leaking or the ballast is below the approved level. It’s obviously not possible to weigh a deadweight anchor in-situ, so some means of telling if it’s “full” must be available.

These products are PPE and so must have a UK/CE Marking. The lawyers decided they were “portable” enough to qualify, even though it can take an hour to move one onto a rooftop!

Summary checklist

- ☑ *Are the markings all present and legible?*
  - ☑ *Type B and E must have a UK/CE Marking. Types A, C and D must not.*
- ☑ *Is the anchor device installed in a position and configuration approved by the manufacturer?*
- ☑ *Is the anchor device installed in a position which can be accessed safely by the user?*
- ☑ *Are all the fixing points secure and in good condition?*
- ☑ *Is the device from significant problems of corrosion other than light surface tarnishing?*
- ☑ *Is the base material around each fixing point in good condition?*
- ☑ *Type A: Where required has the device passed a 6kN tensile test?*
- ☑ *Type A: Where required has the device been removed and inspected?*
- ☑ *Type B clamps and “pods”: Is the device assembled correctly and with no missing parts?*
- ☑ *Type C: Is the wire from deformation which suggests possible overloading?*
- ☑ *Type C: Are the user instructions marked on or near the product?*
- ☑ *Type A, D and E: If used for rope access, is the system configured correctly for twin-anchor working?*
- ☑ *Type C and D: If shuttle units are fitted to the system, are these also in safe working condition?*
- ☑ *Type E: Is the device frame or ballast casing free from damage or cracking, especially around welds?*
- ☑ *Type E: If the device has a contact surface specific to certain base materials:*
  - ☑ *Is it the correct type and the same on all elements?*
  - ☑ *Is it securely bonded and in good condition?*
- ☑ *Type E: If the device uses sets of solid weights are they all present and correctly attached?*
- ☑ *Type E: If the device uses liquid or granular ballast is the device full and free from any leaks?*
- ☑ *Is the inspection paperwork correct (PPE or lifting equipment depending on use)?*

Not what you want to see!