

# REINFORCE



JOURNAL OF THE BRITISH ASSOCIATION OF REINFORCEMENT

2016

For responsible  
sourcing  
keep it local

**Know where  
your rebar  
comes from**

Advice for  
boron rebar

**CE marking  
of reinforcement**

The only way  
is up for  
reinforced  
concrete

**BAR**  
BRITISH  
ASSOCIATION OF  
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# REINFORCE

## 2016

## Welcome

Welcome to the 2016 issue of Reinforce which provides an insight into just how the British Association of Reinforcement (BAR) and its members aim to take the sector forward. As the focal point for the UK reinforcement sector, BAR, on behalf of its members and their customers, has a programme of action designed to ensure that the reinforcement manufactured and fabricated by its members is of the highest quality.

This action includes representation on related industry and standard committees, development of health and safety advice and the issuing of industry guidance. Following recent membership restructuring, BAR is now free from distractions and is better placed to raise the bar.

It is not just the association that is ready to raise the bar, so too are its members. In terms of quality, innovation, customer service and investment in reinforcement design efficiency BAR members aim to lead the field.

I hope that you enjoy this issue of Reinforce. Get in touch if you want to be part of forwarding the UK reinforcement sector.

Stephen Elliott,  
Chairman, British Association of Reinforcement

The British Association of Reinforcement (BAR) is the trade association of UK manufacturers and fabricators of steel reinforcement products including cut and bent bar and mesh.

BAR aims to add value to the reinforcement industry through market and product development, promotion of good industry and health and safety practices and forwarding the development of the reinforced concrete industry as a whole.

BAR is a member of CARES and all BAR members are CARES approved.

Raising the **BAR**

# FOR RESPONSIBLE SOURCING KEEP IT LOCAL

For construction clients and contractors responsible sourcing is more than feeling good about the way that they operate. It can have a significant business impact particularly in terms of corporate reputation and stakeholder development. This is why responsible sourcing is increasingly being enshrined in corporate statements of intent. For construction, it involves the specification of materials that have some form of responsible sourcing certification, the provision of traceable and verifiable supply chains, together with a commitment to reduce the environmental impact of material transportation with the objective of delivering a finished product that has a low whole life CO2 impact using materials that can be recycled at end-of-life. For rebar specifiers and contractors it means knowing where your reinforcement has come from.

Of all structural construction materials, reinforced concrete using UK/EU sourced reinforcement is best placed to deliver the highest level of responsible sourcing due to the local availability of materials, short supply chains and regulated management systems. The average delivery distance for ready-mixed concrete in the UK is 12km, UK manufactured reinforcement is produced from 98% recycled scrap metal rather than from virgin earth resources and there is a readily available supply of UK and EU CARES approved material.

The reinforcement sector has two responsible sourcing schemes, Eco-reinforcement and the CARES Sustainable Reinforcing Steel Certification scheme. Both schemes provide the reinforced concrete supply chain with a methodology and external accreditation to ensure that accurate environmental data is provided.

Most major concrete companies have gained accreditation to BES 6001. The concrete industry was the first to link its sustainable construction strategy to BES 6001 and has produced guidance that supports the implementation of the standard. Clients and specifiers can easily source accredited material and gain maximum credits in sustainability assessment tools such as BREEAM.

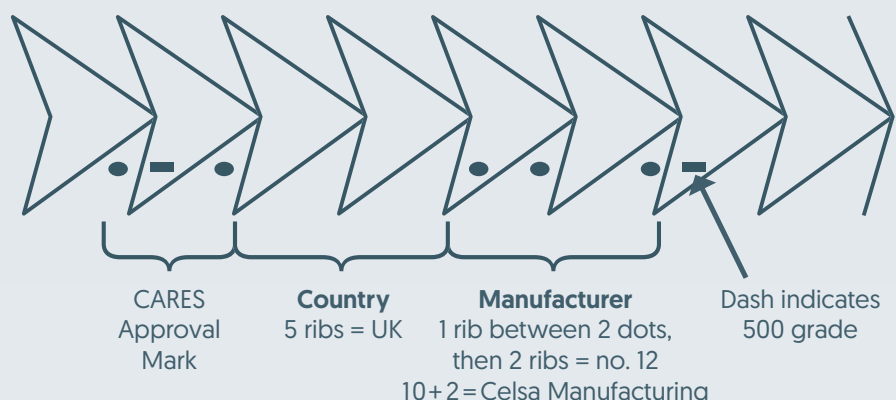
There is government and market pressure for the construction industry to prove that it is signed up to responsible sourcing. Accordingly many construction clients and contractors have stated their corporate commitment to do so. The use of reinforced concrete that is based on the specification of UK and EU sourced material can demonstrate that their commitment is real.

## KNOW WHERE YOUR REBAR HAS COME FROM

Figure 1: Checking rebar markings.

For those wanting to determine the origin of their rebar they should check the rebar markings.

All reinforcement should have rib markings to determine its origin and grade. This should include its CARES approval mark, country of origin, its manufacturer and finally grade.



# BORON: Be Careful not Sorry

A major issue affecting imported reinforcement has been the addition of boron as a micro-alloying element. Chinese mills had been utilizing a tax loophole entitling them to a rebate on VAT paid for exports of alloyed steel. As a result, boron was added to a number of products in order to classify the steel as alloy rather than carbon. The boron-added rebates were removed at the start of 2015, but Chinese steelmakers quickly substituted boron with chromium.

Boron is not specifically referred to in BS4449 as it is not normally added to reinforcement bar, but even small additions of boron can affect the hardenability of a steel [1] and alter its welding characteristics. This may affect the quality of welds and the potential for weld defects if the welding process is not properly specified and controlled. BAR, as the industry focal point for reinforcement, has taken the lead to advise specifiers and customers on the need to be careful and not sorry by ensuring that appropriate welding approaches are adopted.

The effect of boron on the hardenability of steels is a well-documented phenomenon [2] and it is specifically added to some engineering grades of steel to take advantage of this aspect, but it has not been traditionally added to reinforcing steel. BAR is not aware of any detrimental effect of boron on the mechanical properties of reinforcement bar as traditional cut and bent.

However, for some arc welding processes boron can significantly increase the hardness of the weld area thereby making it more susceptible to cracking, particularly in the heat affected zone [3]. This cracking can occur on cooling but also can occur up to 72 hours after welding when the defect is called 'delayed-cracking'. There is a potential safety issue if welds containing cracks form part of the lifting points on reinforcing steel structures.

Welding experts TWI Limited has advised that, in combination with the other elements in steel, boron can increase the risk of crack-susceptible microstructures [4]. As such, additional precautions, such as slower welding, high heat input and additional controls on consumable hydrogen levels may need to be taken when welding reinforcing steel containing boron. It is recommended that weld procedures are assessed to determine their suitability for welding the boron-containing steel.

As boron is not mentioned in BS4449 its presence may not be displayed on the manufacturer's test certificates unless you used a CARES approved manufacturer. Since June 2015, CARES approved manufacturers have been required to report intentionally added micro-alloying or alloying elements in reinforcing steel that are not currently included in BS4449. This includes the addition of boron.

BAR would advise a precautionary approach to the use of any steels that may potentially include additional micro alloying elements by checking the full analysis back to the producing mill or have full sample tests taken.

## References

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4. Devletian J H, [1976]: 'Borocarbide precipitation in the HAZ of Boron steel welds', Welding Journal, January 1976, pp5s-12s.

For ease of identification, the number of ribs between the CARES approval mark and manufacturer mark relates to the country of origin.

Therefore, for the UK there is a 5 rib gap. For German manufactured rebar there is 1 rib gap and a 3 rib gap for rebar from France. For rebar manufactured outside of the European Union, primarily Chinese rebar, the identification is a 9 rib gap. See Figure 2.

Understanding and using the identification system will allow the determination of country and mill of origin.

Figure 2: Determining country of origin of rebar. Source: ukcares.com





# MADE IN THE UK TO **BUILD** IN THE UK



CELSA Steel UK are the largest manufacturer of steel reinforcement in the UK and one of the largest producers of other steel products. From their facilities in Cardiff they produce around 1.2 million tonnes of steel per year for both the UK and European construction markets. CELSA's steel is regularly used in the highest profile projects in the UK, including Crossrail, the Mersey Gateway project, the new Bloomberg HQ and many more.

Our primary raw material is UK sourced recycled scrap metal, which gives our finished product over a 98% recycled content.

Through Eco-Reinforcement and BES 6001 responsible sourcing certification, CELSA can give their customers, and their customers' customers, full supply chain traceability, from raw material processor to construction

site, something that is currently unique to the Eco-Reinforcement scheme. With the help of their customers they regularly deliver a supply chain that is less than 500 miles from the recycled metal processor and the final construction site.

During 2015 the difficulty of on-site identification of reinforcing steel was a hot-topic, so CELSA have implemented an idea to help give everyone in the supply chain an instant confidence in where their reinforcement has been sourced from. All diameters of steel reinforcement bar and coil now have "UK" rolled into the surface of the product in order to aid the identification process, and give on-site personnel extra assurance that they are using sustainable, local and responsibly sourced material.

For further information visit: [www.celsauk.com](http://www.celsauk.com)

# REBAR ANTI-DUMPING MEASURES 'TOO LITTLE, TOO LATE'



BAR has called the European Commission's imposition of provisional anti-dumping measures on Chinese steel rebar imports disappointing and 'too little, too late'.

The Commission has proposed provisional duties of between 9.2 percent and 13 percent on Chinese reinforced bar imports due to dumping – selling rebar below market prices at home or below the cost of production. Chinese rebar imports now represent over 45 percent of the UK rebar market. Last year the quality of some of the Chinese rebar was questioned due to the addition of alloys in order to attract commercial export rebates.

The inability of the European Commission to take a more robust stance against the flood of Chinese rebar imports is disappointing. A duty of as low as 9 percent against a dumping margin of up to 66 percent is too little and too late. Too little to address the surge of Chinese rebar dumping. Too late for those UK steelworkers who have already lost their jobs and for those who may also do so.

The provisional measures have been announced while the investigation of the Commission into import dumping continues. Definitive duties may be imposed

in August 2016 at the conclusion of the investigation and would apply for five years.

BAR supports UK Steel's call for real EU action. This includes:

- Implementation of meaningful anti-dumping measures quickly and effectively
- Lifting the Lesser Duty Rule. This would remove the cap on anti-dumping and anti-subsidy duties and so allow real action against Chinese import surges
- Taking a robust stance against granting Market Economic Status (MES) for China. Granting MES would support China's unfair competition and subsidy practices and would negate any anti-dumping measures. China only meets one of the required five EU technical criteria and so should not be granted MES status
- Recognising that the flawed EU Emission Trading Systems (ETS) post-2020 proposal is a major threat to the EU steel industry that could cost the sector €34 billion in direct and indirect carbon costs for the period 2021-30.



## PREFAB SAVINGS



BAR member Express Reinforcement Ltd has supplied 9500 tonnes of steel reinforcement to Byrne Bros Formwork for Bloomberg Project, London.

The supply contract included modelling/detailing, cut & bent and prefabricated products. A particular feature of the contract was the client's request for a solution that incorporated embedment plates into shear wall prefabricated reinforcement panels. The advantages of this for the project were four fold, firstly lifting heavy components at height, secondly reduced crane time, the accuracy whilst positioning the plate and lastly speed of construction.

Byrne Bros placed an 'on site' engineer within the factory to assist in the accuracy of the insertion and to provide final inspection sign off before dispatch to site just-in-time to meet with the designated crane time where it was taken from the vehicle and directly placed in situ.



It is estimated that the insertion of embedment plates into the prefab shear wall prefabrication units saved the project at least 4 site days.

For further information visit:  
[www.expressreinforcements.co.uk](http://www.expressreinforcements.co.uk)

## PREVENTING THE RISK OF REBAR IMPALEMENT



RFA-Tech has launched a new cap aimed at protecting construction workers from the risk of impalement by reinforcement starter bars. Called ReACTer, the cap has been design protect workers from a height of up to 5 metres.

The ReACTer cap works in two different, but complementary ways. Firstly, inner flutes reduce the speed at which the cap is pushed down onto the reinforcement. Secondly, the ribs and ridge underneath the cap head dissipate the impact force by flexing and directing the force over the side of the cap. These two features combine to provide what is known as the velocity reduction zone (VRZ). The VRZ, together the thermoplastic polymer cover prevents the reinforcement from breaching the cap and so prevents impalement.

Currently, there is no British Standard for a rebar safety cap. However, following a number of fall impalement incidents in the USA, the California Occupational Safety and Health Regulations [CAL/OSHA] have formulated the Code of Regulation 1926.70[b] Reinforcing Steel which states: "All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the hazard of impalement."

Following this, the California Regs [OSHA] 334.90 Impalement protection specifications and testing criteria was introduced. This specifies drop test specifications for an anti-impalement safety cap which can be approved for working at a height of 2.3m. The ReACTer cap has been designed to, and tested to exceed these requirements to a height of up to 5m. The 334.90 Regs are the only ones used throughout the USA and are acknowledged as the only method of testing in Europe, Australia and New Zealand.

The ReACTer cap is further enhanced by the cap rail system which allows four ReACTer caps to cover reinforcement up to a distance of 2.25m.

For further information visit: [www.rfa-tech.co.uk](http://www.rfa-tech.co.uk)



# BAR MEMBER SPOTLIGHT: ArcelorMittal Kent Wire

ArcelorMittal Kent Wire is a wholly owned subsidiary of ArcelorMittal Hamburg, one of Europe's leading wire rod manufactures and a member of ArcelorMittal, the world's largest steel producer. Coil is shipped in from Hamburg to our own quayside for manufacture into fabric reinforcement and cold reduced wire products.

Kent Wire has grown to become the country's leading manufacturer of fabric reinforcement, which it supplies to the construction industry in the UK, Ireland and Norway.

It began production in 1988 with an initial capacity of 20,000 tonnes per annum but after several investments, in 1998 and 2005, manufacturing capability has been increased to figure in excess of 130,000 tonnes per annum.

Wire intersections are resistance welded and the fabric, which itself conforms to BS4483 or BS4449, is manufactured from cold reduced steel wire complying with BS4482 using the latest computer controlled machinery. All products carry a CARES certificate, an internationally recognised accreditation standard set by the Certification Authority for Reinforced Steels

Fabric products can be readily identified by a unique labelling system, which enables total traceability from pre-rolled coil to finished fabric bundle. All this, together with Kent Wire's strong relationships with suppliers of raw materials, are key factors enabling it to maintain strong emphasis on the high quality and competitiveness of its products.

In addition to the standard range of reinforced fabrics, Kent Wire produces special fabrics according to individual customer specification and fabrics for the Norwegian market, complying with NS3576. Fabrics can be up to sheet size 12 metres long x 3.2 metres wide, with rod diameters up to 12mm on 12mm.

Kent Wire also manufactures cold reduced wire conforming to BS4482 for supply in layer wound coil or straight lengths tailored to customer specification. The wire has a specified strength of 460N/mm and is available in three profiles - plain round, indented or ribbed. Coils can be supplied in weights ranging from 250kg to 1,750kg and straight lengths up to 12 metres long.

For further information visit: [www.amkw.co.uk](http://www.amkw.co.uk)



## ArcelorMittal Construction Solutions

As a division of ArcelorMittal Kent Wire, AMCS provides engineered reinforcing steel solutions to the UK construction market. The focus is on developing close working relationships with customers to optimise designs and to generate customised, prefabricated elements that speed up the construction process. This is achieved through the use of a range of specialist, innovative techniques and the application of the principles of design for manufacturing and assembly [DfMA] delivered by a highly skilled team of designers, fabricators and managers. As part of ArcelorMittal Kent Wire, AMCS are based in Chatham Docks in Kent where reinforcing steel products have been manufactured since 1988. AMCS benefits hugely, not just from the wealth of knowledge and manufacturing experience of the UK's largest mesh fabric producer, but also from the technical resource and financial stability provided by the ArcelorMittal group.



# THE ONLY WAY IS UP FOR **REINFORCED** CONCRETE

The skyline of many UK cities is changing due to the increasing number of high rise offices and residential developments either under or due to start construction. The many inherent and free benefits of reinforced concrete means that it is particularly suited for fast and economic high rise construction.

The choice of material for the structural frame of a high rise building has a significant impact on its building time cost and performance. Reinforced concrete has a range of inherent performance benefits that means it has a number of competitive advantages over other structural options.

Firstly, construction scheduling. The old adage "time is money" is never more apt than when talking about construction programmes. Here, concrete with a lead time of 8 weeks compared to 14 weeks for structural steel has a distinct economic advantage. A faster start on site means a faster total construction times and a quicker return on the capital investment. The range of inherent performance benefits of reinforced concrete offer further time and cost savings. The material's built-in robustness and sound insulation minimise or even negate the need for additional finishes, while its mass means that concrete floors generally meet vibration criteria without the need for extra stiffening. Concrete's mass also provide a high level of thermal efficiency that when used as part of a fabric energy storage (FES) approach can reduce plant costs by reducing or removing the need for air conditioning.

A reinforced concrete structure also offers a high level of fire resistance. A premium is incurred on steel frame for sealing and fire stopping at partition heads against the irregular soffits of the steel decking and around irregularly shaped intersecting frame members. Unless this is considered at the early design stage it can result in expensive and time-consuming remedial work late in the construction programme. Staying with internal savings, mechanical and electrical services represent up to 34 percent of overall construction costs. The flat soffit of a concrete floor slab provides a clear zone, free of downstand beams. This allows more services to be pre-fabricated off-site and increases the simplification and ease of installation.

In addition to these potential savings are those offered by the use of high strength concretes and post-tensioned concrete floors. Studies have shown that the use of C50/60 concrete can reduce the cross section

of vertical elements due to the provision of increased strength and stiffness. The same approach when used for reducing slab thickness can result in savings in other building elements, for instance the area of the cladding and the internal partitions, thereby saving materials and reducing the overall building costs. The use of a C60/75 concrete can reduce the volume of the vertical elements still further. This has the additional benefit of increasing the net lettable area.

## The inherent performance benefits of reinforced concrete mean that the way up is fast and economic.



Cost savings are also possible with the use of post-tensioned (PT) concrete floor slabs. PT offers several benefits, not least of which is the fact that the PT floor slabs are generally thinner than an ordinary reinforced concrete slab. They can be up to 300mm thinner over one-storey than a steel frame. This minimises the building's height to the extent that this could mean an extra storey on a ten storey building. PT slabs can economically span further than a reinforced concrete slab. This in turn reduces the required number of columns and foundations and increases flexibility for space planning. The clear flat soffits of PT slabs enable complete flexibility of service layout. The absence of trimming beams around service cores avoids conflicts between services and structure. There is also flexibility in positioning holes through the slab because tendons are widely spaced and can be positioned around openings. In addition to all the above benefits, PT equals rapid construction. There is less reinforcement which reduces fixing time and early stressing of the concrete allows the formwork to be struck quickly. Above all, the use of high strength concrete or PT allows thinner structures and the thinner the overall structural frame, the lower the cladding costs. Given that cladding can represent up to 22 per cent of the construction cost, minimising the cladding area represents considerable savings.

For the skylines of many of our cities the only way is up. The inherent performance benefits of reinforced concrete mean that the way up is fast and economic.

# REPRESENTING THE



On behalf of its members and UK reinforcement sector, BAR plays an active role in the development and review of key industry standards. These include:

**BS 4449: Carbon steel bars for the reinforcement of concrete**

BAR supported the UK Steel proposal to specify rebar as a non-alloy steel in the same way as structural steel. Unfortunately, the BSi committee only accepted a half-way house proposal to restrict certain elements, with no restriction on the maximum levels of chromium, manganese, nickel, molybdenum, vanadium, copper is already limited in BS 4449.

**prEN 10080: Steel for the reinforcement of concrete – weldable reinforcing steel**

Work on the development of a harmonised European standard is still underway with the likely publication date being within the next two years. There are four adhoc groups working in key areas of the standard – fatigue performance, bond, decoiling and factory production control.

**BS 8597: Steel for the reinforcement of concrete – Reinforcement couplers**

The UK not having a standard for reinforcement couplers has been a hole that has needed filling for some time. BAR made the original proposal to BSi and supported its development until it was published in 2015. The industry now has a standard that helps specification, setting performance criteria as well as defining how the tests are performed.

**BS 8548: Guidance for the arc welding of reinforcing steel**

The revised standard for the welding of steel reinforcement was introduced in 2006, but it has not been adopted to any great extent, in the main due to the lack of adequate guidance to support this document. BAR has been working with the industry to develop a document to fulfil this need, and further went on to propose the development of this guidance standard. The work is still on-going but it is expected that the guidance standard will be published in 2016.

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## FORWARDING HEALTH & SAFETY

Forwarding Health and Safety During the coming year, BAR is to review and update its current delivery health and safety guidance, *'The Safe Off-loading on Reinforcement Fabric'* and *'The Safe Off-loading of Cut and Bent Reinforcement'*. Both guidance documents forwards safe working practices for all those involved with the off-loading of reinforcement from delivery vehicles.

In addition, the Association is developing guidance on the use of pre-slinging of loads/single trip bags and will

be reviewing its guidance note *'The Design and Lifting of Pre-fabricated and Site Fabricated Reinforcement Cages for Piling and Walling Works'* and its *'Delivery Charter'*. Together, the above documents will provide a suite of health and safety best practice guidance that will be of real value for reinforcement suppliers, hauliers and contractors.



# CE MARKING OF STEEL REINFORCEMENT

There continues to be some confusion amongst designers, consultants and specifiers as to whether steel reinforcement requires a CE mark. As there is currently no harmonised European Standard [hEN] it does not. [highlighted copy quote] What the sector has is a quality certification scheme that in many respects is a more rigorous check than CE marking.

Since 1st July 2013, under the Construction Products Regulation [CPR], it became mandatory for manufacturers to apply CE marking to any of their products that are covered by a hEN or a European Assessment Document [EDA]. The CPR replaced the Construction Products Directive [CPD] under which affixing the CE marking was voluntary. CE marking is used to demonstrate a presumption of conformity by the manufacturer or importer. It is not a quality or safety mark and is primarily designed as a regulatory mark to ensure freedom of movement of goods throughout Europe.

It is expected that steel reinforcement will eventually be covered by a harmonised European standard. This standard, EN 10080, is currently at draft stage and is

not predicted to facilitate CE marking before 2018 at the earliest. Until then as there is no hEN there is no CE marking necessary for reinforcing steel, reinforcing fabric or lattice girders. Furthermore, there are no plans for cut and bent reinforcement to be subject to a hEN as it is not included in the European Commission's mandate. It should be noted, however, that some reinforcement accessories are subject to CE marking and designers and specifiers are advised to check accordingly.

As stated above, CE marking is a regulatory mark not a quality mark. For quality assurance, there is the well-established Steel for the Reinforcement of Concrete [SRC] scheme developed and managed by the UK Certification Authority for Reinforcing Steels [CARES].

The SRC scheme covers all stages in the supply chain from the receipt of raw materials, the manufacture and processing of the steel through to the delivery to the customer. As a quality scheme, it offers a more robust certification route than CE marking. This is underlined by the comparison table below:

## CARES SRC SCHEME

Reinforcement from a CARES approved supplier is marked for identification of strength, ductility and manufacturer. This enables assurance of correct reinforcement supply by visual inspection without the need for further testing.

CARES product certification provides full traceability by addressing all the following activities: steelmaking; casting; rolling; delivery to processor/fabricator, processing/fabrication; delivery to construction site.

The CARES SRC scheme requires that the reinforcing bar/coil manufacturer issues a works test certificate for each batch for strict traceability to production conditions for each cast of steel.

Each company in the supply chain approved by CARES must demonstrate the following: compliance with the product standard; management system complying with ISO 9001; proper process control.

CARES product certification requires the analysis of three different sets of tests results: As Witnessed; As Independently Tested and As Produced. This enables independent checking of the accuracy of the manufacturer's test methods and consistency of production.

## CE MARK

CE marking requires product strength and ductility related information. The generic strength and ductility should be rolled onto the bar itself as described in the product standard - interpretation of which is subject to the manufacturer. CE mark offers no obvious strength or ductility indication.

CE marking is only concerned with the product as it comes from the steel mill.

CE marking requires only a declaration of performance [DOP] by the manufacturer with no test result certification. The proposed European standard for reinforcing steel does not require traceability to production conditions for each cast of steel.

CE marking does not require process control assessment. The European standard requires only Factory Production Control [FPC] rather than compliance with ISO 9001.

CE marking requires initial type testing and surveillance testing by the manufacturer but no statistical analysis of test results. There is no requirement for independent testing.

The voluntary CARES SRC scheme offers an internationally recognised assurance of product quality that is not matched by the mandatory CE marking. For quality assurance, designers and specifiers are advised to require CARES certification for steel reinforcement.

When in the future CE marking becomes a requirement for steel reinforcement, the sector will be able to offer the best of both worlds: quality assurance supported by product conformity.

# MEGA AWARD FOR OUTOKUMPU

Outokumpu Long Products has won a contract to provide 350 metric tonnes of smooth round stainless steel dowel bar for the Mega Reservoirs PRPS-3 at Rawdat Rashed (Package D).

Habtoor Leighton Group (HLG), contractor for PRPS 3 and Big Blue has made a supplier agreement to use stainless steel dowel bars manufactured by Outokumpu. The bars will be supplied in grade Supra 316L/4404 to be used in the expansion joints for rafts and walls of the reservoirs. Stainless steel is an ideal material for infrastructure projects such as the Rawdat Rashed in the Qatar Mega Reservoir projects due to its high corrosion resistance and low life-cycle costs.

The new mega reservoirs projects will include five primary reservoir and pumping station (PRPS) packages with a capacity of 100 million gallons each, making them the largest reinforced concrete reservoirs in the world. The objective of the project is to provide seven days' potable water storage in new reservoirs, combined with the existing and future secondary reservoirs, to preserve Qatar's water quality.

Outokumpu stainless steel dowel bars are used in expansion joints for the movement of lateral loads and manage stress within the joint. The dowels are debonded and movements allowed by specially designed sleeves by Big Blue which includes uPVC



pipe, compressible filler and end cap. The one half of the dowel is embedded into concrete, while the other half is debonded to allow the movement at the expansion joints.

Outokumpu has a century of experience creating efficient, long-lasting, recyclable stainless steels. Its global offering includes quality-critical Long Products for infrastructures. Outokumpu's Long Products sites are located in the UK, Sweden and the US, all renowned for their high quality products, flexibility and world-class delivery performance.

Read more about Outokumpu Long Products at:  
[www.outokumpu.com/rebar](http://www.outokumpu.com/rebar)

## CONCRETE CONNECTION



**Dextra Group**

UK contractors are increasingly take advantage of the benefits of precast technology to speed up construction schedule. In London, for the new London Wall Place office building, Byrnes Bros used Groutec couplers, supplied by Dextra, to connect their precast panels more quickly and efficiently, without the need for wet joints.

Groutec is a mechanical splicing system featuring both a threaded end and a grouting sleeve. It is especially designed for the connection of precast concrete elements. Groutec is designed and manufactured in compliance with Eurocode 2, BS 8110, ACI 318, IBC, AASHTO.

Groutec connects precast concrete elements in two steps:

- At the precast factory, the Groutec couplers are screwed onto the reinforcement and positioned against the formwork. Reinforcement is then cast in concrete.

- On site, precast elements are connected by inserting protruding bars from the first element into the Groutec sleeves of the second element. The connection is completed by using non-shrink grouting mortar, injected through the injection holes, or directly poured into the cavity by gravity.

The system offers a range of benefits. These include simple connection without the need for in-situ wet concrete joints, the threaded end of the coupler offers a compact solution that minimises potential congestion problems, the cavity end of the coupler can be filled with a range of non-shrink grouting mortars whilst the width of the cavity allows the connection of continuation bars that are not perfectly aligned.

For further information visit: [www.dextragroup.com](http://www.dextragroup.com)





# LENTON INVESTMENT

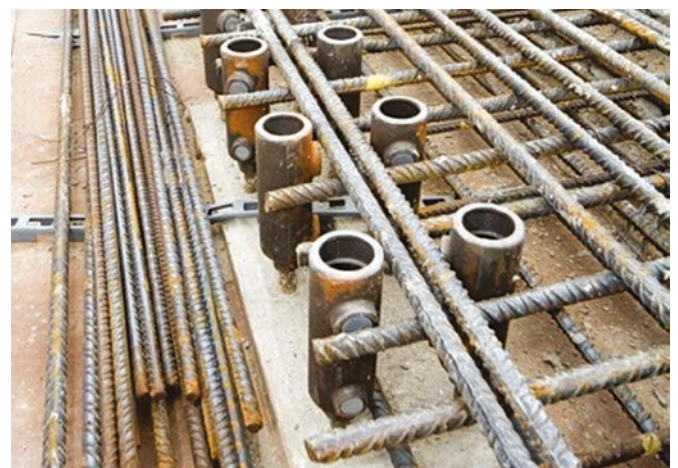
LENTON products are manufactured and marketed by Pentair, who recently acquired ERICO. LENTON will continue to provide market leadership in quality, reliability and performance renowned to the brand, through focus on innovation and manufacturing.

LENTON reinforcing steel connectors, including steel anchorage and coupling systems, are used in thousands of concrete construction projects throughout the world for both cast-in place and precast applications including nuclear and cryogenic projects.

In the UK, many prestigious projects feature LENTON products. The Shard, one of the distinguished new additions to the London skyline includes LENTON standard couplers, parallel bolt couplers and weldable couplers. The Highbury Square project used both LENTON INTERLOK grout filled couplers and LENTON standard couplers due to their inherent flexibility that helped with addressing the structural challenges of the retrofit of the Arsenal F.C. Stadium to a residential complex. Other UK projects include Crossrail, St. Pancras Station, Wembley Stadium, Liverpool ONE and the Second Severn Crossing.

LENTON products reduce congestion and provide structural integrity and reliable performance to stringent worldwide building code requirements. LENTON products are supported by well-respected engineering capabilities, extensive experience and thorough testing. LENTON provides confidence in reinforcing steel connections.

For further information visit: [www.erico.com](http://www.erico.com)





# RAISING THE **BAR**

BAR members are fully supportive of the Association's objectives aimed at raising the bar for the UK reinforcement sector by:

- Providing a forum in which common issues facing the UK reinforcement industry can be addressed.
- Forwarding and supporting the market share of reinforced concrete against competitive structural materials
- The Association cannot dictate material sourcing but expects its members to, wherever possible, to forward and support the UK steel and reinforcement sectors
- Improving overall quality of the product and service within the UK reinforcement industry, through

representation on the Board of CARES (Certification Authority for Reinforcing Steels) and on relevant BSI Technical Committees.

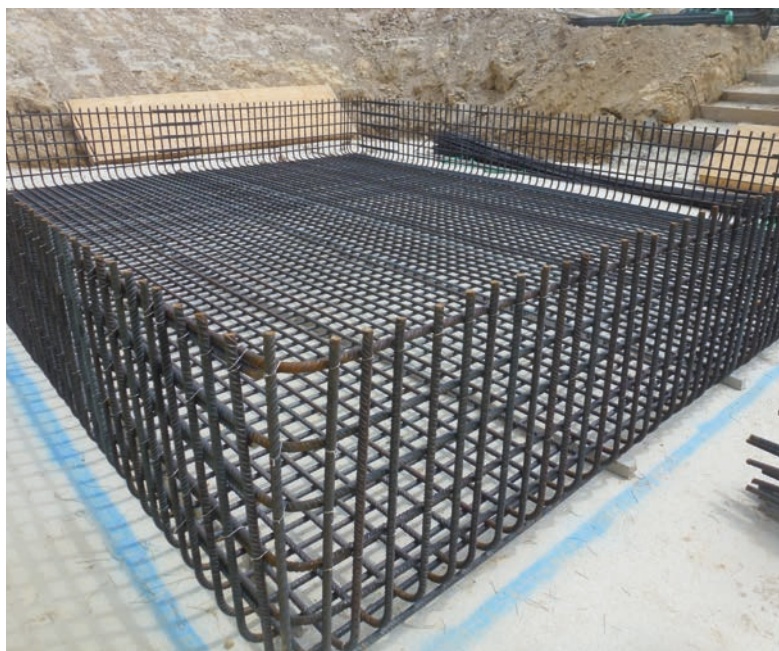
- Improving the health and safety record of the UK reinforcement industry.
- Improving the environmental record of the UK reinforcement industry.
- Actively promoting the UK reinforcement industry's products and capabilities to relevant target audiences.
- Representing the UK reinforcement industry with HM Government, in Europe and with other decision makers.





# REINFORCE

2016



**BRITISH  
ASSOCIATION OF  
REINFORCEMENT**

[www.uk-bar.org](http://www.uk-bar.org)

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