

## CE Marking of steel frames, where are we and what is RIDBA doing to help its members?

We felt it was time to bring the different themes together and let everyone know where we are.

I will start with the key points and then expand to explain how we reached this point:

- The Generic Factory Quality Control Manual (FQCM) is available now for Members to purchase for £750.00. We recommend that it is purchased as soon as possible to allow adequate time for implementation.
- To ensure that a company is ready for July 2013, it will be best to have the FQCM in place and the factory systems compliant with it by early 2013 at the latest.
- We recommend that you train at least one member of staff to act as your internal auditor. Speak to the National secretary about booking a place on a course.
- The Design Protocol is almost complete; we will advise members as soon as it is finalised.
- The Welding protocol should be complete in the New Year.
- To CE Mark a frame with timber purlins, the purlins will have to be stress graded and CE Marked.
- Supply – It will be a criminal offence to supply a steel frame without a CE Mark after 1<sup>st</sup> July 2013.
- Trading Standards will act on a complaint that a frame manufacturer is not CE Marking their frames, and if they continue in non-compliance the results for them could at the end of the day be a criminal prosecution.

### How did we get here.

Work started over 2 years ago, when we were first given indications that all building frames would be treated as a construction product and so if the Construction Products Directive (CPD) was changed to the Construction Products Regulation (CPR) then frames would have to be CE Marked. At that time many of us thought that a frame was not covered by the CPD or CPR as it was a 'kit' i.e a collection of construction products put together to construct a building. An analogy might be a brick and block wall, the individual components such as bricks, blocks, mortar, tie bars etc. might be CE Marked but the final wall is not.

We were proved wrong; a frame was to be treated as a product. Many also thought that as with most construction products, compliance with the requirements of the CE Mark could be certified by the manufacturer, again we were proved wrong; because of the injury that could be caused by the collapse of a **frame, the 'Attestation of Conformity' Euro speak for who checks that products comply with the requirements of the relevant standard, was set at a level which meant that a Notified Body (NB) (an independent third party accredited by a Member State's official Accreditation Authority, in the UK this is UKAS) had to check that a frame manufacturer complied with the requirements of the relevant standard.**

At this stage we realised that we needed help not only to fully understand the requirements of the CE Mark but also to find ways to help members obtain a CE Mark for their frames, in the most cost efficient way. We therefore contacted the structural steel side of CORUS now TATA, The Steel Construction Institute (SCI) and the British Constructional Steelwork Association (BCSA). TATA initially offered to help after we showed that agriculture used approximately 15% of the structural steel used in single story construction but this help was later vetoed by the BCSA, who were not prepared to offer any help and in fact provided us with incorrect information, saying that CE Marking was not required for agricultural buildings. The SCI were extremely helpful and have lead us through the design issues and introduced us to BM TRADA Certification who are accredited to act as a NB for steel frames.

We soon learnt that the relevant standard is BS EN 1090 – Execution of steel structures and aluminium structures, which raised a number of important issues that needed to be addressed

- Design – All designs would have to be to the Eurocode and the NB would check that the design calculations based on the environmental and other imposed loads were correct and if load tables were used there were backed up with adequate calculations.
- Welding – All welders would need to be trained to the correct standard dependant on the type of building being constructed. All companies would need a correctly trained Welding Coordinator and a highly qualified Responsible Welding Coordinator.
- Factory Quality Control – All processes in a manufacturer's factory would need to be written down in a manual, in accordance with BS EN 1090 and this manual would have to be followed at all times.
- Supply – It will be a criminal offence to supply a steel frame without a CE Mark after 1<sup>st</sup> July 2013.

## Design

At present in England and Wales no one actually checks the design of an agricultural building, In Scotland a building warrant is required which does mean that the design has to be approved by a qualified structural Engineer, but no checking is carried out that the frame is in fact fabricated and erected in accordance with the design.

Up and until now most frame manufacturers claim to design their frames to BS 5502 -22 but in reality a number do not, but rely on old load tables which they believe have 'proved the test of time', yet others fabricate what they think will be OK and since they might not understand the implications of missing bracing or details this can lead to problems, as we saw with the number of collapsed farm buildings over the last 2 winters.

The Eurocodes make no reference to BS 5502 and our UK National Annex also makes no reference to it either.

This matter is further complicated by the fact that BS EN 1090 splits different buildings into a number of different execution classes, dependant on the risks associated with collapse, with EXC 1 the lowest class and EXC 4 the highest. Most commercial or industrial buildings will be in EXC 2, agricultural Buildings could fall into EXC 1 or EXC 2 dependant on the interpretation of the standards.

The standard says that the choice of EXC class should be agreed between the designer and the client, taking national provisions into account, but the choices are very judgmental, the standard says that an EXC 1 building is one "where there is low consequence for loss of life, and economic, social or environmental consequences small or negligible". It is quite likely that different clients and designers will end up with different EXC classes for the same building. Because they use the phrase 'taking national provisions into account', and BS EN 1990:2002 adds that EXC 1 could be "agricultural buildings where people do not normally enter (e.g. storage buildings), greenhouses" it could be argued that in the UK all agricultural buildings should be class1.

We do not believe that this is the intent of the standard and so we will be amending BS 5502- 22 to clarify the situation. At present this sets different classes of agricultural buildings in the UK by changing the required design loads dependant on the occupancy level (risk of injury) and the expected life of the building, the class structure runs in the opposite direction to that in BS EN 1090 so class 1 is the highest and class 4 lowest. Most agricultural buildings are designed to class 2 where the normal design loads are reduced, because of a lower design life and a factor to recognise the lower occupancy (lower risk of injury), to approximately 72% of the industrial loads.

The revisions to BS 5502-22 are in the process of being finalised but it is likely that the definition of class's 1 and 2 buildings will be amended to take account of the increased size and complexity of modern farm buildings and it will recommend that Class 1 buildings are EXC 2 to BS EN 1090 and Class 2, 3 and 4

buildings are EXC 1 to BS EN 1090. The probable amendments are set out in more detail in the report on RIDBA's last Council Meeting on page [????](#)

This will mean that C E Marked frames will be designed to the Eurocode with the loads taken from BS 5502-22 and this will need to be stated on the C E Mark.

As I have mentioned before most frame manufacturers do not have their own in-house structural engineers and would prefer not to have each building individually designed to the Eurocode by an outside consultant.

RIDBA has therefore contracted with SCI to produce a design protocol for the use of its members, this will set out how the Eurocode should be used to design an agricultural frame and will also have load tables for them to use.

Many frame manufacturers already use the old 'Fearn tables' to design their buildings and it is expected that these will be recalculated to the Eurocodes as part of the design profile.

Many frame manufacturers use plastic calculations to ensure that they obtain the most efficient designs, unfortunately there seems to be no agreement in Europe as to how the Eurocodes can be used plastically and so at present all calculations will be elastic, which is not as efficient. As soon as Europe has resolved the plastic issues we expect the SCI to produce advice on how plastic design to the Eurocode should be actioned.

This should not delay the implementation of CE Marking.

## Welding

### Welders

It is likely that a number of welders employed by members will be coded and up to the required standard all ready, but some will not and so our chosen consultant will need to assess them and if further training is required provide the necessary training or advise someone that can.

A Welding needs to be carried out in accordance with a Welding Procedure Specification (WPS), this will depend on the type of equipment, the type and thickness of steel and the position of the welding process. The type of welding carried out by members is relatively simple and is likely to be, fillet single and multi, butt single and multi, and possible tube welding, once this is confirmed and the type of welding equipment used is ascertained then I expect RIDBA will commission the writing of the necessary generic WPS which can then be passed on to members at a vastly lower cost than if they had to do it themselves. How many WPS will be required is difficult to predict but it should not be too many as one weld test can cover a number of different welds.

Once the Member has these WPS they will need to ask a suitably qualified welding consultant to visit to watch the weld being carried out and then take the weld away for testing, if the weld was correctly carried out and it passed the test then that named welder will be qualified to carry out that type of weld for 2 years. He will then need to go through the process again. It is being argued by some that this is too simplistic and that Initial Type Testing will have to be carried out on the first 5 welds to a new WPS, This is being investigated.

The cost of the above does need to be taken into account but there is no need to code all welders to the same standard, so where a fabricator has 10 welders and 80% of the welding they do is fillet welding 10% butt and 10% site welding, the fillet weld is the simplest so cheapest to achieve followed by butt and then site welding. There is a strong argument that all are coded for fillet but only 2 for butt and site welding.

Each company's mix of welds will probably be different and so they will need to decide their coding requirements with the welding consultant.

## Welding Coordinators

Every company will need to employ a Welding Coordinator (WC) to oversee the welders and the welding processes in the factory. RIDBA is commissioning the purchase of a generic WC procedure so that once again they can be passed on to members for a cost lower than they can do it themselves. RIDBA will also need to agree prices for WC training with the consultant, as it is likely that most members will require only 1 or 2 WCs and so for them to be trained as part of a group is likely to be less expensive than individual training.

## Responsible Welding Coordinator

Every company will need a Responsible Welding Coordinator (RWC) who will need to be adequately qualified and have the full authority to be able to control the welding processes of the company. It is not a full time job and so I would not expect many members to employ their own. We will obtain prices from Competent Welding Consultants to provide this service to members. Depending on the size of the member and the processes they carry out it is felt that the job will require a visit between 3 and 6 times a year; with communication, such as the WPSs, required for each job carried out electronically between visits. We expect to be able to ensure that the consultant combines visits to a number of companies in an area, so that the costs can be reduced for members.

## Welding next steps

There are still some grey areas concerning welding, that need to be resolved such as, some say that it is the RWC who confirms to the NB that all the welding processes and welders are correct, others say that it is the NB that checks on the welders and processes. We expect to have this clarified in the near future.

So to confirm, our aim is to be able to provide the following to members in the near future:

- The ability to purchase Welding Procedure Specifications, from RIDBA for the welding processes and equipment used by the member.
- The assessment of welders, testing of their welds and where required the cost of training them to the required standard for the EXC involved.
- The ability to purchase a generic welding coordination procedure of how the welding coordinator should control the welding, at a price considerably lower than doing it themselves.
- A price for training a welding coordinator.
- The annual cost for consultant Responsible Welding Coordinator services.

## Factory production control (FPC)

This is a key part of the process to be able to CE mark steel frames. The production control has to fully comply with the requirements of BS EN 1090 and then a NB has to check, **initially that the company's FPC manual is in accordance with 1090, and then that the company's employees and systems follow the manual.**

The initial check is normally time consuming and expensive but RIDBA has arranged for a generic FPC manual to be written, although it has been called a Factory Quality Control Manual. BM TRADA who we recommend members use as their NB are happy that this FPC is in accordance with the standard and so they do not need to check it in depth, they just need to check that the parts that have been personalised to **the Member's factory are correct and then to check that the procedures in the factory fully comply with the Manual.** This will save members a lot of time and money.

I believe this FPC is going to take most members some time to properly put in place and so work needs to start relatively soon to ensure that all is in place by July 2013. As the NB needs to check that the manual is being correctly followed they will do this by checking a few jobs that have been completed in accordance with the plan, so the manual will need to be in place and being used well before July 2013.

It is also important to check that the manual is being correctly followed before calling in the NB, as if the NB finds serious non conformities, it may entail a second visit to check that they have been corrected, which will be expensive, To help overcome this problem RIDBA has organised internal audit training so that Members that wish will have someone on their staff who can audit their systems, The first 10 candidates are being trained in Feb 2012; if you would like your staff trained please contact the Secretary.

The cost for a member for buying the Generic FPC (FQCM) from RIDBA is only £750.00, which is less than it would cost for the NB to check that a manual produced by a company complies with the standard. We recommend that this is purchased now to give a company the time to personalise it and then ensure that their factory processes and systems complies with it. The key is to ensure that everyone in the fabrication process 'buys in' to the manual; the NB is likely to check that employees and managers understand the plan and are following it.

Once a company has received their certificate of conformity they are able to CE Mark their frames and RIDBA will be providing advice based on the requirements of BS EN 1090 what will have to be written on the CE Mark.

The Mark does not have to be put on to the steel work but must be available to the client in the paperwork, but it is likely that RIDBA will ask all members to plate their buildings by riveting the CE Mark on to the frame in a prominent position.

The one area that the CE Mark does not cover is the erection of the frame, there is detail in BS EN 1090 as to how this should be actioned but the NB will not check this. The collapses due to snow load over the last 2 winters has shown that one of the reasons for the collapse of some buildings was that correctly designed and fabricated buildings were not correctly erected, has shown that something needs to be done in this area. I expect RIDBA to agree that the site erection practices of members will be assessed, taking into account not just that the erection is in accordance with the design but that all the correct health and safety precautions are in place.

This should allow us to promote our Members to their clients, not just as supplying CE Marked frames but also site erection assured. RIDBA will need to start work on this next year once all the CE Marking work is completed.

## Enforcement

One of the concern's we have is how CE Marking is going to be enforced. Trading standards are the enforcement agency and it should be relatively easy for them to enforce the regulation. All they have to do is to write to a frame manufacturer and ask to see their certificate of conformity, if they cannot supply one they are breaking the CPD regulation and so committing a criminal offence.

I have been in correspondence with Trading Standards and it is obvious that they are not going to be proactive and automatically write to all frame manufactures asking to see their Certificate of Conformity but they will react to a complaint. In their words "You state that your members are concerned that the legislation will not be enforced. As with all other areas, if any complaint is received about an alleged non-compliance, the matter would be fully investigated and a wide range of options are available to officers, from advice and assistance, through to criminal prosecutions in the most serious cases. I would hope you would reassure your members that all complaints would be investigated and there may be serious

consequences of non-compliance with these, and all other legislation that falls within the remit of trading standards.”

So it is up to us, if after July 2013 you know of a frame manufacturer who is not CE Marking his frames, then either make a complaint to your local trading standards office or if this is inappropriate for any reason provide the National Secretary with their name and address details and he will make an official complaint to Trading Standards. I know that many do not like to report non-compliant companies to the authorities but if we do not it will allow the ‘cowboy’ to undercut the competent contractor who has gone to the expense of ensuring that he is in compliance with the regulations.

This is going to be a difficult year or 2 but I am sure that the industry will come out of this in a far stronger position.