



THE ULTIMATE SAFETY GUIDE FOR RETAIL SHELVING.

*Includes check lists to audit your shop safety.

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1. Why the 'Ultimate Safety Audit for Shop Shelving'

a. About the author.

Andy Magrini has 20 years' experience in the shop shelving sector: his family business is CAEM, an industrially scaled manufacturer of shop shelving which has clients from across the world.

The Magrini family has always prided itself on the quality of its product and its responsibility to provide safe, reliable shelving and accessories that exceed standards and ensure the best in safety for its customers and theirs. Unlike large corporate companies, running a family business connects you face to face with customers on a more personal level, hence extra care is always taken.

b. About this white paper.

There are many shelving manufacturers in the market today, some good, others less quality oriented. Shop shelving is considered a commodity, since it is easy to find and easy to put up. But, not all products are made equally well and even when it they are, reliability can be seriously compromised through incorrect fitting and lack of maintenance.

This white paper looks at the differences between different shelving styles, best practice in the assembly of these systems, the importance of maintenance and ensuring that shelving is kept at it's best. This together with the mistakes that could easy lead to failure.



Correctly manufactured and installed shelving should be attractive, safe, strong and reliable over many years of use.

The idea on sharing this knowledge is to raise awareness of what 'shop shelving' really means and what considerations should be made when purchasing it and during its life time. It is about ensuring the safety of staff and the end consumer.

c. Look at it: Does it do the job?

To outline the importance of choosing the right solution and the right installer, we shall first consider the categories of people that the shelving will interact with:

- The manufacturer of the shelving
- The fitters
- The retailers
- The retailers' staff
- The consumer

Though the average buyer or consumer may not consider it, each of these needs to play their part in keeping people safe. Manufacturers need to ensure their designs are fit for purpose and they are educating the fitters on any limitations and the correct ways to install their solutions. The fitters need to ensure they are aware of these installation rules and ensure that they are followed.

Retailers also need to be aware of the limitations and maintain the shelving properly to ensure that it continues to serve the store as it should, and staff and consumers are kept safe.

Luckily we don't hear too often about accidents in stores, since most of them simply cause minor injuries or distress. However there have been cases of 'near misses' that could have easily resulted in a fatality and even where lives have actually been lost.

Just consider the pure numbers of people who interact with your shelves over their lifetime. For example, if the average large shop has 1500 visitors per day, that means that more than half a million people every year are exposed to your shelving and risk injury if they are not installed or kept correctly.



Avoid failure by considering the forces you are applying to your shelving.

2. Principles of how shop shelving works

a. Weight loading

Modular shop shelving, often referred to as 'gondola shelving' is normally manufactured in mild steel (not stainless steel). The steel components interconnect to each other to make a complete self-supporting structure. In some cases a manufacturer may adopt screws or bolts to guarantee such connections are reliable, in other cases bolts are avoided by some clever engineering. The more gondola shelving is 'bolt-less' the more attractive it is to fitters due to its ease and speed of assembly.

Depending on the design of the individual components that make up the shelves, manufacturers adopt different thicknesses of steel. However there is more to mild steel than its thickness. Is it called tensile strength. The capacity of the material to resist stress and deflect, without breaking its internal structure.

A steel sheet is flexible, like a road bridge. Under stress (weight) steel will deflect. The crucial factor is: when the load is removed, will it go back to its original shape?

If not then the steel has broken both its physical and chemical structure beyond remedy and must be replaced. If yes, the structure has not broken, however the amount it did deflect may create problems.

In a typical gondola there is a cascade of components that ultimately hold the weight on the shelves. It is imperative that shelving is designed so that if anything has to fail, it is a single shelf and not the entire structure.

From the structure to the shelf, these elements take the load stress. The higher they are in the hierarchy, the stronger they should be:

- Upright + Base Connection:

In such little space, all the weight on the suspended shelves is transferred to the floor (why are your ankles so much bigger and stronger than your wrists?)

- Upright Deflection:

The vertical pillar takes all the load from the shelves and brings it to the Upright+Base connection. This must be fit for the job! (why are taller trees wider than lower trees?)

- Bracket Deflection:

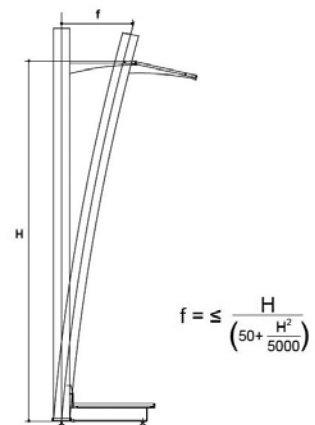
A pair of brackets bring the weight from the shelf to the upright. Why the typical triangular shape? Because the more they get near to the upright, the more they accumulate weight (why is your upper arm bigger than your forearm?)

- Shelf Curvature:

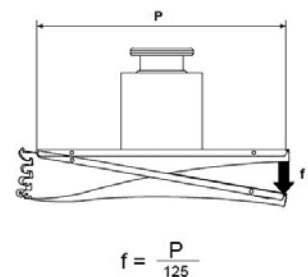
The shelf needs to hold the product safely. The deeper and larger it is then the more challenging is to avoid deflection.



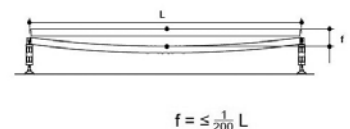
DEFORMABILITÄ DEL MONTANTE
DEFORMABILITY OF UPRIGHTS



DEFORMABILITÄ DEL PIANO SOSPESO
DEFORMABILITY OF UPPER SHELVES



DEFORMABILITÄ DEL PIANO BASE
DEFORMABILITY OF BASE SHELVES



As you can see in this example, the extreme weight causes the brackets and the upright to flex.

In designing and testing the above 4 elements, engineers concentrate on two main aspects to confirm the permissible weight loading: the breaking point (even with some abuse, no shelving component should ever reach the inner steel breaking point) and the acceptable deflection (imagine a shelf made of a rope: it will never break, but it will bend too much to hold up the products safely).

When you are merchandising, always try to understand the forces that will be exerted on the shelving. In particular consider the shelf depth: the deeper the shelving the more the structure will be under stress despite the wider shelf surface easily accepting more products.

Do the 'Andy's arm' test: raise your arm straight out at 90 degrees to your body. Now ask a colleague to apply force downwards at your shoulder point, you will find it easy to resist it. Now ask to do the same force on the elbow point, you can still resist it quite well. Now apply that same force on the wrist: you can't fight it! The deeper the shelving the more we are asking it to do.

b. Stability

Gondola shelving is an amazing product thanks to its modularity and flexibility. So much can be done with it, and so many changes and amendments can be applied over its lifetime. Beyond all of the above calculations, stability is something often disregarded however it is very easy to assess.

I call stability the capacity of the structure to hold itself and the merchandise, under the stress generated by staff (replenishing shelves), consumers (buying, sorting products), trolleys (hitting with kinetic energy), earthquakes (striking more or less likely depending on the territory).



A foot which has completely failed due to excess load.



How much side pressure would it take to tip this gondola unit over?

It also depends where you draw the line in terms of what you expect the shelving to encounter: what about staff caught climbing on shelving? And what about consumers, (likely to be children) climbing on them?

A gondola can be double sided, 50cm in overall depth and 3m tall. Statically it is safe. But is it stable?

How great a force does it really need to either vibrate (and let a product fall) or even topple over? It is evident that another gondola can be 90cm deep and 150cm tall therefore much more stable.

During installation it is imperative that stability is considered. For example a single sided shelving unit, designed for installation against a wall or another structure, maybe required somewhere in the centre of the store: these units are extremely dangerous even during the installation, requiring very little force to cause them to fall backwards. Do add rear-side stabilizers.

A suspended shelf that is deeper than the base shelf is normally forbidden by manufacturers. However, I would say that a retailer's risk assessment can override this rule: a 60cm shelf with a light load overhanging from a 50cm base would not be a problem, whilst some 40cm shelves with bricks overhanging from a 20cm base are at risk of tilting over.

c. Norms UNI 11262, US, earthquake

In the world of warehouses and pallet racking some legislative rules apply, but additionally industry bodies have, together with manufacturers issued voluntary guidelines. Some of these guidelines have now, in part or totality become part of a voluntary norm system. In the UK, SEMA is a widely recognised

brand issuing guidelines for pallet racking, its maintenance and its installations. In the world of shop shelving however, there is unfortunately no such thing. In some cases earthquake directions have limited the rules to simple floor and wall fixing. In general, there is not one single norm (never mind legislation) to refer to.



Ignoring installation instructions can have catastrophic effects, This unit is flexing under load.

CAEM is a founding member of the **ACAI Shop Shelving Association**, that in the past 10 years have developed the engineering way to calculate and test weight loading. This voluntary work and lobbying has resulted into the UNI - EN 11662. The journey continues and more needs to be done.

There are numerous ways to compute the weight loading of a shelving system in a computer. From finite elements analysis to structural engineering calculations, the results vary.

Surprisingly, there are also many ways to test such weight loading! Did you know for example that a shelf loaded with 100kg of bricks is under less stress than 100kg of beans? Self-structured products do help the capacity of the shelf to resist the loading stress. Also beware: some manufacturers will show you a **single** gondola unit tested to a certain weight: this is in their favour because 2 uprights and 2 bases are servicing only 1 unit of shelving. It is recommended to do full-scale test loading with a minimum of 5 shelving unit runs, where the third unit, the one in the middle, is the one on which deflection should be measured.

And even if the above were agreed, there is then a safety factor that companies use differently. At CAEM, whatever the calculated limit is for the shelving, we cut every element by a safety factor of 2. So, for example, if our test result is 100kg, we tell the client 50kg. In the civil sector (a bridge) the safety factor is also 2. **Is your supplier telling you the numbers before or after the safety factor?**

d. Manufacturers' approach

Due to the lack of rules, a shelving manufacturer is left free to adopt its own computational rules, testing procedures, management quality system, suppliers qualification process and random tests policy.

Normal commercial 'savvy-ness' helps: structured manufacturers are more prone to be ahead of the curve in engineering and ethical behaviour.

Without a specific legislation the suppliers of shelving should adhere to, without even a voluntary norm, please check the credentials of the supplier and the practices at the manufacturing plant.



The leveller on this gondola unit was incorrectly displaced during use in a busy store. This could easily cause failure under load. Regular checks should be carried out.

Tenders often require for 'warranty' to be clarified. With shelving being a static product, that is simply loaded and offloaded regularly, a bad product would uncover itself in a matter of hours, a good product will just last... forever. The paint, technically a powder coating finish, is probably the only element, despite it being merely aesthetic, that could show unwanted early signs of age. In such cases it will also depend on the type of products being merchandised.

In the world of gondola shelving the term 'warranty' has little value in my opinion, better to use 'reputation': will the supplier, the person be available and willing to help when you have a question or a problem? A respectable supplier should also share its insurance cover.

3. Safe Life

a. Installation

It is always recommended to delegate installation to a professional company with experience in the field. Remember that as a client you are after the safety during the installation works and for as long as that shelving will be in situ performing its job. It can be appointed by the manufacturer / supplier of shelving or by the client directly. Suppliers should have trusted partners that are experienced with their particular brand.

Before installation ensure that the H&S paperwork matches the requirements, and that a liability insurance cover is present.

Do request and attend an 'handover sign off process' to go over the execution of the work and avoid any grey areas time may reveal. If you don't do this then the supplier could potentially say it was done correctly by them and then modified by on site staff / other contractors,

A typical scenario is the case of the shelving fitter finishing their job, then ceiling fitters coming in and moving the shelving around.



Uprights connected with zip ties. Definitely not the correct, strong solution.

b. Maintenance / cleaning

Gondola shelving holds your valuable merchandise day and night, is visited by thousands of people and interacted with by your valuable staff. Keep shelves clean.

c. On site changes / shop attendants inductions

Flexibility is one of the greatest advantages of adopting modular gondola shelving. Moving shelves up and down, changing displays from flat shelves to inclined shelves to name just two of the cases. They are what retailers need to adapt their offer to the consumers' ever changing demand.

Changes to the shelving can assume different forms:

- Move a shelf up or down
- Remove shelves, add shelves
- From horizontal to inclined shelves
- Change shelves for rear support bars, hooks, shelves with a different shape
- Add displays to the shelving (not just shelves)
- Add upright extensions
- Move gondolas around
- Change the gondola shelving entirely

It is evident that the scope of the changes can be very different. In general, moving shelves around is something left to the shop attendants to do, anything else and certainly whenever involving back panels, should involve a professional fitter.

Retailers should have a clear policy about what shop attendants can do and what shop attendants cannot do. Their induction and yearly training should clearly highlight both of them.

d. On site checks

A retail shop is an extremely live environment: they are actually the backbone of society! It is recommended to adopt a multi-tier 'safety check' for the store: daily, weekly, monthly, quarterly checks, in respect of the thousands of people shopping and working in front of the tons of merchandise displayed.



When moving shelves this shelf has been installed with brackets that are too short. This is causing failure to the edge of the shelf plank.

The safety checks could adopt our checklist. These should ideally be built specific to the shop, its floorspace and overall size, the presence of refrigeration, of heavy duty trolleys, baskets, high storage racking and much more.

An example could be:

- Daily:

A focus on empty aisles and visual checks. Ensuring that merchandise stands safely on shelving

- Weekly:

A visual check of every shelving run in search of any obvious issues.

- Monthly:

A closer, more precise look at every base shelf and every bracket.

- Quarterly:

An audit of any intervention done to the shelving, a clean under bases, adjustment of every riser and divider and a thorough clean of shelves above and below,



Regular checks should spot issues such as the one above. Damage to the Shelf is both unsightly, and more importantly could be dangerous to customers.

4. Real life Examples.

Unfortunately, things can go massively wrong on site: between the manufacturers and the retailers we do work to make shopping better for the consumer!

A number of examples follow of things that should have been prevented from happening by adopting a regular safety checks policy. These are real life pictures. The name of the retailers and the manufacturers of the shelving have been hidden whenever possible. In any case, these are not 'whistle blowing' examples, simply an assessment of how busy stores really are, to raise awareness of how we can all improve our procedures to make the consumer safer.

Incorrect Situation:



Here upright extensions have been added to increase the height of the unit and add a shelf. Simply inserting these and hanging additional shelves causes a serious hazard: has the manufacturer been involved? The shelf depth delivers a huge torque on the extension which by the nature of its design, is not tight enough to hold this safely?



Here the shelf planks fitted are longer than the brackets. The shelf planks themselves rely on the strength of the brackets to ensure they stay straight under pressure. Placing heavy items towards the edge of this shelf could easily cause the plank to bend and become unstable.

Incorrect Situation:



Here, the shelves installed are longer than the bases they sit upon. This can cause undue stress on the edges of the shelf and cause failure.



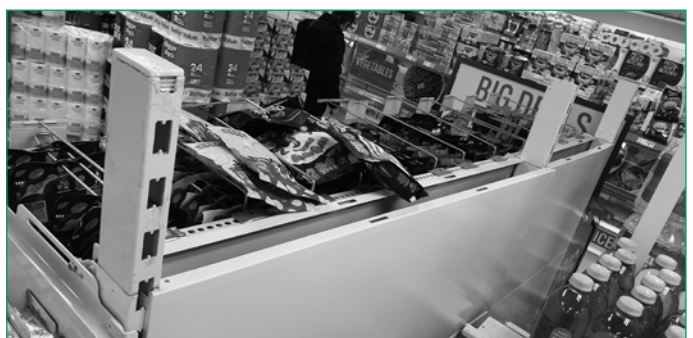
Here, the shelf brackets have not been set at the same heights in the uprights. This can cause undue stress on the shelf itself and cause items on it to be unstable.



Here the shelf is not sat on the base this does not allow for correct support and can cause the shelf to bend or fail.

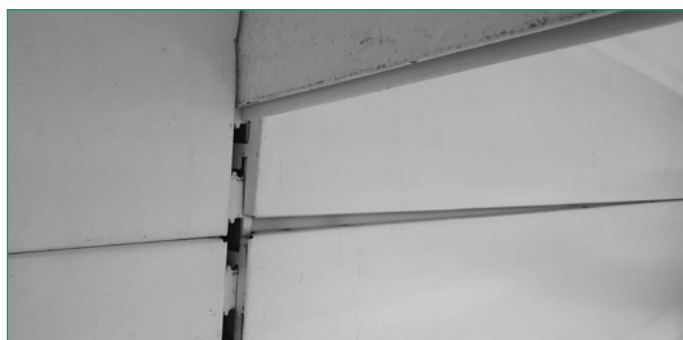


Here, the shelf canopy is not engaged. This could easily collapse.

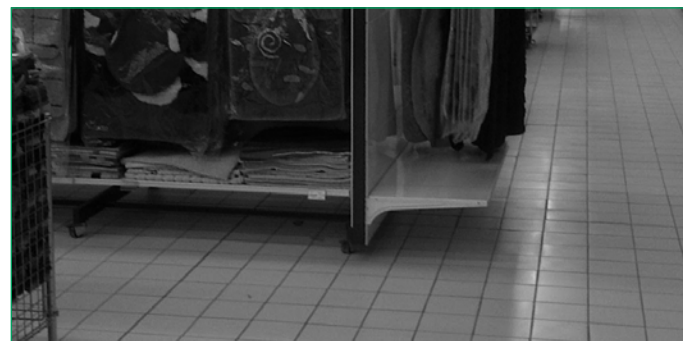


In these cases the back panels of the shelving have been incorrectly installed. The back panels of the shelves are structurally integral, not installing them correctly seriously compromises the stability of the entire unit.

Incorrect Situation:



As with those on the previous page, the back panels of the shelving have been incorrectly installed. The back panels of the shelves are structurally integral, not installing them correctly seriously compromises the strength of the shelves.

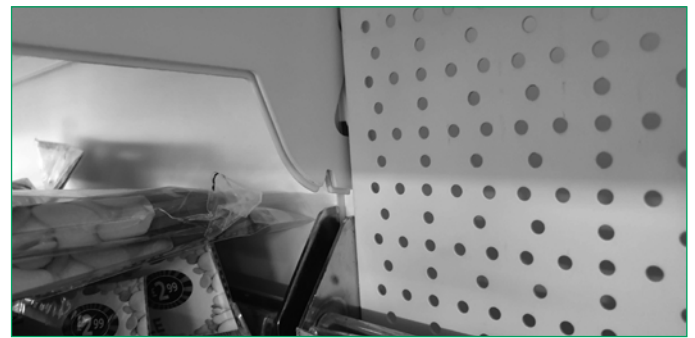


Castors, though a very convenient way to move often heavy loads, should when stationary be locked to avoid the shelving moving. This could make the units unstable and risks injury to customers. They should also be regularly checked since the regular side force their fixing could disengage them and make the whole unit fall.

Incorrect Situation:



Missing or damaged kick plates can result in a trip hazard for customers, or items ending up under the shelving. This can become un-hygienic or a fire hazard.



Here the brackets holding the shelves have not been correctly installed. This is just attention to detail when installing. It can have serious structural effects on the shelving.



Here the a mixture of bracket types is in use. This initially doesn't seem to be dangerous, just an aesthetic issue. But it is important that compatible brackets are used with corresponding cut outs and heights to ensure that the shelves are both secure, the same heights and level.

Incorrect Situation:



Incorrectly fitted levellers/supports, fitted to increase the strength in the centre of the span can move. When they are bent or damaged it reduces the ability of the shelf to hold weight. Failure in the centre of a shelf like this can have catastrophic effects on the rest of the unit.

Use the securing methods.

Shelving units come from the manufacturer with the correct fixings to ensure that it is safe in the environment, skimping on, or not using them can be dangerous.



Above (top left and right) these units have been fixed to the floor. This gives both structural stability and ensures that the units do not move when knocked or pushed. Bottom left, this unit uses extra bolts to ensure the shelf brackets stay where they are and don't slip. Bottom right, this unit was floor fixed, but the brackets have now failed. These should be re-instated to ensure the safety of the unit.

Incorrect Situation:



Wing units, equally need to be secured to the rest of the gondola to ensure stability.



Wall mounted units are often secured to the wall to avoid tipping hazards. Check the manufacturers guidelines.

Maintenance, damage, wear and tear

Bad installation is one aspect of why shelving can fail or become dangerous. Good maintenance and ensuring that shelving units are kept properly is also of massive importance. What follows are examples of where issues should have been spotted and corrected, before they get worse.

Corrosion:



Corrosion on shelves or uprights needs to be addressed. It not only looks bad to customers but also, given time can reduce structural strength of the shelves. It also introduces risk of injury.



Broken feet look insignificant but they effect the weight distribution of the unit. In addition, without the cover the exposed metal thread could damage the floor.





Damaged parts need to be replaced. They can crack and expose sharp corners, or effect the structural integrity of the shelving.

Hygiene:



Unclean shelving and poor hygiene causes not only an unpleasant experience for shoppers, but also the potential for infection. Unclean isles cause fire hazards and the potential for tripping.

5. Check lists

Please use the following check lists to carry out your shop safety audit. There is an initial check which will hopefully help you to get on track, and a further one for use on your shelving runs. We recommend this is done monthly but this is up to you.

Contact CAEM if you want the editable version.

- Print the following pages, one set per each run
- Audit, Fill in, Date, Sign and File
- Adopt measures, specify deadlines

Retail Store Safety Audit: Frequency - 3 Months

Company:
Store Ref:
Store Address:
Sales Area Sq. Ft.:
Audited by:
Date:

Comprehensive Stores' Sales Area Checklist

Date of first installation (if known)	
Are you missing the invoice of the shelving supplier?	
Are you missing the invoice of the installer?	
Are you missing the suppliers' insurance policy?	
Are you missing the installation manual for the shelving?	
Are you missing the weight loading capacity?	
Since initial install have there been additions or modifications?	
- If yes, please describe the main ones	
- When do you think they were done?	
Was the shelving added to over the time?	
- If yes, please describe the main additions	
- When do you think they were done?	
- Was it a different supplier/fitter?	

- If yes, do you have their details?	
Is anything in the shop that is visibly not from the original shopfit?	
Are you missing a training and induction log for the staff to add/remove shelves?	
Are you missing a document stating what the best practices/incorrect practices are?	
- If yes, please confirm you are taking immediate action	
Is any shop display fixture taller than 180cm (typically the highest picking point)?	
- If yes, please confirm consumers are not required / invited / instinctively would reach such height?	
- If yes, are staff allowed to work at that height? Are there clear instructions / induction for the safety?	
Is the shop not really clean? Is anything on the floor that could represent a tripping hazard?	
Is any corridor not clear?	
Is any merchandise not stacked properly?	
If you use shopping baskets, is any of their stack unsafe?	
If you use shopping baskets, is any of them not in good working condition?	
If you use shopping trolleys, is any one not fit for purpose (too big, too small, too many mixed models)?	
If you use shopping trolleys, are they not stored properly?	
If you use shopping trolleys, is any wheel unsafe?	
Is the floor not really anti-slip?	
If there is a drying mat at the entrance, is it a tripping hazard?	
Are there step ladders around the sales area?	
- If yes, would consumers use them (or they are clearly marked for staff only)?	
- If yes, are you missing staff training and induction documentation on how to use them?	
Are you missing clear cleaning procedure for this store?	
Are you missing a pest control procedure for this store?	
Is there an external sales area to the shop?	
- Do you think anything there is not safe?	
- Is the merchandise outside wet, breaking, collapsing?	
- If yes, is any of the outside merchandise safe? Is packaging wet, breaking, collapsing?	
- If yes, is there any 'pallet racking'? does it have a SEMA signage? Does it regularly checked to SEMA standards? if not, it is fine, but has the company a precise policy on why it is so?	
- If yes, has the company a safe practice code in place for it?	

If you have answered YES to any of the answers then they do require investigation

Retail Store Shelving Safety Audit - 1 Month

Company:
Store Ref:
Store Address:
Sales Area Sq. Ft.:
Audited by:
Date:

Comprehensive Stores' Sales Area Checklist

Does any upright look inclined, unstable, not really vertical (even just slightly)?	
Nothing is floor fixed	
- If no, is any floor fixing looking unsecure?	
- If yes, should the shelving be floor fixed?	
Nothing is wall fixed	
- If no, is any wall fixing looking unsecure?	
- If yes, should the shelving be wall fixed?	
Does any adjustable feet look inclined or broken?	
Are any of the adjustable feet too much disengaged?	
Are any uprights and base not properly engaged?	
Does it look like it has been moved?	
- If yes, does anything look non vertical or not engaged?	
Does any unit look like it is not handling the weight?	
If pushed, does it vibrate dangerously?	
If hit, does it vibrate so that products could fall?	
Are base noses bent?	
- If yes, do you think they are a hazard to consumers?	
If any promo end unit has no bases, is extra fixing missing to the last two gondolas (they should have bolted bars)?	
Are back panels disengaged?	
Is any signage unsecure?	
Is any base shelf overhanging from the base?	
Is any bracket not fully engaged into the upright?	
Is any shelf not looking horizontal?	
Are shelves on brackets overhanging?	

Is any display above the base deeper than the base?	
Is any shelf bent more than 1/200 of its length? (5mm for a 1000mm shelf, 6mm for a 1200mm shelf) [make a few tests using a straight bar]?	
Does any wing promotional unit look unstable or unsafe?	
Is any wing promotional unit fixed incorrectly to the main shelving?	
Is any peg hook missing the safety plastic cover at its front edge?	
Is any power cable run around or through the shelving?	
- If yes, does it look professionally fitted?	
Is there any power cable going through a hole cut through the metal back panel without further protection from it, hence exposed to chafing?	
Is any kicker panel disengaged hence dangerous for consumers?	
Is any components' finish peeling off / showing rust?	

If you have answered YES to any of the answers then they do require investigation - Please ensure you log any action taken.

Notes:



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This document is intended as a guide only and to support you in the initiation of your own safety procedures