Neutral Citation Number: [2007] EWHC 111 (Ch)

Case No: HC05C01951

IN THE HIGH COURT OF JUSTICE
CHANCERY DIVISION
INTELLECTUAL PROPERTY

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 5 February 2007

Before :

THE HONOURABLE MR JUSTICE KITCHIN

- -

Between :

(1) CEMBRIT BLUNN LTD **(2) DANSK ETERNIT HOLDING A/S**	**Claimants**
- and -	
(1) APEX ROOFING SERVICES LLP **(2) ROY ALEXANDER LEADER**	**Defendants**

- -
- -

Mr Michael Hicks and Mr Alexander Learmonth (instructed by **Bond Pearce LLP**) for the Claimants
Mr Jonathan D.C. Turner and Mr Alexander Madgwick (instructed by **Fisher Jones Greenwood LLP**) for the Defendants

Hearing dates: 24, 27 – 30 November, 1, 4, 6 – 8, 11, 14, 15 December 2006

- -

Judgment

MrJustice Kitchin :

Introduction

1. This is a dispute about fibre-cement roof slates. The second claimant ("Dansk") is a Danish company and the parent of a multi-national group of companies which together form one of the largest producers of fibre-cement slates in Europe. The first claimant ("Cembrit UK") is a wholly owned subsidiary of Dansk and is responsible for the sale in the UK of fibre-cement slates made by the Dansk group. The first defendant is a roofing contractor and the successor to the firm Apex Roofing Services (collectively, "Apex"). The second defendant, Mr Leader, is a member of Apex.

2. The fibre-cement roof slates in issue were manufactured in the Czech Republic by Cembrit CZ a.s. ("Cembrit CZ"), another subsidiary of Dansk. They have a textured surface which resembles natural slate and are sold by Cembrit UK under the trade mark "Zeeland". Between 2000 and 2003 Cembrit UK supplied Zeeland slates to Apex for installation at two sites known as "Aberfeldy" and "Greenhithe", where the firm was subcontracted to the main contractors Countryside Properties (in Partnership) Limited ("Countryside") and Crest Nicholson plc ("Crest") respectively. Apex complains that many of the slates laid at these sites have curled up to an extent which is unacceptable and has necessitated the replacement of many of the roofs. In short, it contends that the slates supplied were not of satisfactory quality. The claimants respond that the problem of curling, such as it was, was not the result of any defect in the slates but rather the result of the failure by Apex to install them properly.

3. The proceedings began with a claim for infringement of intellectual property rights. The claim was issued in July 2005 following the circulation by Apex of an internal letter ("the Letter") dated 27 February 2004 written by Mr Karl Jorgensen, the Executive Vice-President of Dansk, to Mr Mark Fisher and Mr David Bailey, respectively the Managing Director and Sales and Marketing Director of Cembrit UK. The Letter considers and discusses possible settlement of a claim which had by that time been threatened by Apex against Cembrit UK in relation to the Zeeland slates installed at Aberfeldy.

4. The claimants contended that the circulation by Apex of the Letter constituted an infringement of copyright and misuse of confidential information and they made an application to restrain further circulation of the Letter pending trial. They also sought disclosure of the identity of the person who had provided Apex with the Letter. Apex gave undertakings not to circulate the Letter further pending judgment or further order but declined to identify its source. It also defended the allegations of infringement of copyright and breach of confidence on the grounds that the use made of the Letter was justified to counter false statements made in an earlier letter written by the claimants' solicitors to a number of parties including Countryside and Crest.

5. In August 2006 Apex amended its defence to introduce a counterclaim against Cembrit UK that the slates were not of satisfactory quality. Then, in September 2006, Apex revealed that the source of the Letter was a Mr Richard Cook, a building consultant employed by Cembrit UK in the spring of 2004 to advise it as a consultant in relation to the same dispute. At this point the parties recognised that the central issue between them was whether or not the Zeeland slates supplied by Cembrit UK to Apex were of satisfactory quality. The intellectual property issues were now of

secondary importance. The identity of the source was known and the counterclaim would determine whether the slates were defective and whether Cembrit UK was liable to Apex. Nevertheless, I am invited to make findings in relation to the intellectual property claim because I am told that significant costs issues may depend on it.

6. In summary, the issues I have to determine are therefore as follows:

   i) Were the claimants' Zeeland slates of satisfactory quality within the meaning of section 14 (2) of the Sale of Goods Act 1979 (as amended)?

   ii) Is the Letter the subject of copyright and protected by the law of confidential information?

   iii) Should the defendants have been restrained from circulating the Letter and should they have disclosed the identity of its source?

7. Before addressing these issues I must first describe aspects of the technical background and explain how the events which gave rise to this dispute unfolded.

Manufacture of fibre-cement slates

Production

8. Fibre-cement slates have been made and sold in Europe for over 70 years. They are generally made by a process developed by an Austrian, Ludwig Hatschek, in the early 1900s. He called his process "Eternit". For this reason a number of companies in the industry include the word Eternit in their names. For example, the claimants' main rival in the UK is Marley Eternit Ltd ("Marley") and its equivalent slate to the Zeeland is called "Garsdale".

9. As their name suggests, the slates consist of cement reinforced with fibre. Originally asbestos was used. Now, for safety reasons, all manufacturers use a mixture of other fibres, most usually cellulose and synthetic polymer. The process for the manufacture of Zeeland and other similar slates begins with the production of a sheet of fibre-cement consisting of a number of layers. Each layer is itself made up of thinner laminations. Normally there are five layers and each layer has three laminations. The upper layer (that is to say the side exposed to view on the roof) is pigmented. Individual slates are then stamped out of the sheet. Standard Zeeland slates are 600mm x 300mm and provided with three pre-formed holes, one on each side near the middle of the length of the slate, and one in the centre of the tail end of the slate. The needles used to punch the holes have a diameter of 4.5mm.

10. Stamped out slates are then picked up and transported to a stack. In the case of slates with smooth upper surfaces, the stacked sheets are interleaved with flat steel sheets. In the case of slates with a textured upper surface (such as Zeeland slates) the sheets are interleaved with moulds, called templates. The stack of steel sheets or templates and slates is then compressed. This serves to increase the density of the slates and to mould the upper surface to create either a textured finish or a smooth surface, as desired.

11. After compression Zeeland slates are left for a period of time during which they cool and begin the process of curing. They are then painted. This is a two stage process. First, the slates are passed through rollers which paint their upper and lower surfaces. The rollers are automatically controlled but the process is continually supervised by an operator who tries to ensure that there is an even coating of paint by checking the weight of paint applied and by visual inspection. The rollers are made of metal and covered with soft rubber. They are replaced every seven to ten days, or sooner if they become damaged.

12. Zeeland slates are certified by the British Board of Agrément ("BBA") as complying with the European Standard EN 492:1994 ("EN 492"). This standard specifies the technical requirements of fibre-cement slates and their fittings. Section 5.1.2 provides:

> "The exposed face of the fibre-cement slates can be with or without texture. The fibre-cement slates can be coloured or left in their natural colour. The fibre-cement slates can also receive adherent coloured or uncoloured coatings on their surface.
>
> The fibre-cement slates can be supplied holed for fixing.
>
> On exposure the surface and/or its coating will be affected by weathering which may vary with site location, aspect, pitch of roof and duration of exposure. Any deterioration in this respect shall not detract from the minimum mechanical and physical characteristics as specified in this standard or from the function of the fibre-cement slate as a durable element."

13. Mr Madsen, the Group Technical Manager of Dansk, explained, and I accept, that this means that the cement and fibre mixture may be pigmented or left in its natural colour, the slates may be painted or not, and the paint may be clear or coloured. But the slates must remain durable.

14. The standard also provides a number of tests with which the slates must comply. Two have particular relevance to these proceedings. First, it provides a water impermeability test. This involves placing a column of 250mm of water on the upper surface of the slate for 24 hours. The underside of the slate is allowed to show traces of moisture, but no drops of water must appear. Secondly, it provides for a "heat-rain" test. This involves submitting the upper surfaces of the slates to 50 wetting and heating cycles in which the upper surfaces are first wetted for just under three hours and then, following a pause, heated to 70ºC for just under three hours. Following this test any visible cracks, delamination or other defects in the slates must be of a degree such as not to affect their performance in use.

Curling in fibre-cement slates

15. Both Mr Madsen and Mr Petersen, the Group Research and Development Manager of Dansk, gave evidence on this topic. I should say at the outset that I found them both to be honest and fair witnesses. They explained that all fibre-cement slates have a tendency to curl for essentially two reasons. The first is absorption of water and the second is carbonation.

16. Mr Madsen explained that his view and, indeed, the general accepted view, is that the main cause of curling is moisture. This causes the material of which the slate is made to expand. Consequently, if one surface of a slate absorbs more water than the other the slate will tend to curl. It will also tend to curl if one surface of the slate dries out more quickly than the other. If, for example, more moisture escapes from the upper surface than the lower surface, then the slate may curl upwards. Curling may be cyclical and depend upon the weather conditions. A slate which is curled in the wet may become flat again when it dries out and then curl again as the weather changes. These factors are reflected in the tests set out in EN 492. It is accepted that a slate can be permeable but it must prevent water ingress and be capable of withstanding cycles of heat and rain.

17. Mr Madsen explained two further matters which have a bearing on the effect of moisture. First, it is a feature of the Hatschek process that slates are compressed and this creates a structure within each slate in which the upper surface tends to be less porous than the lower surface. This means such slates have an inherent tendency to curl upwards. Second, slates gradually cure by a process called hydration. This takes place over a period of time as the slates are subjected to weathering. As the slates hydrate they become more stable. One of the reasons for this is that hydration increases the density of a slate and reduces its porosity. This also has the effect of reducing any difference in porosity between the upper and lower surface. After about a year the slates tend to become stable. This means that some slates "set" in a curled condition depending upon their state as they harden.

18. The second factor affecting curling is carbonation. When the slates leave the factory they contain free calcium hydroxide. This can react with carbon dioxide from the atmosphere to form calcium carbonate. As it does so, water is released and evaporates and this can lead to shrinkage of the material left behind. Consequently, if the process of carbonation occurs differentially on the upper and lower surfaces of a slate it can also lead to curling. This factor is less relevant to these proceedings because, as Mr Petersen explained, it was found that very little carbonation had occurred in the slates installed at Aberfeldy.

The reason for painting slates

19. Fibre-cement slates are painted for a number of reasons. One is to make them resemble natural slates. For present purposes, however, it is of greater importance that painting reduces the permeability of the slate surface. As Mr Madsen explained, all the main manufacturers of fibre-cement slates put more paint on the upper surface than the lower surface because the upper surface is exposed to the elements. That does not mean to say that slates are intended to be wholly impermeable. They are clearly not. As EN 492 makes plain, a degree of permeability is certainly acceptable. It is also notable that EN 492 contemplates that slates may not be painted at all. This may be perfectly acceptable because the more a slate permits water absorption, the more it will allow water to escape. It is differential absorption rather than absorption as such which causes the curling.

Installation of slates

20. Cembrit UK supplied a fixing guide with their Zeeland slates. This specified that the slates must be fixed in accordance with British Standards BS 5534: Part 1: 1990, and BS 8000: Part 6: 1990.

21. When a roofer is faced with the task of slating a new roof his first job is to fix the underlay over the exposed rafters. Sheets are lapped one on top of another and the overlap must measure at least 100mm. The roofer must ensure that the underlay drains freely into the gutter and does not obstruct the flow of air through any ventilators. Obviously care must be taken to ensure that the underlay is not torn and that any tears or holes are repaired. At about the same time the roofer will check the fascia board is properly fitted and does not require adjustment. If it is too high then the slates which fit over it at the eaves of the roof will tend to lie at too shallow an angle which can cause or contribute to the curling of slates. This shallow angle was referred to in evidence as "sprocketing".

22. The roofer then fixes horizontal battens over the underlay and nails them to the rafters beneath. The battens are 50mm wide and 25mm deep. The dimensional tolerance of the batten depth is +3mm - 0mm, but the battens are rarely significantly larger than the specified size. It is the battens which will in due course carry the slates.

23. The battens must be fixed in accordance with BS 8000 and are spaced a fixed distance apart. This distance is known as the "gauge" and in the case of Aberfeldy it is 250mm. The battens should rest on and be nailed to the rafter at each side of the roof and to the various rafters in between. Where the ends of two lengths of batten are joined, each end should rest on a batten and be nailed in. If the end of the batten does not rest on a rafter then it can result in unevenness of the slates. The same problem can arise if the nails securing the battens to the rafter have not been fully driven home.

24. The roofer then begins to fix the slates. As I have mentioned, the Zeeland slates in issue are 600mm long and 300mm wide, save that at the edges of a roof wider "slate and a half" (450mm width) slates are used in every other row or "course", and may be cut to fit.

25. The slates are laid in horizontal courses with their tails aligned. They are centre nailed using two 2.65mm x 30mm long copper nails. The slates must be aligned carefully with a gap between them, called the "perp-gap", of about 5mm. The roofer starts with the bottom or eaves course and then gradually works his way up the roof. To assist him in maintaining the vertical alignment of the slates down the slope he marks the battens with a series of vertical chalk lines. Once the roofer has completed a course of full sized slates he then lays the next course immediately above it and gradually proceeds up the roof.

26. Zeeland slates are laid with a double lap in their length and a single lap in their width. The appearance of a correctly laid double lap slate roof is similar to that of stretcher bond brickwork with slates in alternate courses lining up with each other. In the centre of an array of slates, each slate has a portion that is exposed to view and a larger portion that is covered by the slates of the two courses above it. The portion of the slate that is not visible is covered by two slates of the same size that butt up against each along its centre line. Each slate rests at its upper end on one batten and is nailed to the batten 250mm immediately below it. It then overlaps the next batten down by some 100mm. The result is that each slate has an exposed portion of 250mm (the

gauge), a portion of 250mm which is overlapped only by the course of slates immediately above it (also the gauge) and a portion of 100mm which is overlapped by the two courses above it (called the "head-lap"). The length of slate can therefore be defined as two gauges and one head-lap.

27. This arrangement is designed to render the roof waterproof. The path of rain water may be considered by reference to the slates in three courses, an upper course, a mid course and a lower course. Any water gathering on a slate in the upper course drains off that slate and, at least in part, down through the side gap (the perp-gap) in the two slates immediately below it in the mid course. It is then collected on the surface of the slate in the lower course which is aligned with the slate in the upper course.

28. The tails of the slates are held down by a copper disc rivet. Standard rivets used in the UK have a copper disc with a diameter of 19mm and thickness of 0.4 to 0.45mm. From this extends a pin of 2mm diameter and length 18mm. These dimensions are in some cases slightly smaller than these identified in Cembrit UK's fixing guide but nothing turns on the differences, such as they are. The rivet is fixed in the following way. The copper disc rests near the top of a slate in the lowest of three courses. The pin protrudes through the perp-gap of the two slates immediately above it, quite close to their fixing nails. The pin then passes through the hole in the tail of the slate in the upper course. The roofer bends it over with one or two blows of a hammer. His aim is to try and ensure that the pin is bent over so that it lies flat on the surface of the upper slate, and gives the impression of being bent over at 90°. As I shall explain, however, the actual angle of bend may be rather greater than this.

29. The purpose of the rivets is explained in BS 8000. They should grip the slates together and resist any tendency of the tail to lift or curl. If this is to be achieved the roofer must pay particular attention to the way he lays the slates. He must line the slates up carefully so that the perp-gap through which the rivet pin extends is not too wide. If it is too wide then there is a risk that the disc of the rivet will be pulled through the gap. Further, the courses of slates must be very carefully laid so as to ensure that they run horizontally and are properly vertically aligned. As Mr Douglas, one of the roofers who gave evidence before me said, the vertical alignment of the slates down the slope must be "spot on", for otherwise it may not be possible for the pin to extend vertically through the perp-gap of the slates in the mid course and the hole of the slate in the upper course. If it must be bent to "find" the hole then the useful length of the pin will be reduced and the rivet fixing will be weakened.

30. At this point it is convenient to mention a distinction which was drawn at the hearing between "curling" and "lifting". Curling was used to describe the situation where the corners of a slate curl up but the centre remains securely fixed by the rivet. Lifting was used to describe the situation where the whole length of the bottom of the slate rises, in some cases coming off the rivet altogether, and allowing the rivet to drop out. It was common ground that it is desirable that a slate which has lifted from its rivet should be replaced or re-fixed. Further, the claimants accepted that if the curling force of properly installed and fixed slates was so great that specified fixing rivets were straightened by that force, and that the slates lifted free of the rivets, then they were not of satisfactory quality. They also accepted that their slates should be sufficiently durable to resist a reasonable range of weather conditions. They did not accept, however, that the mere fact that their slates had a tendency to curl meant that they were not of satisfactory quality.

31. There are a number of other general aspects of roofing which I should mention at this stage. It is a recommendation of BS 5534 that the ridge tiles at the ends of the roof are mechanically fixed. It is also important that the mortar used to secure ridge tiles is correctly mixed, so as to ensure that it adheres to the slates and ridge tiles satisfactorily. Further, slate roofs often contain ventilation slates which are designed to allow air into and out of the roof and so ventilate the roof space and control condensation without compromising the weather proof integrity of the roof itself. A ventilation slate is normally made up of a body which replicates the slate, a ventilation grill and a rain water collection box and pipe connection. Some units are made with side extensions that lap under the adjacent slates to prevent water ingress. Slate vents that have these side extensions that pass under adjacent slates may tend to kick up those slates by the thickness of the extension. They may also prevent the copper disc rivets on those adjacent slates from being installed correctly.

32. Particular care is needed to ensure the integrity of the roof where it meets an adjacent structure, such as a parapet wall. Flashings and soakers are used to try and ensure the joint is weatherproof. Soakers are made of lead sheets and are laid between the courses of slates at a vertical edge and then bent vertically against the parapet. The upturned edges of the soakers are then covered with lead flashings so as to form a seal with the parapet wall.

Narrative of events

The two estates

33. As I have mentioned, Apex installed Zeeland slates at two estates which have become the subject of this claim: Aberfeldy in East London near the north entrance to the Blackwall Tunnel and Ingress Park, Greenhithe in North Kent. Aberfeldy was built by Countryside for East Thames Housing Group ("East Thames"), a company limited by guarantee, a registered social landlord and a registered charity, and for Poplar Housing Regeneration Community Association Limited ("Poplar"), a housing association. Greenhithe was built by Crest for sale as a private development. In each case Apex was engaged to roof the relevant part of the estates.

34. Countryside is part of the Countryside group of companies and a subsidiary of Countryside Properties PLC. It is a highly reputable business. Countryside currently has a turnover in the region of £100 million per annum and each year builds around 900 housing units. In 2005 the Countryside group won Housebuilder of the Year, Best Volume Housebuilder and Best Sustainable Housebuilder of the Year awards. The Countryside group has had a trading relationship with Mr Leader and Apex for about 30 years. Over that time Mr Leader and his businesses have installed around 10,000 roofs for the Countryside group. Save for the problems giving rise to the present action the Countryside group has never had any problems with roofs installed by Apex.

35. A good deal of the factual evidence upon which the defendants rely was given by Mr Leader. Clearly he has a significant interest in the outcome of these proceedings. As he gave evidence I was left in no doubt that he has strong views about the merits of his position and that he firmly believes that the Zeeland slates which have given rise to these proceedings were defective. Mr Leader is also very determined, as evidenced by his actions in relation to the Letter which I relate hereafter. He formed certain

theories as to why the slates behaved as they did which ultimately proved unfounded and which were not pursued. But I do not believe he can be criticised for this. I have no doubt that he honestly held the views he expressed and, as I shall explain, the claimants themselves have substantially changed their own position on this issue. Overall I found Mr Leader to be an honest witness and I reject the submission advanced by the claimants that his evidence was not generally reliable or satisfactory. In particular, I believe it right to attach considerable weight to Mr Leader's evidence as to the manner in which the slates in issue were laid and as to how events unfolded and the problems with the slates became apparent.

Aberfeldy

36. Construction at the Aberfeldy estate began in 2000 and comprised three phases. The first phase related to 69 housing units at sites B, C and F. Sites B and C were bordered by Leven Road and Abbott Road and site F was bordered by Abbott Road, Balmore Close and Findhorn Street. The second phase comprised site D and the third, site E. Site D was bordered by Leven Road and Abbott Road and Site E by Fortrose Close and Oban Street. These two further sites comprised an additional 87 units.

37. Apex installed the slates on the roofs of the units at Aberfeldy during the period July 2000 to October 2003. It installed slates at Greenhithe over a similar period, commencing in September 2000 and ending in November 2003. In the following narrative I will focus on Aberfeldy where the problem roofs have been subjected to the most careful scrutiny.

38. The contract between Countryside and East Thames provided for various dates for the issuing of "certificates of practical completion" in relation to each site. These dates varied from October 2002 to May 2003. The process required an inspection by an agent instructed by East Thames and for this purpose it chose a firm of surveyors called Stanford Eatwell & Associates Limited ("Stanford Eatwell"). As a matter of practice, Countryside did not remove the scaffolding from the various constructed units until the certification inspection had taken place.

39. I am quite satisfied that the work carried out by Apex was inspected at regular intervals as it progressed up to and including the point at which certificates of practical completion were issued. Mr Leader explained that the roofs at Aberfeldy were of a standard construction with cold lofts, that is to say the insulation was at ceiling, rather than rafter, level and the loft spaces were ventilated through vents in the eaves. He had engaged experienced roofers and as the work proceeded he regularly inspected it himself. I heard evidence from three of those roofers, Mr George Donald, Mr Andrew Donald and Mr Sean Douglas. I return to the evidence they gave later in this judgment.

40. I also heard evidence from Mr Balcomb, a Quality Control Manager employed by East Thames and from Mr Everett, the Managing Director of Countryside who each gave evidence on behalf of Apex. I consider both witnesses gave their evidence honestly and carefully and I have no hesitation in placing reliance upon it. It was Mr Balcomb's role to oversee and take responsibility for quality control inspectors whose job it was to ensure that building projects carried out for East Thames met the relevant specifications and requirements which East Thames had laid down. Mr Balcomb was concerned with all phases of the Aberfeldy development and oversaw the work of his

inspectors and visited the site himself on a regular basis throughout the various phases of the development. He explained, and I accept, that since the properties were residential and due to be transferred to different organisations the supervision of the building works was extremely thorough. In addition, and as I have mentioned, East Thames employed Stanford Eatwell as its agent to supervise and certify the works as they progressed. Further, Mr Balcomb explained all the work was inspected on a regular basis by the Building Control Inspector employed by Tower Hamlets, a Mr Bill Flanagan, who was extremely thorough. Mr Balcomb also explained that the properties were to have the benefit of a warranty from the National House-Building Council ("NHBC") and the work was therefore regularly inspected by NHBC representatives. Finally, Countryside also employed their own building manager, site managers and other supervisors who regularly visited and checked up on the work and its progress. In short, therefore, the ongoing work was inspected by representatives from Tower Hamlets, East Thames, Countryside, Stanford Eatwell, NHBC and Mr Leader of Apex.

41. Mr Balcomb could not recall a single occasion upon which the quality of the workmanship carried out on the roofs or the fixing of the slates was raised as a problem. He believes that there were no visible faults and the slates on all the roofs were flat when they were first laid. Had this not been the case he was sure that somebody would have picked it up. In particular, he commented upon the suggestion that the copper rivets were not properly knocked down. He explained that this was definitely not the case and that he had confirmed this from his own inspections from scaffolding at close quarters. Had there been any concerns about the roof construction or the installation of ventilation or slates being incorrectly laid, these issues would have been canvassed at the time.

42. The contract also provided for an additional period known as the defects maintenance period and thereafter for the issuing of "certificates of making good defects". Accordingly, after some twelve months an inspection was to take place to check that no defects had become apparent in the interim. If all was well and any defects addressed, then the balance of the contract price would be released.

Lifting and curling

43. A certificate of partial practical completion for site F was issued in July 2002. It was not until July 2003, in the course of an exceptionally hot period, that Mr Balcomb noticed that a number of slates on south facing elevations at the Aberfeldy estate were curling. He had seen the same problem some 30 years earlier and had a recollection it had then been related to the process of manufacture. He was immediately conscious that this was a problem that needed to be addressed before East Thames could accept the properties and he therefore called in representatives of Countryside and Stanford Eatwell and explained to them that he wanted the issue thoroughly investigated.

44. On 5 August 2003, Stanford Eatwell wrote to Countryside noting from their end of defects liability period inspections that there was a concern over the roof slating at Aberfeldy, site F (Balmore Close), especially on the south facing slopes. They reported that the slates appeared to be lifting or buckling and that Mr Balcomb had asked for a meeting to be arranged at which it could be discussed with Apex. Stanford Eatwell also noted that the problem appeared to be getting worse and might be due to the recent high temperatures.

45. At about the same time the matter came to the attention of Mr Leader. He was told that East Thames had refused to release its retention monies under its contract with Countryside and that Countryside had, in turn, withheld its retention monies under its contract with Apex. It initially appeared to Mr Leader that only a few slates were affected and Apex tried to deal with the problem by re-fixing the rivets. But during August the problem became much worse. Mr Leader estimated that the rivets in about 5% of the slates had straightened and that around half the others were under pressure. The worst affected roofs were south facing.

46. Mr Leader formed the view that there must be a serious problem with the slates and he therefore arranged a site inspection on 8 October 2003 attended by Mr John Penrose (a Regional Sales Manager of Cembrit UK), Mr Simon Mountney of Countryside, Mr Stockdale of East Thames and himself. At that meeting Mr Stockdale explained that he had been entirely happy with the work of Apex, that the roofs had been satisfactory on completion and that, in his view, the roofs of all 40 units of site F would probably have to be replaced.

47. In view of the problems which he anticipated that Apex now faced, Mr Leader decided that Apex should at that point stop buying Zeeland slates and buy the equivalent product from Marley. Mr Leader told me, and I accept, that Apex has not had any problems since that time with those equivalent products. Apex returned all Zeeland slates which it had in stock and suspended payments to Cembrit UK.

48. A further inspection took place on 11 November 2003. This was attended by Mr Leader, Mr Milan Masek, the Factory Manager of Cembrit CZ's factory in the Czech Republic, and Mr Petersen. As recorded in an e mail from Mr Petersen to Mr Bailey, Mr Petersen and Mr Masek concluded that slates with severe curling had no rivets and that the rivets had been straightened out due to the tension caused by the curling. No suggestion was made that the rivets had not been correctly installed. As Mr Leader pointed out in his evidence, many more slates have curled at Aberfeldy since November 2003.

49. Following the meeting Dansk's technical staff requested samples of the affected slates for analysis and, on 21 November 2003, one of Mr Leader's staff removed between 40 and 50 affected slates selected by Mr Penrose. A similar number of slates were removed for Apex.

50. Apex then approached the Stanger Material Science Laboratory ("Stanger") to carry out an independent analysis. Apex supplied Stanger with eight typical samples of distorted Zeeland slates, ten unused Zeeland slates and a pack of twenty unused "Jutland" slates, an alternative product sold by Cembrit UK. It also contacted the BBA explaining the problem that it faced.

51. On 3 December 2003, Mr Fisher of Cembrit UK wrote to Apex stating that they understood their concern at the curling slates on the Aberfeldy site and were conducting tests to establish the reason for it. They offered to pay the reasonable costs incurred in having the rivets fixed down. During the course of December further correspondence passed between Countryside, Apex and Cembrit UK. Mr Leader's view was that it was not appropriate to carry out temporary repairs until the cause of the problem had been identified. About this time Apex received a preliminary report from Stanger ("Stanger I") which concluded that the slates would

bow when subjected to heating and cooling cycles and that this process could be accumulative over a period of time. This seemed sensible to Mr Leader because he was aware that the worst affected roofs were south facing. In the same month Mr Leader asked Cembrit UK whether it had experienced any similar problems with other developments.

52. Mr Fisher responded on behalf of Cembrit UK on 16 December 2003 stating that he was aware of three other sites where similar problems had been found but that these involved a very small proportion of the slates supplied and that in all cases the installation or design had been at fault. Mr Fisher also proposed that one of the affected roofs be stripped for investigation and replaced.

53. Mr Leader discussed the issue of stripping a roof with Countryside but it felt it would cause unacceptable disruption to the residents of the properties over Christmas but that it could be done in early 2004, if East Thames agreed. By letter dated 18 December 2003, Mr Leader conveyed this information to Mr Fisher.

54. On 5 January 2004, Mr Fisher wrote again stating that tests would be completed by the early part of the following week. Mr Leader replied asking that the situation be addressed as a matter of urgency since three months had now elapsed since the original site meeting.

55. On 8 January 2004, Dansk produced a report of the results of the laboratory investigations. It was sent by Mr Petersen to Mr Fisher at Cembrit UK. In the section entitled "Background" it explained that the magnitude of curled slates was at the level of 2 to 3 % on the south facing slopes of the roofs. On the north side there was no problem. The conclusion following the inspection of Mr Masek and Mr Petersen was that all slates with severe curling "*were without rivets"* and "*The rivet was simply straightened out either due to the tension caused by the curling /heavy wind load or weak rivets*". The report then referred to tests carried out on slates taken from two houses in Balmore Close. It explained that an analysis of the paint thickness on the surfaces of the slates had shown a thicker paint layer on the upper surfaces of slates which had not curled than on those which had curled, but that that no difference in paint thickness had been observed on the lower surfaces. The report concluded that it was not possible to make a clear statement as to why some of the slates had curled but observed that it might be related to a variation of paint film thickness on their upper surfaces. It was noted that the rivets used in the UK and Denmark were equal in terms of the force needed to straighten them out but that the rivets used in the Czech Republic were rather stronger. The report therefore recommended that the curled slates be re-fixed with rivets from the Czech Republic and that further investigations be carried out to verify if the curling was related to the thickness of paint layer on their upper surfaces. I would also note that an analysis of carbonation revealed no difference between slates which had lifted and those which had not.

56. On 14 January 2004, Mr Fisher wrote to Apex to say he had received the report of the tests carried out in Denmark and summarising its contents. He explained that the report stated that 2 to 3% of the slates on the south facing roofs of 25 houses appeared to be severely curled and had pulled clear of or broken the rivet restraint at the tail of the slates. He also related the results of the tests for paint thickness and that the rivets which had been used were not as strong as those supplied by Cembrit UK. He expressed Cembrit UK's conclusion that the slightly higher curling tendency of some

of the slates had combined with an exceptionally dry, hot summer and the lower strength of the rivets to produce the effect of slates pulling clear of the rivets. Once a gap was opened at the tail of the slates, they were more vulnerable to wind uplift and this may then have contributed to the slates lifting. The letter continued that they had two basic options, which were either to re-fix the lifted slates or to strip and replace the affected slopes. Mr Fisher observed that Cembrit UK did not believe replacement was strictly necessary but in order to assess the options they would appreciate an estimate from Apex of the relative costs of the two alternatives based on the assumption that Cembrit UK would supply the slates and fixings.

57. On reading this letter Mr Leader had a number of immediate thoughts. First, the extent of the problem was underestimated. Second, it was curious that the claimants believed that the problem might be caused by differences in paint thickness on the upper surfaces of the slates because upward curling of the tail was consistent with water absorption on the underside. Finally, and as to rivets, Apex had simply used the standard rivets normally used in the UK. Mr Leader therefore asked for a copy of the test report by letters of 15 and 22 January 2004. He also reminded Mr Penrose by telephone that East Thames had indicated that it thought all 40 affected roofs would have to be stripped and replaced. Mr Fisher replied on 23 January indicating that he did not agree that this was the appropriate course.

58. On 26 January 2004, Mr Fisher again wrote to Apex repeating the summary of the report which he had already provided on 14 January 2004. He recommended that the slates which no longer had an effective rivet restraint at the tail be re-fixed with rivets of a higher strength than those commonly used in the UK market. He stated that reasonable costs, agreed in advance, would be born by Cembrit UK and that it would provide the fixings. He also said that Cembrit UK would guarantee the effectiveness of the solution and undertake to inspect the roofs at agreed dates and to carry out further appropriate action should problems recur. He indicated that it was their intention to agree action and to give guarantees in such a way as to release Apex and Countryside from their liability in respect of the roofs. It is notable that at no stage did Cembrit UK suggest that the roofs had not been properly installed.

59. The suggestion was not acceptable to Mr Leader for a number of reasons. He was concerned that even if a new rivet held down the centre of the tail edge of a heavily curling slate, the corners would lift around it forming a dish shape. This would increase the absorption of water on the undersides of the slates and exacerbate their curling and greatly increase their wind loading. Further, he felt that if a rivet held down the centre of the tail edge of a curling slate then that load would be transferred to the slates below, pulling out their fixings. Finally, he was concerned that removing the existing rivets would require forcing the slates upwards, so weakening the fixings and forming cracks in the matrix of the slates. The process was likely to cause wear of the edge coating, increasing the probability of water absorption and distortion.

60. In the meantime communications continued between East Thames, Poplar and Stanford Eatwell. On 29 January 2004, Countryside wrote to Apex enclosing a copy of a letter from Stanford Eatwell which confirmed that East Thames was happy for the defective slates to be replaced with slates from the same manufacturer, on the understanding that the replacement slates would be a modified version which would not suffer from the same defects.

The second Stanger report

61. On 2 February 2004, Mr Ali of Stanger produced a further draft report ("Stanger II"). Mr Ali analysed used Zeeland slates (EE 5993), unused Zeeland slates (EE 5994) and a sample of used Jutland Slates (EE 5999). In paragraph 11.5 he set out the results of surface water absorption tests that he had conducted and his thoughts as to how this might have led to the distortion of the slates. The report stated:

> "The surface water absorption tests have shown that the absorption of the top side of sample EE 5993 is not dissimilar to that of samples EE 5994 and EE 5999. However, the tests demonstrated that the absorption of the underside of sample EE 5993 is more than 5 – 6 times the absorption of samples EE 5994 and EE 5999 (refer Table 2).
>
> The water absorption by immersion also directed that the sample EE 5993 has a greater absorption than samples EE 5994 and EE 5999.
>
> It is therefore reasonable to conclude that the bow distortion observed on the site sample is not due to obvious defects in the construction of the slate.
>
> The most likely causes of this distortion are:
>
> (i) Inconsistent application of the black pigmented coating on the edges and the underside of the slate which was, in parts, very thin.
>
> (ii) The intermittent nature of the clear sealer or the lack of it on the underside and the edges of the slate.
>
> It is clear from the literature obtained on similar fibre cement products and also the BBA certificate on Zeeland slates that the coatings on the outer surfaces play an important role in reducing the risk of differential carbonation and thus bowing.
>
> Furthermore, these coatings, particularly the clear sealer are intended to act as a weather barrier to minimise penetration.
>
> An explanation of the bow mechanism in the slate is that due to the thin coatings of the underside, the slate would probably absorb significant moisture in prolonged periods of rain and wind, at the same time, little or no moisture is absorbed by the top surface.
>
> This causes differential expansion and hence an upward bow. In hot weather, the slate would dry out fairly rapidly and would bow downward.
>
> Depending on the weather conditions, these cycles could be repeated many times, during which the slates would be rubbing

against each other. However, due to its thickness, rapid wear of the coatings on the underside could take place which would expose the underlying cementitious matrix. This in turn promotes more moisture uptake and hence excessive bow.

Once a significant bow has taken place, a gap would be formed between the tail end and the slate below. In this situation the slate would be prone to wind uplift and therefore possible distortion of the disc rivet fixing."

62. In its summary Stanger concluded at 12:

"12.1 No obvious defects were observed within the fibre cement matrix of the site samples, except where local disruption of the surface coatings had taken place.

12.2 The new "Zeeland" slate sample (EE 5994) was found to have similar structure to the site samples (EE 5993) both essentially comprised of fibre cement matrix coated with a black pigmented paint which is coated with a layer of a clear sealer.

The "Jutland" slate sample (EE 5999) however was found to be different from the other two samples in that it had a plain top surface, the black pigmented paint and the clear sealer uniformly applied to all surfaces, the cementitious matrix was finer than the "Zeeland" slate and higher density of the fibres towards the top surface.

12.3 The water saturation and water absorption tests demonstrated that all slates are liable to bow. However, the greatest bow was observed on the site sample, 12.4mm (initial bow). Samples EE 5994 and EE 5999 were observed to achieve a maximum bow of 2.1mm and 1.4mm respectively.

12.4 On the basis of the results of the examination, analysis and tests, it is considered that the condition of the coatings on the underside was the prime cause of bowing distortions of the site sample.

In our opinion the unused "Zeeland" slates (EE 5994) if detected in similar environments are likely, in the long term, to exhibit similar performance as that of the site sample. In this situation any significant distortion could undermine the performance of the slate as a roofing product. Excessive distortion of the slates could lead to fracture under certain conditions such as high winds which could cause danger to the public from falling sections of the slate."

63. Stanger II was flawed in that the analysis of the slate coatings was incorrect. Nevertheless the report revealed an important aspect of the character of the used

Zeeland slates. They had a tendency to absorb significantly more water through their lower surfaces than their upper surfaces and in this respect they were different to the unused Zeeland and used Jutland slates.

64. On 10 February 2004, Mr Leader wrote to Mr Fisher referring to the options mentioned in his letter of 14 January 2004. At this time Mr Leader had received a verbal report from Stanger, but not Stanger II. He told Mr Fisher that the preferred choice of East Thames was to replace the affected slopes and that Cembrit UK's suggestion of re-fixing lifted slates would not be significantly cheaper. He also explained that the rivets which Apex had used were standard in the UK and the suggestion that paint thickness on the top of the slate was the cause of curling was contrary to the verbal conclusions expressed by Stanger. He also referred to the fact that the problem had apparently occurred some four years previously. This was a reference to a roof installed by another business, Brown Roofing Contractors Ltd ("Brown Roofing"), at Unit 850, Severalls Business Park, Colchester, which had by that time come to Mr Leader's attention.

65. A meeting took place at Unit 850 on 11 February 2004. It was attended by Mr Fisher and Mr Fair of Cembrit UK, Mr Neville Harris and Mr Philip Jarratt, respectively the Chairman and the Technical Officer of the National Federation of Roofing Contractors ("NFRC") and Mr Leader. Mr Fisher apparently suggested that the rivets be replaced with stronger ones, but Mr Harris expressed the view that this would cause more damage to the roof covering (a matter later confirmed in a letter from the NFRC to Brown Roofing dated 4 May 2004). He also suggested that the report from Stanger (that is to say, Stanger II) should form the basis of the solution to the problems both at Unit 850 and Aberfeldy, and Apex and Cembrit UK agreed to exchange technical reports with a view to resolving the position as soon as possible.

66. Following this meeting Mr Leader wrote to Mr Fisher on 13 February 2004 enclosing a copy of Stanger II and referring to the agreement that Cembrit UK would forward its test results to Apex. Mr Leader confirmed what he described as Mr Fisher's verbal agreement that installation was not an issue and that it was Mr Harris's view that renewing the rivets was not a realistic option. It may be that this letter was something of an overstatement. Nevertheless, I am satisfied that at this stage both Mr Harris and Mr Leader believed that renewing the rivets was not a practical solution and, moreover, that Cembrit UK had at no time suggested that curling was the result of the defective installation of the slates by Apex. Mr Leader concluded the letter:

> "if we fail to receive your firm offer to resolve this problem by the agreed date 1st March 2004, we will have no alternative but to seek advice to progress this matter further."

67. On 18 February 2004, Mr Kevin Harris of East Thames wrote to Stanford Eatwell. He expressed the view that the certificate of making good defects should be issued since the roof slate problem had only been identified after the preparation of the list of defects. Nevertheless, he said that the problem should be dealt with as a "latent defect" and that monies retained should therefore be released subject to the retention of a sum to pay for any remedial works needed in relation to the slates in the event that Countryside failed to make the defect good.

68. Meanwhile Dansk had begun to consider the Stanger II report. Mr Petersen produced a memorandum dated 25 February 2004 containing his comments. He made various criticisms which, he said, "*can diffuse, the findings*" in the report. In particular, he pointed out that Stanger had incorrectly identified and measured the various coatings applied to the Zeeland slates. Nevertheless he noted that the Dansk analysis had shown a paint thickness of only 6-12 microns on the lower surface as compared to 20-44 microns on the upper surface. He finished with the following "Additional comments":

> "As mentioned above we can put a question mark at some of the findings and methods used, but the Stanger report is difficult to comment. It is a fact that we have higher water absorption due to less amount of paint at the lower side of the slate, and this is stated as the main reason for the curling.
>
> What Stanger's report does not tell us is why some of the slates are performing without any problems.
>
> In my opinion the claim at Aberfeldy Road does not justify a totally exchange of all roofs and I will still recommend to work for re-fixing of the curled slates by rivets from CZ. If we can have the curled slates re-fixed we will get highly valuated information how to solve claims with randomly curled slates. If it turns out to be a wrong solution by re-fixing the curled slates we have to solve the "new" claim when the time comes."

69. These comments were sent by Mr Petersen to Mr Fisher by e mail on 25 February 2004. The following day Mr Fisher replied, evidently in some frustration. He pointed out that what was needed was a detailed and comprehensive reply to the Stanger II report together with details of the Dansk test results. Further, it was needed in a form that could be passed to Apex. He said he was not able to compose a reply to Apex based upon the material he had and now had virtually no chance to meet the deadline of the end of the week which Apex had set. He noted that Apex had rejected the offer to re-fix the slates as not being adequate or practical and, further, that Apex had taken an interest in Unit 850 in Colchester. There, Mr Fisher noted, slates had apparently been re-fixed every summer but continued to curl and that was so despite the fact that ventilation had been introduced into the roof.

The Letter

70. At this point, if not before, Dansk obviously realised that it had a serious problem on its hands. Early in the morning of 26 February 2004, a meeting took place between Mr Jorgensen, Mr Madsen, Mr Petersen and Mr Theil, the scientist who had conducted the tests at Dansk. The meeting lasted between half an hour and an hour, in the course of which Mr Jorgensen was briefed upon the investigation conducted by Dansk and Mr Petersen's comments upon the Stanger II report. After the meeting Mr Jorgensen wrote the letter to Mr Fisher and Mr Bailey at Cembrit UK dated 27 February 2004 - the Letter - which has given rise to the claim for infringement of copyright and breach of confidence. It stated:

"I have for the first time yesterday morning heard about the above claim after having been called for a meeting with Kurt V. Madsen, Henrik Steen Petersen and Sven Erik Theil.

I understand that the contractor, Apex Roofing is very demanding and that he until now has rejected the proposed settlement solutions by remedying the defects (curling slates) by adding/using new copper disc rivets.

I have also understood that the tests of the curling slates both in our own laboratories and at the Stanger laboratories reach the same conclusion, namely that the curling is caused by imbalance between the front and the back side of the slates due to differences in the paint layer thickness on the front and the back side.

Even though we may have some critical remarks to the Stanger report it does not fundamentally change the conclusion.

However, we are of the opinion that the curling problem (on a limited number of slates of the roofing area) can be solved by adding new rivets of a bigger strength as applied in the Czech Republic (with 50% higher strength than the rivets used in England and Denmark).

We would therefore kindly propose the following solution to Apex Roofing:

1. We assume that the installation is done properly and in accordance with the UK code of practice and with Cembrit Blunn's installation manual for slates.

2. The curling slates (only on the south side of the roof) on two houses are pressed flat by adding new rivets with higher strength (supplied by Cembrit CZ). Cembrit CZ is paying for the repair work on the said two roofs.

3. Cembrit CZ or Dansk Eternit Holding is issuing a warranty statement in writing stating – if it appears one year later – that the solution with new rivets has not solved the curling problem on the said two roofs, then Cembrit Blunn Ltd will replace all the south sides of the 40 houses included in the contract at the expense of Cembrit CZ, the producer of the slates.

4. Further the Apex Roofing has to bear in mind that the tests made of the curling slates prove that the slates are in compliance with the European standard for fibre-cement slate, EN492.

> I know that you have already tried to persuade the contractor to accept a solution similar to the above proposal – however, without the proposed written warranty statement.
>
> As I understand that we have already lost the customer it seems to me that we have little left to loose by presenting the above offer to the contractor.
>
> If you disagree, please contact me again. For the sake of good order, I also wish to emphasise that to the extent possible we should avoid being involved in court cases – in particular if we have a bad case. "

71. I am satisfied in the light of the evidence that I have heard that the collective view within Dansk at this time was that the tendency of the slates to curl and lift was indeed caused by differential water absorption through their upper and lower surfaces. It was for this reason Dansk suggested that Cembrit UK propose that the rivets on the curling slates be replaced with the stronger Czech rivets coupled with a warranty that if, one year later, the problem had not been solved then Cembrit UK would replace the south sides of the roofs in issue. Dansk was, however, undoubtedly puzzled by the fact that only some of the slates had curled and lifted.

72. In my judgment the Letter was clearly a private internal communication written by Mr Jorgensen to Mr Fisher and Mr Bailey of Cembrit UK. It contained an expression of Dansk's views about Apex, the reasons for the problems with the slates and the tactical approach which Mr Jorgensen thought should be adopted and it recorded his concern that litigation should be avoided, particularly if the claimants had a bad case. I accept the submission advanced by the claimants that it was plainly not intended for circulation outside the Dansk group of companies.

73. On 27 February 2004, Cembrit UK sent Apex a holding letter by fax indicating that it hoped to receive the Dansk group comments and proposals by 1 March 2004. By letter of the same date Mr Leader replied agreeing the date of 1 March 2004 and stating that if no offer was forthcoming then he had already made it clear what course of action would follow.

74. On 2 March 2004, Mr Fisher wrote to Mr Leader enclosing a letter from Mr Jorgensen, technical comments on the Stanger II report and a table of results obtained by the Dansk group R&D department. He asked Mr Leader to pass on the enclosed comments and proposals to Countryside and request a date and venue for a meeting to be attended by a representative from the Dansk group technical department. The first enclosure was a letter dated 2 March 2004 from Mr Jorgensen. It explained that the Dansk R & D department had studied the Stanger II report and had a number of critical comments upon it which appeared from the enclosed technical comments. It continued:

> "However, even though the slates are in compliance with the European standard for fibre-cement slates, EN 492, and even though we may have some critical comments to the Harry Stanger report, we agree that the observed curling of a few slates of the total roof area is not acceptable. On the other

hand, the slates, which are not curling, are in our opinion, of a satisfactory quality."

He then proposed the solution which he had detailed in the Letter and which is set out in paragraph [70] above.

75. The second enclosure headed "Technical comments to Stanger's report" was written by Mr Petersen and was a re-draft of the earlier memorandum dated 25 February 2006 to which I have already referred. Specifically, it excluded the additional comments and, most notably, the observation that it was a fact that the Zeeland slates had higher water absorption due to less amount of paint on the underside of the slates, and this was the main reason for the curling.

76. The final enclosure was a table of results dated 8 January 2004 produced by the Dansk group R & D department and which had formed the basis of the Dansk report of that same date. This shows a significant difference in the thickness of the paint layer on the upper and lower surfaces of the Zeeland slates and also a considerable degree of variation in the thickness of paint on the lower surfaces.

77. At about the same time a series of e mails passed between Mr Fisher, Mr Petersen and Mr Masek. In particular Mr Fisher was concerned as to whether or not there was a real risk of slates breaking and whether or not it was really possible to re-fix slates with new rivets. Mr Petersen replied that there did not seem to be any problem with broken slates in that none had been seen; on the other hand, he could offer no guarantee that slates would not come off the roof in heavy storms. They were obviously more vulnerable to wind load due to the missing rivets. He also explained that he had no personal experience of re-fixing slates but that during his inspection on site he tried to bend the curled slates back into the flat position and that seemed to be possible.

78. I believe this exchange of e mails is significant. It again confirms that Mr Petersen and Mr Masek had closely inspected the roofs and formed the view that some of the slates were unsatisfactory.

Brown Roofing

79. As I have indicated, Brown Roofing was the roofing contractor on Unit 850, Severalls Business Park. Mr Spencer Brown, the Managing Director, gave evidence before me and I found him to be straightforward and honest. I accept his account of events.

80. Between 1989 and 2000 Brown Roofing laid Jutland and Newland slates at a number of premises at Severalls Business Park. In January 2000, Brown Roofing entered into a contract to lay slate roofs at Unit 850. Zeeland slates were used and the work was completed in March 2000. Within a few months of the slates having been laid they began to show evidence of curling, a phenomenon with which Mr Brown was not familiar.

81. Numerous site visits with representatives of Cembrit UK followed to try and identify the possible cause of the problem. After a number of these visits Cembrit UK suggested that the problem was caused by a lack of ventilation. Mr Brown therefore agreed with Mr Penrose of Cembrit UK that Brown Roofing would introduce

ventilation, by way of a test, to see if it made a difference. Cembrit UK recommended that Brown Roofing put in eaves and ridge ventilation, flatten the slates back down and re-fix the rivets. It duly did so but the slates continued to curl and, in about the spring of 2001, Cembrit UK was called back to the site. At that point Mr Brown took the decision to monitor the roof himself and to put in two experimental patches of slate. He laid one patch with slates of another manufacturer (Eternit Thrutone) and another patch with Zeeland slates. He found that the Eternit Thrutone slates did not curl but the Zeeland slates curled once again and the rivets were straightened and pulled through the slates in large numbers, even to the extent that in some cases the dishes of the copper rivets were bent into an inverted U shape.

82. It was at about this time, late 2003, that Mr Brown received a telephone call from Mr Leader who had noticed the problems with the slates at Unit 850 and asked him what was being done about it. He explained to Mr Brown that he had the same problem with Zeeland slates on another site.

83. From the end of 2003 Brown Roofing entered into correspondence with Cembrit UK and the NFRC. Mr Brown also provided slates from the roof of Unit 850 to Cembrit UK for testing. It appears, however, that no tests were in fact carried out.

84. On 11 February 2004 the meeting took place at Unit 850 to which I have referred in paragraph [65] above. Eventually negotiations led to a further meeting on 25 June 2004 at the Hilton Hotel in Dartford. Mr Fisher prepared a summary of the complaint in advance of the meeting. In that summary he noted that the slates had been laid in February 2000, that in May 2000 a complaint was received regarding 30 lifting slates which were subsequently re-fixed. In June 2000 a further 150 slates were complained about and in July 2000 a further 80 slates had lifted. Between 2000 and 2003 vents were introduced into the roof, lifting slates were re-fixed and at some stage the eaves were opened to introduce further ventilation. This appeared to lead to the issue settling down until the hot summer of 2003 led to a recurrence of the slates lifting. Mr Fisher noted that in early 2004 Brown Roofing contacted Cembrit UK, believing that the roof required replacement and that Cembrit UK should bear the costs. Mr Fisher continued:

> "In our opinion further maintenance work on the roof is not practical and large scale or complete replacement is required.
>
> We have accepted that we have a problem with the Zeeland slates but believe the problem has been made worse by the lack of ventilation and possibly by some wide gaps between slates making the copper disc rivet less effective. This site is in a very flat area of the UK so the exposure to wind is high and slates that have become loose are very susceptible to wind damage."

85. The meeting on 25 June 2004 was attended by Mr Jorgensen and Mr Madsen of Dansk, Mr Fisher of Cembrit UK, Mr Brown and Mr Mattei, a journalist. Mr Mattei made a note of the meeting which the claimants accept forms a largely accurate record of what was said. He also confirmed the essential accuracy of the contents of that note in evidence before me. During the course of the meeting Mr Madsen indicated that the Zeeland slates were not fully covered with paint on the backside; there were parts

which were not covered and moisture drying out would cause them to curl. He said that they had discovered a thickness difference which would lead to less paint on the backside of some slates and some with no paint at all. Now that Dansk had recognised the problem they had invested in new templates and were working further to improve the painting process. In the end the claimants agreed to meet the cost of re-roofing Unit 850.

Mr Cook

86. When faced with the complaints from Apex and Brown Roofing, Cembrit UK engaged a Mr Richard Cook who describes himself as a "self-employed" building consultant and trades under the style "Building Solutions". He was provided with photographs, details of the Dansk internal laboratory tests and a copy of the Letter. On 24 March 2004, Mr Penrose drove Mr Cook to the Aberfeldy site and Millennium Quay, another Zeeland site. Mr Cook prepared a report which he sent to Mr Fisher on 29 March 2004.

87. I have to say that I found Mr Cook to be a wholly unreliable witness. His report prepared for the claimants criticised the work carried out by Apex but subsequently, and in circumstances I relate shortly hereafter, he prepared a witness statement for and was called as a witness by the defendants. In his witness statement filed on behalf of the defendants he suggested that the report he had prepared for the claimants did not reflect his true views and that he understood that it was part of his duty to set out what he thought could be wrong with the roof other than the slates. Then, in the course of cross examination by counsel for the claimants, he contradicted this evidence and accepted that he had looked at the problem with an open mind.

88. In April 2004 Cembrit UK asked Mr Cook to prepare a report on Unit 850. In the event Mr Cook never produced a report on this site and eventually Cembrit UK lost confidence in him and terminated his engagement in June 2005.

89. In early 2005 Mr Leader approached Mr Cook for assistance in connection with the dispute. Mr Cook met Mr Leader in mid March 2005 and took with him to the meeting all his papers relating to Aberfeldy and Unit 850, including those provided to him by Cembrit UK. He showed Mr Leader some photographs of Aberfeldy upon which his report for Cembrit UK was, at least partly, based. Mr Leader pointed out some aspects of the photographs which Mr Leader believed revealed that they were photographs of roof sections which had been deliberately prepared by the claimants to present a misleading impression of the cause of the curling and lifting. In Mr Cook's words, he felt Cembrit UK "had used" him. He therefore showed Mr Leader his copy of the Letter and thereafter agreed to Mr Leader's solicitor having a copy of the Letter on the basis that his name as the source of it remained confidential. He subsequently also agreed to the Letter being disclosed to Countryside and Crest Nicholson.

90. In April 2005 Mr Cook prepared for the defendants a statement setting out his views as to the cause of the slates curling at both Aberfeldy and Greenhithe. In this statement Mr Cook attributed the curling and lifting to the lack of a back coating on the slates. On the 14 September 2006 Mr Cook signed a witness statement on behalf of the defendants which had appended to it his statement of April 2005 and contained confirmation that his statement of April 2005 contained his views as to the cause of the curling. In cross examination, however, Mr Cook accepted that the report he had

written for Cembrit UK was more accurate than the statement he had written for the defendants. Mr Cook's evidence as a whole was hopelessly inconsistent and I feel unable to place any reliance upon it.

The dispute with Apex continues

91. In the meantime a meeting took place at the offices of Countryside on 22 March 2004. It was attended by Mr Fisher of Cembrit UK, Mr Petersen of Dansk, Mr Everett of Countryside and Mr Leader. At that meeting Mr Everett made it clear to those present that anything other than a complete re-roofing was unacceptable to East Thames. It was Mr Everett's impression that Mr Fisher accepted that action would be taken to undertake a remedial scheme and he recorded this understanding in a letter to Mr Fisher dated 31 March 2004. In that letter he stated:

> "I write further to our meeting at my company's offices of 22 March 2004. The meeting was the latest to take place concerning the significant problems caused by defective roof slates supplied by your company.
>
> …
>
> You accepted during our meeting, that your company takes responsibility for the problem of the curling slates and will take action to relieve Countryside Group or Apex Roofing of any responsibility. We discussed possible remedial schemes and I confirm that it will not be acceptable to our Housing Association clients or house purchasers for piecemeal remedial schemes to be adopted. For the variety of reasons we discussed during our meeting, this is unlikely to be a long term solution.
>
> Accordingly, we await confirmation that your company is prepared to indemnify Apex Roofing Ltd or any of the other contractors with which we have contracted to strip and re-lay the affected roofs. "

92. Much the same appears to have been acknowledged in a memorandum written by Mr Bailey of Cembrit UK dated 23 March 2004. He noted that both parties had agreed that the variable paint finish on the underside of the slates and the "*imbalance of the paint finishes and the performance between the top face and the underside*" of the slates might be a contributory factor to curling. He also noted that there was disagreement as to the extent of the problem but both Countryside and Apex believed that re-roofing was the only way to resolve it. Cembrit UK evidently did not accept this and Mr Fisher wrote to Apex on 2 April 2004 suggesting once again that the tails of the lifting slates be re-fixed with stronger rivets.

93. On 7 June 2004, Mr Everett of Countryside wrote to Mr Fisher rejecting the suggestion of re-fixing rivets and noting that the position of Aberfeldy was a matter of serious concern to it and to East Thames. He also pointed out that the NFRC had by this time indicated that replacement of rivets would only be practical if small quantities were involved. He therefore requested Mr Fisher to stand by his comments

that he had made at the meeting on 22 March 2004 and take responsibility for the curling slates.

The dispute escalates

94. About this time Apex found itself coming under increasing pressure from Crest Nicholson in relation to Greenhithe. Similar problems of lifting slates were now apparent at this development, which caused Apex considerable concern because it was even larger than Aberfeldy. Mr Leader recorded these concerns in a letter to Mr Fisher on 2 June 2004. Mr Fisher replied on 7 June 2004 proposing a site meeting with Mr Bailey of Cembrit UK on 14 or 15 June 2004. Mr Leader met Mr Bailey at Greenhithe on 15 June 2004 and Mr Bailey agreed that Dansk should send a representative to see the problem at first hand and offer appropriate solutions. On 16 June 2004, he faxed Mr Leader confirming Mr Madsen would inspect Aberfeldy and Greenhithe on 22 June 2004. That site inspection took place as arranged. Mr Leader recalled that Mr Madsen said that he agreed with the finding of Stanger II that the curling of the slates resulted from excessive water absorption through the underside of the slates due to insufficient coating. Mr Leader also recalled that Mr Madsen said that the problem was due to the textured coating of the top side causing the slate to bounce around as it passed through the rollers applying the coating on the underside. This had been an ongoing problem but progress was being made with the development of a process for applying a double paint coating with a lacquer finish which he hoped would be included in the production process by November 2004. In cross examination Mr Madsen said that he would never have used the word "insufficient". I am prepared to accept that is so. Nevertheless, I have no doubt that Mr Madsen used words to the effect that the coating on the underside of the slates was inconsistent. Once again there was no suggestion that the quality of the work carried out by Apex could be faulted.

95. Mr Robertson of Apex wrote to Mr Fisher a letter dated 30 June 2004 confirming Mr Leader's understanding of the meeting.

96. On 20 July 2004, Mr Fisher replied to Mr Roberston. Once again he acknowledged that the inconsistent application of back coating had made the slates more susceptible to curling. He wrote:

> "We refer to the visit of Kurt Madsen, DEH Group Technical Director to the Aberfeldy Estate site on 22 June and to your letter of 30 June 2004.
>
> Below we summarise the findings of our investigations and the actions we have taken and have planned.
>
> As identified by tests carried out in our laboratory in Denmark in December 2003, some of the Zeeland slates removed from roofs at Aberfeldy Estate had an inconsistent application of back coating. This has made these slates more susceptible to curling. The proportion of slates affected is low but action to improve this aspect of performance is justified.

> In 2001 new templates were introduced for the production of Zeeland slates. These templates improved the dimensional tolerances of the product and improved the consistency of the back coating.
>
> Following the tests on Zeeland slates removed from roofs at Aberfeldy, further improvements to the back coating process have been introduced and are planned. Initially the maintenance program for the rollers that apply the back coating has been upgraded to obtain the best performance from the existing equipment. Changes to the formulation of the back coating and the installation of an amended design of rollers later this year will further improve this aspect of the slates.
>
> When the above improvements are complete we expect occurrences of curling to be virtually eliminated from correctly installed and ventilated roofs.
>
> With regard to action on the Aberfeldy Estate site we refer to the letter sent to you on 2 April 2004.
>
> We believe the offer in that letter to strip and replace two roof slopes was fair and reasonable but are now prepared to amend that offer to demonstrate the effectiveness of the copper disc rivet replacement. In addition to the two roof slopes proposed for replacement we are prepared to bear reasonable costs to re-fix curled or lifted slates on the two adjoining slopes with new rivets. ”

97. Mr Leader felt extremely frustrated at this point. Despite the apparent acceptance by the claimants of the problems with their Zeeland slates, Mr Fisher had essentially simply reiterated the proposal that the slates be re-fixed.

98. On 7 September 2004, a further site meeting took place at Aberfeldy attended by representatives of Apex, Cembrit UK, East Thames and Countryside. A note of that meeting records that Cembrit UK advised the problem with the slates had arisen due to a defective back coat applied to the slates by roller as part of the production process. This was a problem with the textured slates used at Aberfeldy. The process was now being attended to in the factory with “*new templates being used and new rollers being fitted*”. Cembrit UK proposed re-laying slates on two roofs only and carrying out repairs and replacement on two adjacent roofs. These would then be monitored to assess the performance of the slates over time. Once again, all the other parties present suggested that this was not an appropriate or adequate solution. On the same day Countryside wrote to Cembrit UK rejecting the proposal made at the meeting and asking for further proposals.

99. On 15 October 2004, the BBA wrote to Apex in relation to a complaint which it had made saying that Cembrit UK and Dansk had confirmed that some of the slates removed from the roofs at Aberfeldy had inconsistent back coatings causing them to curl, that this had been confirmed by Stanger and that Dansk was taking steps to improve its process. This satisfied the BBA which was proposing to close its file.

100. This placed Mr Leader in what he perceived as a difficult position. The BBA and NFRC did not appear willing to take any further action and the claimants were refusing to take satisfactory remedial action. In what I think can fairly be described as desperation Apex then proceeded to contact various trade journals such as Roofing Magazine, Roofing Cladding and Insulation and Construction News, and various trade bodies emphasising the dangers caused by the non-performance of the Zeeland slates. It also complained about the inaction of the BBA.

101. On 20 October 2004, Campbell Hooper, Countryside's solicitors, wrote to Apex asking it not to proceed with the press campaign, anticipating it would make a settlement more difficult. But Mr Leader ignored the request and in early November handed out a press release with photographs at the launch of a new product by Lafarge.

102. On 18 November 2004, Construction News published an article which was critical of Cembrit UK and based upon the materials Mr Leader had supplied. Mr Leader was delighted and telephoned Mr Penrose to say he was "*gleeful*", that this was "*just the start*" and "*I am going to get well rough from here on in*". Not surprisingly, Mr Penrose explained that he found this tactic very unsettling.

103. At this point matters began to escalate rapidly. On 23 November 2004, Campbell Hooper wrote a pre-action protocol letter to Cembrit UK. They pointed out key aspects of the history, that the tiles were defective, as Cembrit UK had admitted, and that Cembrit UK had assured Apex and Countryside that it would stand by its guarantee in relation to the durability of the slates. They then referred to the repeated requests by Countryside that the roofs be re-laid by Apex with Cembrit to supply the slates. They noted the suggestion by Cembrit UK that the slates be re-laid with stronger copper rivets and reiterated that this was not a satisfactory solution. They sought Cembrit UK's acceptance that they would re-lay the roofs at their own expense, failing which they would issue proceedings against Cembrit UK under the guarantee and against Apex as sub-contractor. They also pointed out that they had communicated with Apex and that if proceedings were commenced then Apex would immediately commence Part 20 proceedings against Cembrit UK.

104. On 25 November 2004, Bond Pearce, the solicitors for Cembrit UK, wrote to Apex complaining about the activities Apex had undertaken to generate publicity. The letter was copied to a long list of different persons, including trade bodies, Stanger, East Thames and Campbell Hooper. Curiously it does not appear to have been sent to Apex, who did not hear about it until told by Stanger. The letter took a strong position. It forms a major part of the defence to the intellectual property claim and, so far as material, reads:

> "Our client's position as regards the zeeland slates is, in summary, as follows:
>
> > From the date that you or anyone else first informed our client that there may be a problem with the zeeland slates, it has done everything in its power to investigate that problem, advise on any problems and causes and remedy these. Our client is unaware of any way in which it could have done more. Certainly you have not suggested any.

You have been extremely obstructive to our client's efforts, not least in denying it access to site to properly investigate the alleged problems. You have never explained why you have been obstructive nor can we conceive of any sensible reason.

The impasse the parties now face is a product of your obstruction.

You have also seemingly concentrated your efforts in doing everything in your power to build up ill-will between our client and yourself and involve anyone else who seems willing in contributing to that. Our client is again unaware of the reasons why.

Our client is confident from the tests, investigations and enquiries that it has carried out over the last year (being approximately since this problem first arose), that any problems are limited to a very small amount of the total zeeland slates it has supplied over the last 8 years (the period of supply), being approximately 0.1% of the total 4 million slates.

Our client has identified that any problems that do exist are the cause of 1 of more factors, the most significant of which have nothing to do with our client, namely inadequate installation of the slates and/or design of parts of the roof structure (for example its ventilation). Where the slate has been at fault in whole or part, our client has explained how the problems need to be rectified and offered to assist or undertake that process itself.

Our client remains vigilant for any further problems.

The report by Stanger of 2 February 2004 to which you have referred and extracts of which you have engineered the publication, is flawed and/or misleading, and the publication and commentary you have published on that report have perpetuated that problem.

Our client is therefore extremely concerned by your actions.

Specifically as regards the articles you have distributed/ published in various journals and at various events, our client's position is this: the material is libellous in that it states, without any foundation, that there is a fundamental defect in our client's zeeland slates. There is not. However, you have sought to repeat the allegation to as many parties as you can persuade to listen and, in turn, encouraged them to repeat it further in trade publications. It is clear from the voicemail message you left on one of our client's employee's mobile

> telephone (of which we have a recording), that your primary motive in doing so is to intimidate our client into meeting your unreasonable demands. All our client's rights are reserved regarding these matters, including that of bringing libel proceedings.
>
> As regards your approach generally, in no conceivable way does it permit a sensible resolution to this dispute. "

105. Mr Leader considered that this letter represented a step backwards. Both sides had adopted entrenched positions in response to the aggressive line taken by the other. Nevertheless, the suggested meeting did take place on 1 December 2004. It resulted in an agreement to exchange documents and to appoint independent experts to investigate the cause of the curling.

Further discussions with the BBA and changes to slate production introduced by Dansk

106. In the course of late 2004 further discussions took place between the BBA and Dansk. By e mail of 30 November 2004, the BBA asked Mr Masek what, in his opinion, was the cause of the curling of the slates at Aberfeldy, whether it was an isolated incident or a low frequency problem and what actions had been or would be taken to ensure it did not happen again.

107. Mr Madsen replied on behalf of Dansk on 2 December 2004. He explained that curling of slates was caused by a number of factors, including basic slate properties and workmanship. He suggested that they had not been allowed to carry out a full investigation but that their studies of the Aberfeldy slates had shown a trend that the backside coating was not always uniformly distributed and this may have contributed to a faster moisture uptake through the lower surface and so also a faster curling tendency. He also pointed out that most of the slates at the site had not curled. He explained that he thought it was a low frequency problem but that certain corrective actions had been and would be taken.

108. In particular he said, and confirmed in evidence before me, that in July 2004 the coating of the lower surface of the slates was changed from a pigmented to a clear pure acrylic binder because this was easier to apply uniformly. He pointed out that reduced curling had been measured in the laboratory and that slates made for the Danish market had been painted with this clear binder since 2001 and that no significant curling had been observed since that time. Before that, however, the Dansk group had experienced some claims of curling. He also explained that, as from the 5 December 2004, and based upon laboratory and full scale testing carried out earlier in the year, the overall basic moisture content of the slates would be reduced by the addition of a filler to the formulation.

109. In his evidence Mr Madsen also told me that new templates were introduced in 2001. These were not introduced because it was felt that there was anything wrong with the old ones, but rather to cope with increased production. The new templates were slightly different, having a textured surface which was slightly less deep and a more even thickness. The technical staff speculated from time to time that the change in templates might have given rise to an improvement in paint application. Dansk also carried out tests on the rollers to see if the process could be improved if they were

changed more frequently. But it was found that this was not the case and no changes were implemented.

110. A meeting took place at the BBA on 9 December 2004. It was not satisfied that the steps taken would prevent the problem from recurring. Accordingly, a further meeting took place on 21 December attended by Mr Fisher of Cembrit UK. According to a note of the meeting, Mr Fisher gave a breakdown of the actions taken following the reports of the failure. The following points are material. It was agreed that a major contributory factor was the inadequate coating on the rear of some of the slates and that a similar problem in Denmark had been corrected by the removal of the pigment from the coating to the rear surface. This was undertaken for the Zeeland slates as a first step. It was felt that the problem was initiated when the template used to create the riven surface was changed to correct a thickness variation. The new template had given rise to a more even product but had created difficulties in applying a consistent even coating thickness due to "wobble" of the slates during coating. New softer rollers had been ordered but in the meantime improved maintenance of existing rollers had been introduced. Finally, a filler had been added to the rear coating.

111. Clearly there are some inconsistencies between what was said at the meeting on 21 December and the evidence of Mr Madsen. I do not believe it is necessary for me to resolve them all in order to reach my decision in this case. For one thing is clear. Dansk recognised that it had a problem with its manufacturing process and was taking action to improve it. That action included, at the least, a change to the composition of the material used to coat the underside of the slates. Further, a filler was being introduced which would have the effect of reducing the overall moisture content of the slates.

2005 and the start of proceedings

112. A meeting took place at Aberfeldy on 13 February 2005. It was attended by representatives of Countryside and the claimants and Mr Leader on behalf of Apex. It seems that the claimants began to lose patience with Apex because it had not instructed an expert. But, as Mr Leader explained, he had difficulty finding an expert who could address all the issues which he understood the claimants wished to raise. In the event Mr Leader left the meeting.

113. On 4 March 2005, the claimants decided to withdraw from the discussions. It was at about this time that Mr Leader decided to consult Mr Cook to see if he would be willing to act as an expert for Apex. Thereafter the meeting took place with Mr Cook and the Letter was disclosed by him to Mr Leader in the manner I have already described.

114. In the meantime discussions between the solicitors for Countryside and the claimants continued. By April 2005 Mr Leader sensed that the parties had reached deadlock and that if he was not able to find another way forward then Countryside would commence proceedings. A meeting was arranged between Apex and Countryside and their respective solicitors for 13 May 2005. At that point Mr Leader considered it would be helpful to show the Letter to Countryside in the hope it would encourage Countryside to renew its negotiations with the claimants rather than bring proceedings against Apex. As I elaborate later in this judgment, I have no doubt that Mr Leader believed he had in his hands a powerful document which could be used to put

pressure on the claimants to agree to the demands that the defendants had made. Mr Cook agreed to this disclosure. Accordingly, at the meeting a copy of the Letter was handed to Countryside's solicitors and read by them and the representatives of Countryside who were present.

115. On 27 May 2005, Crest wrote to Apex complaining about the curling of the slates at Greenhithe and about the fixings of some of the ridge and hip tiles. It was in this context that Mr Leader thought it would also be helpful to show a copy of the Letter to Crest and he duly did so.

116. On 14 June 2005, the Chairman of Countryside wrote to the Chief Executive of Dansk enclosing a copy of the Letter and urging him to accept a suitable remedial scheme. Shortly thereafter the claimants commenced proceedings against Apex alleging breach of confidence and infringement of copyright. The claim was defended on the basis that the disclosure was justified to combat the false contentions of the claimants regarding the problems with their slates. Accordingly the issue of whether the slates were of satisfactory quality has been central to the case from the outset. As I have indicated, Apex later amended its pleadings to introduce a claim for breach of contract.

Remedial work

117. East Thames has insisted that 59 of the roofs at Aberfeldy be stripped and replaced. Apex carried out that work from August 2006 using Garsdale slates.

Satisfactory quality – the law

118. Section 14 of the Sale of Goods Act 1979 (as amended) reads, so far as material, as follows:

> "(2) Where the seller sells goods in the course of a business, there is an implied term that that the goods supplied under the contract are of satisfactory quality.
>
> (2A) For the purposes of this Act, goods are of satisfactory quality if they meet the standard that a reasonable person would regard as satisfactory, taking account of any description of the goods, the price (if relevant) and all the other relevant circumstances.
>
> (2B) For the purposes of this Act, the quality of goods includes their state and condition and the following (among others) are in appropriate cases aspects of the quality of the goods:
>
> (a) fitness for all the purposes for which goods of the kind in question are commonly supplied,
>
> (b) appearance and finish,
>
> (c) freedom from minor defects,

(d) safety, and

(e) durability."

119. It is clear that the test is an objective one and the matter is to be assessed through the eyes of a reasonable person in the position of the buyer. As Auld LJ explained in *Bramhill v. Edwards* [2004] EWCA Civ 403, [2004] 2 Lloyd's Rep. 653 at [39]:

> "The reasonable person must be one who is in the position of the buyer, with his knowledge; for it would not be appropriate for the test to be that of a reasonable third party observer not acquainted with the background of the transaction."

120. The defendants submit that the Zeeland slates supplied by Cembrit UK to Apex were required to meet a satisfactory standard in relation to functionality and appearance.

121. There can be no doubt about the former, that is to say functionality. The slates were sold with a 30 year warranty and as being suitable for all kinds of projects. The product literature explained that under normal conditions of use and normal weathering conditions the slates would retain their integrity, impermeability and frost resistance for a period of 30 years from the date of delivery to site. Cembrit UK promised that any slates that did not meet with these standards would be replaced free of charge provided that Cembrit UK was notified within a period of one month from the date of appearance of any defect.

122. In my judgment appearance was also an important and material aspect of the quality of the slates. The slates were described thus in Cembrit UK's promotional literature:

> "Zeeland slate has an appearance close to that of natural slate. Its attractive riven surface makes it an ideal solution for situations where presentation is important."

123. But this does not mean to say that the reasonable person would expect Zeeland slates to look as good as and be indistinguishable from natural slates. They cost only about one fifth of the price. Moreover, and as I shall explain, a degree of curling is a known and accepted feature of fibre-cement slates.

124. I would mention two other points at this stage. First, the issue of satisfactory quality must be determined as at the date of delivery. But that does not mean that if the goods suffer from a latent defect that only manifests itself at a later date then the goods are of satisfactory quality. At the time of supply the goods must be such as to meet the standard that a reasonable person would regard as satisfactory. If they are prone to fail at an unreasonably early date then they will not be.

125. Second, the defendants submitted that compliance with an industry standard does not necessarily mean that the product is of satisfactory quality: *Britvic Soft Drinks v Messer* [2002] 1 Lloyd's Rep 20; [2002] EWCA Civ 548; [2002] 2 Lloyd's Rep 368. I accept that this is so. But the proposition must be approached with some care. In *Britvic* the relevant standard did not contain any limits for the presence of the offending chemical benzene in carbon dioxide. But, as the trial judge observed at [78], the reason the standard did not mention benzene was that contemporary

informed opinion would have considered it inconceivable that it could be present. The evidence demonstrated that those who compose standards and specifications do not include tests for the presence of substances which they have no reason to believe could be present as a result of the manufacturing process. In the present case, by contrast, the tendency of slates to curl was known and EN 492 does contain tests which relate to the permeability of fibre-cement slates and their behaviour when subjected to heat-rain cycling. This strongly suggests that for fibre-cement slates to exhibit a degree of curling is not of itself an indication of unsatisfactory quality.

Satisfactory quality - general

Introduction

126. In the course of the trial the parties drew a distinction between curling and lifting, as I have explained in paragraph [30] of this judgment. The claimants accept that any slates which had lifted free of the rivets were no longer in a satisfactory condition. The claimants also accept that if the curling force of properly fixed and installed slates was so great that that the specified fixing rivets were straightened by that force and the slates lifted free of the rivets, then the slates were not of satisfactory quality.

127. It was at this point the position of the parties sharply diverged; the crucial issue being: what caused the slates to lift? The claimants contend that there is a good deal of evidence that their slates were of satisfactory quality and that the lifting was caused by the defective installation of the roofs by Apex. In support of this position they rely upon a number of matters including, most notably, the number of Zeeland slates installed without any problems over the years, that the slates complied with the relevant standard, that a variety of defects in the installation of the slates have been exposed and that the technical evidence was all to the effect that the lifting force exerted by a curing slate is not sufficient to straighten a properly installed rivet under any reasonable conditions.

128. The defendants contend that the slates lifted because of the way they were made. In support of this position they rely upon the way the lifting problem developed, the recognition by the claimants that the coating of the lower surfaces of the slates in issue was inconsistent and inadequate and this led to a change in the production method, that the work was carried out properly by experienced roofers and regularly inspected without adverse comment, that the same problem had occurred at Unit 850 and elsewhere, that the alleged defects in installation, such as they were, could not have caused lifting and that the technical evidence was inconclusive but consistent with the slates being defective.

129. The second major issue between the parties concerns slates which have curled but not lifted. There can be no doubt that a significant number of slates at Aberfeldy and Greenhithe are now in a condition where their corners are raised but their tails are still restrained by a rivet. The defendants contend that this condition is unsatisfactory visually and because a reasonable architect would consider that that there is a risk of water ingress or an unacceptable risk of the slates deteriorating in the future.

130. The claimants, on the other hand, say the degree of curl is no more than is to be expected from fibre-cements slates, that it will not cause the slates to deteriorate, that

it will not cause problems with water ingress and that a reasonable purchaser or architect would not consider the extent of curl to be visually unacceptable.

Witnesses of fact and the experts

131. For convenience I will here identify all of the witnesses from whom I heard evidence, even though I have already referred to some of them earlier in this judgment.

132. On behalf of the claimants, I heard evidence of fact from Mr Madsen (the Group Technical Manager of Dansk), Mr Petersen (the Group Research and Development Manager of Dansk), Mr Masek (the Factory Manager of Cembrit CZ), Mr Jorgensen (the Executive Vice-President of Dansk), Mr Penrose (a Regional Sales Manager of Cembrit UK), Mr Bailey (the Sales and Marketing Director of Cembrit UK) and Mr Fisher (the Managing Director of Cembrit UK). I have already made comments on some of these witnesses. In summary, I found they all gave evidence in a careful and reliable manner.

133. On behalf of the defendants, I heard evidence of fact from the following persons. Mr Balcomb (a Quality Control Manager of East Thames) and Mr Everett (the Managing Director of Countryside) were not the subject of any adverse comment and I also accept their evidence as careful and reliable. Mr Brown (the Managing Director of Brown Roofing) and Mr Mattei (a journalist and adviser to Mr Brown) gave evidence about Unit 850. Some faint criticism was made that Mr Brown was obstructive when it came to permitting proper inspection of the roof at Unit 850. I reject that criticism which was based upon the evidence of Mr Cook. I found Mr Brown and Mr Mattei to be frank, careful and helpful witnesses. Mr Cook (a consultant trading as Building Solutions) was not a reliable witness, as I have explained in paragraphs [86] to [90] of this judgment. Mr Jarratt (the Technical Officer of the NFRC) was accepted to be a thoroughly impartial witness although I found his evidence of little assistance in determining the issues before me. Mr Leader was the subject of some criticism which I have addressed in paragraph [35] of this judgment. I found him to be an honest and frank witness. Finally, I heard evidence from four roofers, Mr Douglas, Mr Palmer, Mr George Donald and Mr Andrew Donald. They were cross-examined in turn with those still to be cross-examined waiting outside court. The claimants accept that Mr Douglas, the first to be cross-examined, was honest. But it was submitted that the evidence of the other roofers was compromised by their discussion of the evidence outside court before they were called. I reject that submission. I do not believe their evidence was influenced by earlier answers given by Mr Douglas. In my judgment they gave their evidence honestly and did their best to assist the court.

134. In accordance with the directions given by Master Bragge, each side served reports of experts on the testing of slates (Mr Ali for the defendants and Dr Blanchard for the claimants) and the installation of slates and roof design and construction (Mr Potter for the defendants and Mr Thomas for the claimants).

135. In the course of his investigations and the preparation of his report Mr Potter arranged for tests to be carried out on a model roof section in a wind tunnel maintained by the Building Research Establishment (the "BRE"). At the pre-trial review before Mr Bernard Livesey QC, sitting as a deputy High Court Judge, the claimants sought and were granted permission to adduce the evidence of an additional expert, Mr Freathy, on issues relating to and arising out of the wind tunnel tests. He served a report on 8

November 2006. The court indicated at the pre-trial review that if the defendants wished to serve a report in response to that of Mr Freathy then they should serve a copy of any such report and notice of an application to be made to the trial judge at the same time as the skeleton argument. The defendants duly did serve a report of Dr Blackmore and notice of an application which was made at the commencement of the trial. Since the claimants had permission to rely upon the report of Mr Freathy, I felt I had no alternative but to allow the defendants to rely upon the report of Dr Blackmore. In the result I heard evidence from no fewer than six experts.

136. As to the experts themselves, Mr Ali has an MSc in materials engineering and over 16 years experience in investigating and testing materials defects, including defects in fibre-cement slates. He was originally employed by Stanger which was subsequently taken over by Bureau Veritas Materials Science ("Bureau Veritas"), a reputable organisation of independent materials consultants. Mr Ali produced the Stanger I and Stanger II reports to which I have already referred. He also produced a report on Unit 850, dated 23 February 2005. On 9 October 2006 he produced a report ("Ali I") in the name of Bureau Veritas, his principal report in these proceedings, and a supplementary report dated 5 December 2006. I found Mr Ali to be an honest, objective and knowledgeable witness and I found his evidence of considerable assistance. However, I accept the submission advanced by the claimants that he would like to have carried out further tests. Whether this would have materially advanced matters is another question because, as Dr Blanchard accepted, experiments can never be an entirely accurate representation of the situation on a roof.

137. Dr Blanchard has a BSc in geology, an MSc in geochemistry and a PhD in geological sciences. He is a Senior Construction Materials Scientist employed by STATS, another reputable organisation providing technical services for the construction industry. He produced a report on behalf of the claimants dated 16 October 2006 ("STATS I") and a further report dated 16 November 2006 (STATS II"). No criticism was advanced of Dr Blanchard and I found his evidence very helpful.

138. Mr Potter was elected to membership of the Royal Institute of British Architects in 1964 and has extensive experience of roofing and the use of slates of different kinds. He produced two reports, the first dated 13 October 2006 and the second dated 2 November 2006, in which he expressed his opinion that the roofs at Aberfeldy and Greenhithe were visually and physically unacceptable, and gave his reasons for that opinion. The claimants submitted that much of Mr Potter's evidence must be treated with some caution because he was prone to exaggeration and aspects of his reports were careless. I accept that there are aspects of his reports which appear to provide a less than comprehensive picture of the issues he set out to address. In particular, his approval of the work at Aberfeldy was unqualified. Nevertheless, I found Mr Potter to be an honest, knowledgeable and candid witness under cross-examination and his evidence has given me considerable assistance.

139. Mr Thomas is a Member of the Institute of Roofing and has considerable experience in the design and use of roof tile and slate systems. He took a very different position to that of Mr Potter and his reports of 16 October 2006 and 17 November 2006 contain many criticisms of the workmanship at Aberfeldy. As in the case of Mr Potter, he accepted under cross examination that some of his opinions required qualification but overall I found him too to be an honest, knowledgeable and candid witness and his evidence has also assisted me greatly in reaching my conclusions in this case.

140. Dr Blackmore is an Associate Director at BRE and produced a report for the defendants dated 3 November 2006 on the performance of Zeeland slates in the high speed wind tests and further observations on 10 November 2006. He was an excellent witness. It was no fault of his that the tests he carried out have not provided me with much assistance in determining the issues before me. Mr Freathy produced a report for the claimants on 8 November 2006. He is an expert on wind engineering and employed by a highly reputable consultancy, RWDI Anemos. He too was an excellent witness.

Lifting – the way the problem developed

141. There can be no doubt that a significant number of slates have lifted at Aberfeldy and Greenhithe. At least some of these slates were seen by Mr Thomas during the course of his site inspections in 2006. As I have explained in the chronology of events, the state of the roofs was such that Countryside, East Thames and Crest were simply not prepared to accept them.

142. I am satisfied that all, or at least many, fibre-cement slates do show some degree of curl. Such is evident from a survey conducted by Mr Bailey and referred to in his third witness statement. However, as Mr Madsen explained, after about a year fibre-cement slates tend to become stable as they cure and dry out. The curl shown by fibre-cement slates is generally minor and appears to be a matter of no concern to contractors or house owners. Much the same evidence was given by Mr Leader. He explained that sometimes there is a slight camber and curl in fibre-cement slates after they are laid but this tends to settle down after a few months.

143. In the case of Aberfeldy and Greenhithe I am also satisfied that the problem was of a very different nature to this common and acceptable degree of curling. It was much more serious and only became apparent from mid 2003. By this time the slates had experienced severe weather in the autumn of 2002 and were then exposed to high temperatures in the summer of 2003. Inevitably they must also have been exposed to cycles of wet and sunny weather from the time they were laid.

144. It was Mr Leader's opinion that he was faced with a serious problem. Moreover it was one which he tried to remedy by re-fixing the rivets on the slates which had lifted. Not only did this re-fixing not remedy the problem but, in addition, other slates began to lift too. Further, by the end of August a large number of other rivets were also under pressure. This behaviour was different to anything Mr Leader had experienced. The slates only started to curl and lift severely some time after they were laid and the problem increased over time. It is also interesting that the problem seemed particularly acute on south facing slopes which were, presumably, exposed to the greatest degree of heating. Virtually from the outset East Thames took the view that the problem was so serious that the roofs at site F would probably have to be replaced. The same problem then manifested itself at sites B, C, D and E and at Greenhithe. Either there was something out of the ordinary about these lifting slates or they were not properly installed. In my judgment the difference in behaviour of these slates to others that Apex had laid and the fact that Mr Leader tried to re-fix them without success are all indications that it was the former.

Apex as a contractor and the experience of the roofers

145. Apex is a highly experienced contractor. Mr Leader himself started work as a roofer in 1971. He formed Apex Roofing Services in 1976. The business has an annual turnover of £4-5 million and its clients include leading developers and construction companies such as Countryside, Crest, David Wilson Homes plc, Bellway Homes plc, Costains plc and Amec plc. Apex has won a number of prestigious contracts, including the re-slating of sections of The Tower of London and The Royal Naval College, Geenwich. Between 1999 and October 2003 Apex laid over 900,000 Zeeland slates in housing developments in South East England, accounting for nearly 40% of the sales of Zeeland slates by Cembrit UK over this period. Some 450,000 of those slates have been laid at Aberfeldy and Greenhithe. Over the course of the last 30 years Apex has also laid over 1 million fibre-cement slates made by Marley without any of the problems experienced with the Zeeland slates. Apex has laid over 10,000 roofs for the Countryside group and Mr Everett has never heard of any problems arising with those roofs other than those at Aberfeldy. All of this suggests that the problem lay with the slates rather than with Apex.

146. Moreover, Apex employed experienced roofers to carry out the work. Mr Douglas has been employed by Apex for over 20 years and laid the roofs on between 20 and 25 of the houses at Aberfeldy. He was responsible for setting up the first phase at Aberfeldy, that is to say site F in Balmore Close. He has laid all kinds of slates but previously it has never been necessary for a roof of his to be re-laid. Nor is he aware of any other occasion where slates laid by him have come loose or needed replacing. He was quite clear that the roofs could not have passed any sort of cursory inspection if the rivets were standing proud or not bent over properly, by which he meant the ends bent over essentially flat onto the upper surface of the slate.

147. Mr George Donald was responsible for laying most of the slates on the 2nd and 3rd phases at Aberfeldy. He has worked for Apex for over 15 years. He explained that he has a routine and that it would be extremely unusual to miss a rivet or fail to flatten it over properly. When he has finished a roof he checks it over from the scaffolding to make sure it is all in order. He has worked for the last two years at Greenhithe. He has only experienced lifting and curling in relation to Zeeland slates installed at Aberfeldy and Greenhithe.

148. Mr Andrew Donald has worked for Apex for 20 years and has worked at Greenhithe for the last five years. He too confirmed that he has a routine and that laying slates is repetitive and straightforward. It simply does not allow for large numbers of rivets not to be bent over properly. He regarded it as insulting to suggest that the problems at Greenhithe and Aberfeldy were caused by a failure to bend the rivets over. He also confirmed that no roofer "worth his salt" would come off a roof without having checked that the rivets were properly installed.

149. I also heard evidence from Mr Kevin Palmer who has worked for Apex for 24 years. He was sent to Aberfeldy in August 2003 once the problems of curling and lifting had become apparent. As he put it, the curling slates were dotted all over the roof. He took out some slates and replaced them. He also re-fixed other slates where the rivets had been straightened. A few weeks later he was called back to the site and saw that more rivets had "popped up" and he could see that they were straightening under the pressure from the curling slates. This evidence was consistent with that of Mr Leader.

150. I have no doubt that mistakes were occasionally made. Further, I did not hear evidence from every roofer involved at Aberfeldy and Greenhithe and, in particular, I did not hear evidence from Mr Julian Leader who was responsible for laying the slates on some of the worst affected slopes, namely those at 37-39 Balmore Close. Moreover, the roofers were assisted by apprentices. Nevertheless, I found their evidence very persuasive. I believe it is a powerful indication that the tiles were laid properly in the overwhelming majority of cases. It seems to me improbable in the extreme that when it came to the use of Zeeland slates at Aberfeldy and Greenhithe the quality of the workmanship of the Apex roofers lapsed below that maintained on other projects and with other slates. In expressing this conclusion I have well in mind the defects in workmanship which Mr Thomas identified and which I address later in this judgment.

The inspections as the work progressed and lack of any criticism by the claimants once the problems emerged

151. I have already referred to this in some detail in relating the chronology of events. In my judgment it is of considerable importance. Mr Leader inspected the work regularly himself as it progressed. He clearly had a great interest in making sure it was done properly and he has enormous personal experience as a roofer. He checked the work every two or three days.

152. Of even more significance to my mind is the evidence of Mr Balcomb. As I have related in paragraphs [40] and [41] of this judgment, he took considerable trouble to inspect the quality of the work. Obviously he could not identify all defects concealed by the roof covering but he was in no doubt that he would have identified any general failure to bend the rivets over properly. So far as he was aware the suggestion that they had not been bent over properly had never been mentioned until shortly before the trial. He found it inexplicable that the suggestion had not previously come to his notice if there was anything in it. As he said, the rivets are made of copper and stand proud of the roof surface. They catch the sun. They are not invisible. If they had not been knocked over properly this would have amounted to an obvious defect at the time and would have been obvious from "day one". None of this evidence was effectively challenged in cross examination.

153. Moreover, and as I have also related earlier in this judgment, the work was inspected on a regular basis by representatives of Tower Hamlets, NHBC, Countryside and Stanford Eatwell. All of them had a vested interest in nipping any problems in the bud. None of them considered that the rivets or slates had not been properly installed. Once again Mr Balcomb confirmed in cross examination the thorough nature of the inspection process.

154. I have reached the conclusion that this evidence is very significant. It provides a contemporaneous picture of the state the roofs were in upon their completion. I believe it is very powerful support for the defendants' submission that the slates were generally properly laid and that the rivets correctly bent over.

155. I consider that the defendants' submission also derives support from the reaction of the claimants when notified of the problems as they emerged in 2003, all as related in paragraphs [46] to [60] of this judgment. In summary, the site was inspected by representatives of the claimants in October and November 2003. At the first meeting

Mr Stockdale of East Thames explained that the work of Apex was satisfactory on completion. At the second meeting Mr Petersen and Mr Madsen inspected the slates sufficiently closely to observe that slates with severe curling had no rivets and that the rivets had apparently straightened out due to the tension caused by the curling. This was again entirely consistent with the views of Apex, Countryside and East Thames. The same view was then expressed in the report prepared by Dansk in January of 2004. But at no time did the claimants suggest that the problems were the result of defective workmanship by Apex. Mr Petersen said in a third witness statement filed after the commencement of the trial that he and Mr Masek are not experts in the installation of slates. I am prepared to accept that is so. But they undoubtedly have considerable technical expertise and their conclusions as to the cause of the lifting are material and revealing.

156. During most of 2004 the understanding and position of the claimants remained the same, as I have detailed in paragraphs [61] to [105] of this judgment. Despite their further inspection of the roofs in issue the claimants did not suggest that Apex had failed to install the slates properly. On the contrary, they recognised that the cause of the curling was the apparently inconsistent coating on the underside of the slates. The only real issue between the parties was the extent of the problem and whether it could be solved by re-fixing the defective slates with stronger rivets. It was not until November 2004 that an allegation of defective workmanship was raised by Bond Pearce in response to the publicity campaign instigated by Mr Leader in October.

Inconsistency of the back coating

157. The defendants submit that the back coating of the Zeeland slates used at Aberfeldy and Greenhithe was very thin and inconsistent and that this made some of the slates more susceptible to curling and lifting. In my judgment the evidence in support of this submission is overwhelming.

158. The laboratory investigations conducted by Dansk in December 2003 and January 2004 on the slates removed from Aberfeldy revealed that the average thickness of the back coating varied between 6 and 12 microns. As Mr Petersen accepted in cross examination, a layer of 10 microns of paint is not waterproof and the reason these slates curled was because they absorbed water through their lower surfaces.

159. Further, the process of painting used on the slates in issue involved an assessment by the operator as to the adequacy of the paint thickness. He did this by determining the weight of the paint applied and visual inspection. Inevitably, therefore, there was room for a degree of variation.

160. Dansk recognised that there was a marked difference in paint thickness between the upper and lower surfaces of the affected slates and that the curling was caused by this imbalance. As I have related, this was acknowledged by Dansk in its dealings with Apex in 2004. For example, Mr Fisher's letter of 20 July 2004, referred to in paragraph [96] of this judgment, reflected Mr Madsen's view and expressly recognised the problem of the inconsistent application of back coating, that this made the slates more susceptible to curling and that action to improve this aspect of performance was justified.

161. At about this time, Dansk introduced the various changes to slate production referred to in paragraphs [106] to [111] of this judgment. Most significantly, in July 2004 the coating on the lower surface was changed from a pigmented to a clear acrylic binder because this was easier to apply uniformly. Dansk acknowledged that this change was based upon laboratory work and upon its experience in Denmark. Problems with curling had been experienced there but these had been solved by the use of the clear binder. In addition, the overall moisture content of the slates was to be reduced by the introduction of a filler.

162. I would also mention that tests carried out by Dr Blanchard confirmed that slates retrieved from site absorbed markedly more water through their lower surfaces than new slates from stockists and from the factory.

163. In my judgment all these matters support the defendants' case. They show that Dansk appreciated that the Zeeland slates had an inconsistent back coating and that this rendered them particularly susceptible to curling. They also show that Dansk recognised this was a problem that needed addressing and duly did address it. Importantly, it provides a physical explanation for the tendency of the slates at Aberfeldy and Greenhithe to curl and lift as they did.

Other sites and compliance with standards

164. The claimants fairly point to the fact that they have sold millions of Zeeland slates over the years and that a survey of 17 sites in the summer of 2005 revealed very low numbers of slates lifting and curling and that the production records do not indicate there is anything wrong or unusual with the batches of slates produced for Aberfeldy. They also point to the fact that despite Mr Leader's publicity campaign the claimants have received complaints relating to only five sites, namely Aberfeldy, Greenhithe, Unit 850, Westminster Bridge Road and Winwick Park. I am prepared to accept these points, although it is also right to note that the opportunity to investigate the circumstances of the use of Zeeland slates elsewhere has necessarily been limited in this trial and it follows that I am in no position to make any finding about the Zeeland slates generally supplied by the claimants. However, I do not accept that they drive me to the conclusion that the Zeeland slates supplied to Apex were all of satisfactory quality.

165. First, and as I have explained, there can be no doubt that the process used by Cembrit CZ to make Zeeland slates resulted in the application of a back coating which was inconsistent. The fact that the coating was inconsistent seems to me to undermine the submission that the slates installed at Aberfeldy must have been of satisfactory quality because few complaints have been made about Zeeland slates installed at other sites and the general production records do not indicate anything unusual about the slates supplied to Apex for installation at Aberfeldy.

166. Second, the changes which I have described to the process used to make the Zeeland slates were accompanied by an acknowledgement that the use of a pigmented binder had resulted in problems of curling in Denmark and that the switch to the use of a clear binder seemed to have solved those problems.

167. Third, Aberfeldy and Greenhithe were not the only sites where Zeeland slates lifted. The experience of Mr Brown at Unit 850 which I have related in paragraphs [79] to

[85] of this judgment is highly material. These slates were laid in 2000. They began to curl and lift. Eaves and ridge ventilation was installed at the request of Cembrit UK and the slates were re-fixed, much as the claimants suggested should be done at Aberfeldy and Greenhithe. But again they lifted. Eventually the claimants agreed to pay to have the roof re-laid. This is important. It illustrates that Zeeland slates failed elsewhere and the problem was not limited to the Aberfeldy and Greenhithe sites where they were installed by Apex. It also shows that the force exerted by lifting slates was sufficient to straighten properly installed rivets in a real life situation.

168. Much the same applies to the standards and BBA approval. I will return to this issue in considering whether slates which exhibited any degree of curling were of satisfactory quality. But in relation to lifting I consider that the same considerations apply. In my view it does not assist the claimants greatly to say that some slates performed sufficiently well to achieve BBA certification when they have acknowledged that their production process was variable. Indeed much the same line was taken by the BBA. It wanted to know the extent of the problem and what steps were being taken to ensure that it would not recur. This led to the communications and meeting which I have related in paragraphs [106] to [111] of this judgment. Once again the claimants accepted that the backside coating was not always uniformly distributed and that steps had been taken to remedy this deficiency.

Workmanship at Aberfeldy and Greenhithe as revealed by the inspections conducted in 2006

169. On 1 and 2 February 2006 Dansk conducted an inspection of 177 properties at Aberfeldy. Mr Masek and Mr Brunn participated, accompanied by Mr Bailey. A report was produced dated 22 March 2006 which contained a series of criticisms of the workmanship of Apex and also tests of the force needed to pull out or straighten properly bent over rivets and of the warping and lifting tendencies of fibre-cement slates in simulated severe weather conditions. They concluded, inter alia, that a large number of the rivets had not been bent over properly or were missing, that there was a correlation between the roofs with improperly installed rivets and lifting or warping slates and that many other defects in workmanship were apparent. This inspection was carried out from ground level.

170. Much the same line was taken by Mr Thomas in his report. He carried out a number of inspections of roofs at close quarters, as follows:

i) 22 August 2006 at 133-134 Oban Street, when Mr Thomas had 30 minutes to inspect a stripped roof;

ii) 14 September 2006 at 13-14 Balmore Close, to watch the slope being stripped;

iii) 20 September 2006 at 11-12 Balmore Close, to remove a large number of slates; he was accompanied by Mr Potter;

iv) 27 October 2006 at 28 Balmore Close, to observe the roof being stripped. Unfortunately work began before Mr Thomas's arrival. Again Mr Potter was present on this site inspection.

171. In addition Mr Thomas observed other roofs from ground level, as did Mr Potter. Mr Thomas had two other site visits at which he was accompanied by Mr Potter. On 29 August 2006 they climbed onto the scaffolding at 124-126 Oban Street where they were able to inspect the north facing slopes and on 28 September 2006 they climbed onto the scaffolding at 37-38 Balmore Close.

172. In the light of these inspections the key criticisms which the claimants made were that:

i) Rivets had not been turned over to lie flat with the surfaces of the slates.

ii) Some rivets were missing; short rivets were used; rivets were not aligned with the perp-gaps and the perp-gaps were excessively wide.

iii) Some slates had been over-nailed and others under-nailed.

iv) Battens were uneven; there were raised nails on battens and even the roof structures were sometimes uneven.

173. There was a good deal of cross examination on these points and at trial a large number of photographs were examined. It is impossible in this judgment to deal with all those photographs. Nevertheless the impressions I formed as the trial progressed obviously form an important part of the background against which I have reached my conclusions. I should also say that it became apparent during the course of the evidence and submissions that the photographs must be considered with some caution. The angle at which they were taken can have a foreshortening effect which is potentially very misleading. Further, photographs of the same roof taken on the same day but from different angles can create a very different impression. In addition, shadows may suggest a greater degree of lifting and curling than is truly present.

174. It was the claimants' case that the primary cause of lifting was the fact that the roofers routinely failed to bend rivets flat to the roof or failed to install them at all. Particular reliance was placed in this regard upon photographs of 28 Balmore Close and 11 Fortrose Close. The photograph of the south slope of 28 Balmore Close at X31 is notable because it was taken in November 2003 and is one of the earliest available.

175. I believe that these photographs do appear to show that a significant number of rivets are not fully bent over. But I also believe they show that a significant number of the slates are lifting, at least to a degree. In some cases they have lifted completely free of the rivets and in other cases the rivets are still in place but appear to have straightened to some extent, just as the slate has partially lifted. This raises a question to which I do not believe an analysis of the photographs permits a ready answer, namely whether the slates have lifted because the rivets were not bent over or whether the rivets have straightened because the slates have lifted. I have to say that my impression in the light of the evidence and my own consideration of the photographs is that it is the latter. The rivets seem to me to be generally flat where there is no evidence of curling or lifting.

176. I believe that my impression is supported by the evidence of the roofers themselves, of Mr Leader, of those who inspected the roofs during the course of the work and upon their completion, and of those who inspected the roofs during the course of 2003

and 2004 once the problem of lifting became apparent. It is also supported by (or at the very least consistent with) the conclusions reached by the Dansk representatives following their inspection of the Aberfeldy site at the beginning of 2006. They found a correlation between the number of warping and lifting slates on a roof and the number of rivets that were missing or not properly bent over:

> "On Findhorn Street [site F], where it has been observed that all of the 78 roof slopes have a significant number of rivets not bent/fixed properly (or rivets missing completely), the number of warping/lifting slates is relatively high compared with the other streets, where the number of rivets not properly bent/fixed is insignificant and the same is the number of warping and lifting slates"

177. If, on the other hand, there had been significant evidence of rivets not properly bent over or missing on slates which showed no sign of lifting or curling then this would have supported the conclusion that the workmanship was defective. Mr Thomas found only limited evidence of this. In one instance he found an edge slate which had not lifted and which had no rivet, but he accepted that it was possible that the rivet was faulty. In another instance the edge slate had risen and the rivet was bent flat underneath it. I do not find this very persuasive. As I have indicated, I have no doubt that the roofers occasionally made mistakes. But there was no evidence of any general or widespread failure to install rivets properly.

178. Mr Thomas also suggested that the general failure to bend the rivets over properly was evident from the fact that he found that over 50% of the rivets which had been installed were not bent over at 90° but rather at an angle of between 100 and 135°. This issue was explored in cross examination. As I have mentioned, the diameter of the hole in the slate through which the pin extends is 4.5mm, at least at the time it is punched out. There was some dispute as to whether in practice it would be rather larger than this. Be that as it may, the diameter of the pin is only 2mm. Mr Potter suggested that the pin would therefore tend to bend at its base when hit by the roofer. Mr Thomas thought it would assume a curved shape. I am satisfied in the light of the evidence that, as Mr Thomas put it, "*there is a myriad of variations*". I am also satisfied that the angle of bend may well be in excess of 100° when the pin is properly bent over and lies flat on the surface of the slate. I do not accept that Mr Thomas's finding is evidence of a general failure to install the rivets properly.

179. Mr Thomas then pointed to the length of the rivets. Standard rivets were used with a length of 18mm. This allowed the rivets to pass through two thicknesses of slate (8-9mm) and leave 9-10mm of pin protruding at the surface and which could be bent flat onto the surface of the upper slate. Mr Thomas considered that the length of pin projecting from the surface should be not less than 8mm. Clearly for the large part of the roof area there was therefore no problem. However, where the tiles abutted the parapet the rivets also had to pass through one or two layers of the lead flashings with a combined thickness of about 3.6mm, so reducing the length of protruding pin below 8mm. The problem was, he said, compounded by the fact that sometimes code 4 rather than the thinner specified code 3 flashings were used.

180. I do not accept this criticism. In cross examination Mr Thomas accepted that he only saw code 4 flashing used on one occasion and, in any event, the difference in

thickness between a code 4 and a code 3 flashing is only about 0.5mm. More importantly, Apex used standard rivets and the claimants did not specify that longer rivets should be used where slates were interleaved with flashings. Further, Mr Thomas accepted that his opinion that 8mm should emerge from the upper surface of the slate was not one shared by anyone else. Finally, I would note that this criticism was only levelled at the slates abutting the parapet walls and I am quite satisfied that the problem of lifting occurred generally across the roof surfaces.

181. The next point taken by Mr Thomas concerned ventilation slates. He said in his report that the wrong type of ventilation slates had been used and as a result it was not possible to rivet the adjacent slates correctly. Once again I have reached the conclusion that this does not account for the extent of the lifting problem. There are only a few ventilation slates in any roof. Moreover, it was far from clear that the lifting of the slates around any ventilation slate was caused by the design of ventilation slate rather than a defect in the lifting slates. Mr Thomas appeared to accept that rivets could be installed if the sides of the ventilation slates were "nicked" to provide a space for the side of the rivet head and only in one instance was he able to see that a ventilation slate had not been nicked.

182. A more substantial point was taken by Mr Thomas in relation to the perp-gaps. He emphasised that it is important that these be no more than about 5mm. To ensure that the correct perp-gap is maintained the slates must be vertically aligned down the slope. He expressed the view that in the case of some roofs the vertical alignment of the slates was good and in others it was poor. He explained that where the alignment on a roof is poor then it is common to see wider perp-gaps on some horizontal courses to pull the vertical alignment straight and allow the roof to finish straight against the edge. He said there were occasions at Aberfeldy where the perp-gaps were measured at more than 9mm and sometimes at more than 11mm. He thought that a perp-gap of more than 9mm might permit the rivet to work free. He explained that when this happens it is common to see the rivet located in the rivet hole in the upper slate but with the bent section raised by 4mm as the rivet now only has to pass through one thickness of slate.

183. I was shown photographs of a number of roofs where the slates did not appear to be vertically aligned. But, as I have explained, it is necessary to be cautious about drawing conclusions from such photographs because foreshortening can exaggerate the degree of the problem. Of more importance to my mind is the fact that Mr Thomas accepted that he saw no evidence of any rivets having pulled through the perp-gaps on any of his visual inspections. Moreover, any undue misalignment of the slates would have been immediately apparent to all those persons who inspected the roofs in the course of their installation or upon their completion. There is no suggestion that any concerns were raised.

184. The next defect identified by Mr Thomas was that the first few courses of slates on most if not all of the roofs appeared to lie at a slightly shallower angle to the remainder of the slates on the roof; that is to say there was sprocketing. He explained that this can cause some of the slates to bend and so induce a tendency to curl. He also suggested that the most common cause of sprocketing is the use of fascia boards which are too high. It can also be caused by the incorrect installation of eaves ventilation.

185. In cross-examination Mr Thomas accepted that sprocketing is only a problem if the difference in angle of the two courses exceeds 9°. On his inspections he found a difference in angle of 4-5° on one occasion and 2-4° on another. These were not significant and could not have made a material contribution to the curling or lifting of the slates at Aberfeldy. As he put it, 2-4° is "*not very much*".

186. Mr Thomas then proceeded to identify a series of defects which he said had contributed to curling, but not to lifting of slates. These fall into two classes. The first related nail fixings and the second to the laying of battens.

187. I have explained how the slates are fixed to the battens by two nails. Mr Thomas emphasised the dangers caused by over driven and under driven nails. The former force down the centre of the slate being nailed and tend to create a curl. The latter are of greater concern, more common and tend to create bow in the slate immediately above. Mr Thomas suggested in his report that the number of under driven nails on the roofs at Aberfeldy was not high, but they did exist. However, in the light of his cross-examination I do not believe this contributed in any material way to the curling problems.

188. Mr Thomas also explained that nails securing slates to battens should penetrate the batten a significant distance away from the edge of the batten to avoid the batten splitting or splintering. He identified some instances where the nails had been inserted too close to the edge of the batten but accepted that the majority of the nails had been installed correctly. Further, even in those cases where, in his opinion, the nail had been inserted too close to the edge, Mr Thomas did not suggest that the batten had actually split.

189. As to the battens themselves, Mr Thomas explained that these must be joined on the centre line of a rafter and skew nailed into the rafter. In three instances he observed battens which had been joined at the side of a rafter resulting in a drop in the batten level. On one occasion he was able positively to identify the kicking of a slate with this defect.

190. I accept that defects in workmanship of this kind occurred from time to time at Aberfeldy and, no doubt, at Greenhithe too. But I formed the clear impression from the evidence that their nature and frequency were such as to exclude them as an explanation for the degree of curling and lifting observed.

191. There were other isolated instances of defective installation of slates, nails or battens. For example, on one roof a perfectly flat slate appeared to be sliding out. I agree with the submission advanced by the claimants that the only plausible explanation for this is that it had not been nailed in. In another case it seems tolerably clear that a few slates were installed upside down. There was one instance of a batten end not being attached to a rafter at all. In my view it would be surprising in the extreme if there were not some such failures on sites as large as those at Aberfeldy and Greenhithe. But I do not believe that they were widespread. I reject them as a cause of the extensive curling and lifting observed.

192. Finally, Mr Thomas identified a series of defects which were not suggested to be a cause of lifting or curling and accordingly I do not propose to deal with all of them. The following are illustrations. First, some mortar has fallen out of ridge tiles at both

Aberfeldy and Greenhithe. The defendants say this is because of distortion of the slates. The claimants say it is because the mortar was unsatisfactory. I do not feel this matter has been adequately addressed in evidence for me to reach a final conclusion, although I lean in favour of the claimants' contention. Mr Thomas examined the mortar and found that its quantity and degree of surface contact were inadequate. Second, the end ridge tiles are not mechanically fixed. Mr Thomas suggested they ought to have been and I understood Mr Balcomb to agree. I believe he was right to do so. Finally, there should be only one join in every four battens per rafter. As Mr Thomas pointed out, Mr Donald clearly did not comply with this requirement. Mr Thomas referred to these defects to show that the overall construction of the roof coverings was not perfect. I have no difficulty in accepting that opinion. It would be very surprising if it had been.

193. Overall I have reached the conclusion that the visual inspections of the roofs in 2006 do not support the submission that defects in installation caused the lifting problems experienced at Aberfeldy and Greenhithe. In particular, I do not accept the claimants' submission that they reveal the primary cause of lifting to have been the failure to install or bend the rivets over properly. On the contrary, I believe they support the defendants' submission that the primary cause of the lifting was an inherent characteristic of the slates themselves.

The experimental evidence

194. The claimants have placed great reliance upon a series of experiments conducted for this case by both sides. They are directed to two issues, namely (i) the ability of a rivet to hold down a slate and (ii) the strength of the upward forces upon a rivet in use. The claimants say that these experiments show that there can be no doubt that the curling or lifting force exerted by Zeeland slates is not sufficient to straighten a properly turned over rivet and accordingly the only explanation for the failure of the slates at Aberfeldy and Greenhithe is faulty workmanship. The defendants say that the experiments support their case that under appropriate weather conditions the forces generated are sufficient to straighten a properly installed rivet.

195. Before dealing with the detail of the experiments I would make some general observations. First, as the experts recognised, it is very difficult to replicate in a laboratory the conditions which actually occur on a roof over a period of months. Secondly, a roof of the kind installed at Aberfeldy and Greenhithe is a relatively complex structure in which the forces acting on a rivet are derived not just from the slates which it secures, but also from the surrounding slates. Thirdly, many of the experiments were conducted on slates recovered from Aberfeldy. Inevitably these slates had already been subjected to weathering and curing and so their behaviour in the laboratory could not reflect that of slates which were being exposed to the elements for the first time. Finally, as I have already found, the production process for Zeeland slates produced variable results. So the behaviour of some particular slates which may have had a minor tendency to lift or not is not necessarily representative of others which lifted in actual practice. For all these reasons I believe it is appropriate to approach the results of the experiments with some caution.

196. The issues identified in paragraph [194] of this judgment were raised substantively by Dansk in the report of March 2006. Dansk found, in summary, that the force needed to pull out or straighten a properly fixed rivet was in excess of 119N and that Zeeland

slates generated a curling force of only 9-15N. This led to the conclusion that the bending force was far from sufficient to pull out properly fixed rivets. Dansk also noted that it had been documented in previous studies that the wind uplift resistance of the installed slates was 50% higher than the maximum wind uplift force. In the light of all of these matters and the visual inspection of the site, Dansk concluded that the lifting was the result of defective workmanship. The experiments conducted by Dansk were the subject of considerable cross examination at trial and the claimants ultimately placed little reliance upon the results obtained in their final submissions. Instead, attention was focussed primarily on experiments conducted by Mr Ali (reported in Ali 1) and by Dr Blanchard (reported in STATS I). Mr Ali conducted tests of rivet strength and of curling force. I will take them in turn.

Mr Ali – rivet tests

197. In the rivet tests new copper disc rivets were used to determine the forces required to straighten a rivet shaft bent by 90°. The disc of the rivet was inserted into a metal fixture and the shaft of the rivet was passed through a 4mm diameter hole in a slate section of 100 x 400mm and then bent by 90°. The total thickness of the restraining part of the fixture and the slate was 7.5mm. Ali 1 contains a clear statement that the rivet was bent at 90° and the illustration of the apparatus in the report shows that this could be visually assessed.

198. The assembly was attached between the heads of a tensile testing machine such that the fixture was clamped in the lower head of the machine and the slate section was clamped by the machine crosshead. A tensile load was applied to the assembly at a crosshead speed of 10mm/min until straightening and withdrawal of the rivet from the slate section occurred. The maximum load to cause straightening was recorded and a mean result of 72.8N obtained.

199. The experiment was then carried out using load cycling. The load was cycled between 5N and the maximum test load 20 times and the assembly observed for signs of rivet movement. Mr Ali found that there were no obvious signs of rivet movement when the load was cycled between 5 and up to 55N but there was some movement when the load was cycled between 5 and 65N.

200. Mr Ali then carried out a further variation of the experiment in that he applied a constant load for a period of one hour. Using a slate with a 4mm hole he found no significant straightening of the rivet up to a load of 50N, some signs of movement at 60N and noticeable straightening of the rivet at 65N. When the exercise was repeated using a slate with 5mm hole, he found that the rivet straightened and withdrew from the slate at loads of 47 to 50N.

201. Before leaving this experiment I should note that in his supplementary report Mr Ali measured the rivet hole on four slates removed from 13 Balmore Close. He found that on the lower surface the holes were all wider than 5mm in one direction and between 4.6 and 5.1mm in the other direction. On the upper surface the holes were 4.3 to 4.9mm (more precisely, 4.87mm) in one direction and 4.5 to 4.6mm in the other direction.

Mr Ali – curling force

202. The first test was on a restrained slate sample taken from Aberfeldy in September 2006. It was in a state of permanent distortion. It was then placed in a tray of water and the load generated by the further upward curl of the slate was measured over a period of 18 hours. It was found to produce a maximum load of 13.4N. The obvious problem with this experiment was the fact that the slate was significantly distorted before the experiment began.

203. The second set of tests were described as heat and water cooling tests. These were carried out on a roof sample of approximately 1.8m length x 1.5m width set up by Apex at the laboratory of Bureau Veritas in Acrewood Way, St Albans. The roof was essentially of timber sections, felt underlay and fibre cement slates. The timber frame comprised longitudinal and vertical sections, each 93 x 44mm and arranged so that the roof pitch was set at 30° to the horizontal, and 9 transverse batten sections, each 50 x 25mm. Roof slates were fixed to the battens. The slates were removed from Aberfeldy in September 2006 and each measured 600 x 300 x 4mm.

204. The roof was then subjected to cycles of heat and water cooling to simulate the effects of sun and rain respectively. During the periods of water cooling air at ambient temperature was blown diagonally across and up the slope of the roof using a large fan at an approximate wind speed of 20mph to simulate the effect of driving rain. The load generated at the rivets was measured using load cells. Mr Ali indicated in his report that the maximum load generated was in the order of 30N. The defendants fairly say that the merit of this experiment is that it at least makes some attempt to replicate the situation on a real roof and to take account of the forces exerted on a slate by its neighbours.

205. Ali I describes the tests as having a 30 minute cycle time. Further, Ali I simply indicates that "the maximum load generated at the rivet position measured during the heat/water cooling cycles was of the order of 30N". Accordingly the claimants requested the raw data. It consists of load measurements and the graphs. It reveals that the cycles were much longer than 30 minutes. The number of cycles was not indicated in the report, but it appears to have been in excess of 26. The claimants accept that the test is along the lines of the test procedure described in EN492. However conditions were made even more extreme because (a) a wind of 20mph was blown over the sample and (b) on a number of occasions the temperature became very high. Mr Ali considered the thermocouples might be inaccurate, but he believed that the load cells were not. The raw data also indicate that loads up to 35N were generated.

206. The claimants draw attention to a number of other matters. First, the slates were used Zeeland slates recovered from Aberfeldy. Some may have been curled. This means that when the slates were installed, the rivets would have to take the force required to flatten the slates. I accept that this was so, but the load cells only recorded an initial upwards force of between 1 and 4.25N. Further, the slates were well weathered and so less likely to curl further at all. Second, the claimants point out that the slates would have enlarged rivet hole sizes, if this is a typical feature of used Aberfeldy slates. Further, the results must be what Apex considers to be typical of rivets with tails bent flat onto the surface of the slates. Nevertheless, no evidence of any straightening or partial straightening of rivets or any lifting or partial lifting of the slates in the test array was recorded by Mr Ali. Third, the maximum upwards "curl" of the corners of the slates was recorded as 1.4mm. These are also valid points but again I consider

they lose some force in the light of the fact that the slates were by this time well weathered.

Dr Blanchard – rivet tests

207. Dr Blanchard carried out rivet straightening tests reported in STATS I. He measured the force needed to straighten the rivets when bent at angles of 90°, 100° and 110°. The values he obtained using the optimum thickness of slate (and any gap) of 8mm were 169N, 84N and 67N respectively.

208. In cross examination Dr Blanchard frankly accepted that the nature of the apparatus he had used made the absolute values unrepresentative of real life. But the data is nevertheless valuable because it shows how an increase in the angle of the bend of the rivet significantly reduces the force needed to straighten the rivet. In particular, a change from 90° to 100° reduces that force by 50% .

Dr Blanchard – curling force

209. Dr Blanchard carried out tests on a variety of slates. Essentially the back face of each slate was wetted and then the front face heated to 70° for about 7 hours. The slates were allowed to cool for about one hour and the total deflection was recorded. The slates were thereupon turned over and a loading applied until the deflection was removed. It was found that the average force required to remove the deflection on the used slates was about 5.2N, and on new slates between 9 and 10N.

210. In my judgment this test is less relevant than that conducted by Mr Ali. The slates were tested under conditions in which they were wetted and heated simultaneously. As Dr Blanchard accepted, the back of the slates was maintained in a wet condition whilst they were heated. Mr Ali explained that this can cause the slates to bow down instead of curling up. Mr Thomas also accepted that he was not sure to what extent it represented reality. When these matters were put to Dr Blanchard he expressed regret that due to time constraints he was not able to pursue further investigations. Dr Blanchard was also asked about the effect of allowing the slates to cool for one hour. He agreed that this too might have affected his results. Finally, the tests were conducted on single slates and so took no account of the forces acting on a slate arising from its position in an array of slates on a roof.

Wind tunnel tests

211. The wind tunnel tests carried out by BRE did not represent reality. The slates were not subjected to heating before wetting and so did not present the slates with the most testing curling conditions. On the other hand they were subjected to a constant and high wind speed which was more severe than reality. Mr Freathy and Dr Blackmore were entirely candid about these limitations. In the end, neither side claimed to derive any material support from the wind tunnel tests and I will say no more about them.

Conclusions from experiments

212. In my judgment the following points emerge from the experiments. First, I would reiterate that they must be approached with some caution for the reasons I have set out in paragraph [195] of this judgment.

213. Second, the closest approximation of the force needed to straighten a rivet bent over at 90° is to be derived from the experiment carried out by Mr Ali. When secured through a hole of 4mm the force is in the region of 65N and when secured through a hole of 5mm it is 47-50N. In reality the hole is likely to be somewhere in between 4 and 5mm and so the force will likewise fall between 50 and 65N.

214. Third, I am satisfied in the light of all the evidence that rivets which are actually installed on a roof and have the appearance of being bent over at 90° frequently have a true angle of bend which is considerably larger. I think it very likely that it is often 100° or even larger. The experimental work of Dr Blanchard shows that this has a marked effect on the force needed to straighten a rivet. An increase in the angle from 90° to 100° has the effect of reducing the force by 50%. If applied to the figures derived by Mr Ali it can be seen that the force needed to straighten a rivet on a roof may be anything between about 25 and 32N.

215. Fourth, it is not possible accurately to determine now in a laboratory the lifting and curling force acting on the rivets of the Zeeland slates installed at Aberfeldy and Greenhithe. The closest approximation is again to be derived from the work of Mr Ali. He found the maximum load was of the order of 30N.

216. Fifth, the foregoing analysis suggests that the curling and lifting force generated by the Zeeland slates at Aberfeldy may even now be sufficient to straighten a rivet which has been properly bent over. This supports the defendants' case. But in my judgment very little weight can safely be attached to the experiments for all the reasons I have set out in paragraphs [195], [205] and [206] of this judgment. I am, however entirely satisfied that the experimental evidence considered as a whole does not lead to the conclusion that the curling or lifting force exerted by the Zeeland slates at Aberfeldy and Greenhithe was insufficient to straighten a properly turned over rivet.

Conclusion – what caused the slates at Aberfeldy and Greenhithe to lift?

217. In my judgment the nature of the lifting problem experienced with the Zeeland slates installed at Aberfeldy and Greenhithe, the way it emerged and the attempts by Apex to deal with it support the submission that it was caused by an inherent characteristic of the slates. The submission gains further support from the recognition by the claimants that the coating of the underside of the slates was thin and inconsistent and this rendered them particularly susceptible to curling. It was a problem that had been experienced in Denmark and one which was remedied by the use of a clear acrylic rather than a pigmented coating. In July 2004 the same modification was made to the production method for the UK market. In addition, the overall moisture content of the slates was reduced by the use of a filler. The experience of Mr Brown at Unit 850 is also significant. It shows that the problem was not limited to the slates supplied for installation at Aberfeldy and Greeenhithe, nor to slates laid by Apex. It also shows that the lifting force exerted by a lifting slate is capable of straightening a properly turned over rivet.

218. I am also satisfied that the problem of lifting is not attributable to the defective workmanship of the Apex roofers. They were highly experienced and were well aware of the need to bend the rivet pins flat onto the surface of the slates. I believe they generally did so. Their work was carefully inspected by a number of

organisations. If they had failed to install the rivets properly it would have been noticed.

219. I have given careful regard to the defects uncovered by the claimants and Mr Thomas in 2006. I accept they reveal that the workmanship was not perfect. But in my judgment, and for the reasons I have given, they do not account for the lifting problem. I have also given due regard to the facts that the Zeeland slates were approved by the BBA and met EN 492. Moreover, I am conscious that the claimants have supplied millions of Zeeland slates without any apparent problem. These matters do tend to support the claimants' position. But I believe their significance is diminished by the fact that the coating on the underside of the slates was variable. Finally, I do not accept that the experimental evidence supports the conclusion that the lifting force exerted by a curling and lifting slate is not sufficient to straighten out a properly installed rivet. If anything, the experimental evidence supports the defendants' position but I feel that so little weight can be attached to it that I prefer not to attach any at all.

220. Overall, I have reached the firm conclusion that the slates lifted because of the way they were made. There is no other satisfactory explanation for their behaviour.

Degrees of lifting

221. The concession by the claimants that slates which have lifted are not in a satisfactory condition was strictly limited to those slates which have lifted to such a degree that they are no longer restrained by a rivet. However there were cases where the degree of lifting was clearly apparent but not so severe as to lift the slate completely clear of the rivet.

222. The defendants have treated such slates as falling into the same category as those in relation to which the claimants made their concession. It is not clear to me that the claimants accept this. Nevertheless I did not understand them to submit that such partially lifting slates *were* in a satisfactory condition but rather that their condition was attributable to faulty workmanship and, in particular, to a combination of (a) slackness in the rivet as fixed (b) the slate underneath curling because it was under nailed or subject to some other distorting influence from the battens or the sub-structure of the roof or (c) the slate moving upwards on a rivet which has not been fully bent.

223. So far as the condition of such slates is concerned, I believe that they cannot be distinguished from those in relation to which the concession was made. If a slate has partially lifted then the rivet must have partially straightened and the force required to straighten it completely or to such a degree as to allow the slate to lift free will, for the reasons I have already given, be rather less than that which has already been exerted upon it by the rising slate. In any event, slates which have shown a tendency to lift partially are inevitably at risk of further deterioration.

224. In my judgment the same applies to workmanship. I have dealt with this at length. There is no basis for drawing any distinction between the quality of the workmanship of the Apex roofers in relation to slates which have fully lifted and slates which have partially lifted. The rivets were properly bent over and defects in the workmanship in

relation to the battens and other aspects of the roof structure were few and far between and not such as to account for the degree of the problems experienced.

Slates which have curled but not lifted

225. The defendants contend that significant numbers of Zeeland slates at Aberfeldy and Greenhithe have curled to an extent which is visually unacceptable, even though they remain fully restrained by their rivets. Further, the degree of curling of such slates is also unacceptable because it is such as to give serious cause for concern as to their durability, functionality and safety. The reasonable person should not be expected to carry out extensive testing to prove that a roofing slate is bound to fail, particularly given the practical impossibility of replicating real life conditions in a laboratory.

226. At the outset it is important to keep in mind that I am here considering only those slates in which there has been no lifting at all – that is to say the centre of the lower end of the slate has remained fully restrained by the rivet – but which have experienced some degree of curling at the corners of that lower end. I think the starting point is therefore to consider the degree of curling which has occurred in such slates. Mr Ali measured width wide curling of no more than 2.5mm on slates taken from 13 Balmore Close (recorded in Ali I, Table 1). Dr Blanchard found a maximum curl of 4mm (that is to say 2mm on each side) on 119 slates removed from Aberfeldy by Mr Thomas and provided to STATS on 15 September 2006. In addition I was invited to consider a number of photographs. One of the most revealing is photograph 02/3/2 of 37-39 Balmore Close upon which the defendants placed considerable reliance. At first sight it appears to show substantial curling. But the claimants took the photograph, enlarged it and applied straight lines. It is reproduced at X/30. I think it is tolerably clear from this that the degree of actual curling is relatively slight, and probably no more than 2-3mm at each edge. I have very little evidence from the defendants to assist me. Mr Potter and Mr Everett suggested that there was such a degree of curling that the roofs were visually unacceptable, but they made no attempt to distinguish those roofs or slates which exhibited lifting and curling from those which merely showed curling. Overall I am satisfied that a significant number of slates showed some degree of curling but I accept the claimants' submission that it was generally of the order of 2-3mm at each corner of the lower end of the slates.

227. I turn then to consider the visual impression of slates with this degree of curl. I think this must be considered in context. First, the BBA certificate for Zeeland slates says that, in common with all asbestos-cement slates, differential carbonation may cause slight bowing of the slates. Moreover, they are intended to resemble natural slate which has uneven surfaces and wide thickness tolerances. Second, and as I have related, Mr Madsen and Mr Petersen explained, and I accept, that all fibre-cement slates have a tendency to curl. This is an accepted feature of their performance and appearance. There was a good deal of evidence of this. Mr Bailey exhibited photographs of roofs covered with the slates of competitors. Garsdale slates installed at Benledi Street, Aberfeldy, provide a good example. These show distinct evidence of curling and yet there is no suggestion that they are visually unacceptable. Mr Balcomb indicated that he would not require these roofs to be re-slated at this stage, but would keep an eye on them to see how they developed. Finally, there is no suggestion that Crest has regarded slates which are merely curling at Greenhithe as being unacceptable.

228. In the light of all these matters and my own assessment of all the evidence I do not accept that Zeeland slates which have curled but not lifted are visually unacceptable.

229. I must now consider the allegation that the degree of curling of such slates is unacceptable because it is such as to give serious cause for concern as to their durability, functionality and safety. In this regard the defendants placed particular reliance upon a 1991 standard called MOAT 48. They submitted that a reasonable person would attach weight to the guidance in MOAT that a 3mm gap would jeopardise the weathertightness of the covering. I am not persuaded that this is so. The MOAT 48 standard may technically still be valid but it has been superseded in practice by EN 492. Indeed Mr Potter was not even aware of it until it was drawn to his attention by Apex. Further, I do not accept that Zeeland slates which are curling but not lifting do exhibit more than 3mm of curling at their corners. Nor has it been shown that if Zeeland slates were subjected to the MOAT test in issue they would fail it. Of even greater importance is the fact that there is no suggestion that any of the roofs at Aberfeldy have in fact suffered a loss of weathertightness. The defendants adduced no other evidence to the effect that curling (but not lifting) slates were not durable or safe. Further, the slates have now been installed for a good many years and there is no evidence they are likely to deteriorate further.

230. I conclude that the defendants have failed to establish that slates which have curled but not lifted are unacceptable because the curl is such as to give serious cause for concern as to their durability, functionality or safety.

Satisfactory quality - conclusions

231. I can now express my conclusions quite shortly. I am satisfied that Zeeland slates which have lifted were not of satisfactory quality. The lifting was caused by an inherent characteristic of the slates and cannot be attributed to faulty or defective workmanship. At trial attention was focussed on Aberfeldy but the same conclusions apply in relation to the slates installed at Greenhithe.

232. In my judgment Zeeland slates which have merely curled but have shown no sign of lifting were of satisfactory quality. The fact that some slates were of satisfactory quality and others were not is not surprising. It is simply a reflection of the variability of the back coating.

Intellectual property claim

Introduction

233. The intellectual property claim is based upon the dealings by the defendants with the Letter. Both sides accept that the intellectual property claim is now very much subsidiary to the claim that the Zeeland slates were not of satisfactory quality. Indeed the parties made no oral submissions on the intellectual property claim at all. They relied entirely upon their written submissions. The claimants say that the dealings by the defendants with the Letter amounted to a breach of confidence and infringement of copyright. The claim originally included a further complaint that the dealings with the Letter amounted to unlawful interference with the claimants' goods. That latter claim has not been pursued in the light of the evidence. Finally, the claimants contend that they were entitled to disclosure of the source. In the event, and as I have

described, Mr Cook revealed himself as the source in his witness statement. Nevertheless, I am asked to determine whether or not the original claim for disclosure of the source was properly conceived.

Background

234. I have related the background to the writing of the Letter in paragraphs [61] to [78] of this judgment. In summary, Mr Leader wrote to Mr Fisher on 13 February 2004 enclosing a copy of the Stanger II report further to the arrangement made at the meeting at Unit 850 on 11 February 2004. Dansk began to consider the Stanger II report shortly thereafter and Mr Petersen then produced the memorandum of 25 February 2004 containing his comments. Those comments were sent by Mr Petersen to Mr Fisher by e mail on 25 February 2004 and, on the following day, Mr Fisher replied requesting a detailed and comprehensive reply to the Stanger II report together with details of the Dansk test results. These were needed so as to permit him to compose a reply to Apex. The matter was now extremely urgent because of the deadline set by Apex that it be provided with a response by the end of the week.

235. It was against this background that the meeting took place on 26 February 2004 between Mr Jorgensen, Mr Madsen, Mr Petersen and Mr Theil. It was after that meeting that Mr Jorgensen wrote the Letter, the text of which is set out in paragraph [70] of this judgment.

Subsistence of copyright

236. Mr Jorgensen drafted the Letter in manuscript and it was subsequently typed up by his secretary. After the meeting he did not discuss the matter further with his colleagues because the problem with Apex had to be dealt with as a matter of urgency and it was important to get the Letter finished. He explained that he spent about half an hour, at the most, drafting it. It was based upon the information that had been explained to him at the meeting, the letter written by Mr Fisher to Mr Leader on 26 January 2004 to which I have referred in paragraph [58] of this judgment, and Mr Petersen's technical report that was explained to him at the meeting.

237. A comparison of the Letter with the documents to which I have referred shows that there are significant differences between them. Moreover, and importantly, the Letter sets out Mr Jorgensen's views about Apex, his understanding of the tests conducted by Stanger and Dansk, his view that the curling problem could be solved by adding new rivets of a higher strength, his recognition that Mr Fisher had tried to persuade Apex to accept a similar solution to that which he proposed but without the addition of a written warranty, his perception that since Apex had already been lost as a customer there was nothing to lose by making the further offer and finally his opinion that, to the extent possible, Dansk should avoid being involved in litigation, particularly litigation that it might lose.

238. In the light of the evidence and having compared the Letter to the earlier works upon which it was based, I have no doubt that its production did involve a substantial degree of independent skill and labour and that it does justify the subsistence of copyright. The effort expended by Mr Jorgensen was clearly significantly more than trivial. Although it may not have taken very long to write, it gave expression to what

he perceived to be the correct approach to adopt in relation to Apex and his anxiety about litigation.

239. The defendants referred to the decision of the Court of Appeal in *Musical Fidelity Ltd v Vickers* [2002] EWCA Civ 1989; [2003] FSR 50. I do not detect in this decision any reason to doubt the conclusion I have reached. The court was clearly concerned by the submission that when a person receives a solicitor's letter and shows it to another person or copies it to another person in order to complain about the acts and attitudes of the solicitor's client, he thereby commits an actionable breach of either the solicitor's or the client's copyright. It was in this context that the court expressed some surprise that copyright attached to solicitors' correspondence. Nevertheless I do not understand the court ultimately to have doubted the proposition that copyright can subsist in such correspondence and, still less, that it can subsist in business correspondence generally. Indeed, Buxton LJ suggested that it might well be wise to consider in future whether, when a person causes his solicitor to write a letter of this sort, he is not giving an implied consent to its publication by the recipient that goes more widely than the narrow limits recognised by the law of copyright. No such considerations apply in this case.

240. The defendants also submitted that having regard to EC Directive 91/250 and TRIPs, copyright protection should be afforded only to expressions which are the author's own intellectual creation, and not to ideas, principles, procedures, methods of operation or mathematical concepts as such. I see no need to express any conclusion in relation to this submission because I am entirely satisfied that the Letter was the personal intellectual creation of Mr Jorgensen and that its expression is in the nature of a literary work.

241. I conclude the Letter is an original literary work written by an employee of Dansk and that copyright subsists in it which belongs to Dansk. It also follows that the defendants have infringed that copyright by making copies of the Letter, subject to the defences which I address later in this judgment.

Confidential Information

242. It is well established that to succeed in an action for breach of confidence a claimant must establish first, that the information which he is seeking to protect is of a confidential nature; second, that the information was communicated in circumstances importing an obligation of confidence; and, third, that the defendant is about to make, or has made, an unauthorised or wrongful use or disclosure of that information.

243. I have reached the conclusion, as expressed in paragraph [72] of this judgment, that the Letter was a private internal communication written by Mr Jorgensen to Mr Fisher and Mr Bailey of Cembrit UK and that it was not intended for circulation outside the Dansk group. I do not understand this to be substantially in dispute.

244. The defendants say, however, that all information in the Letter was known to them by the time of its disclosure to them and by them in 2005, and furthermore was information which they were entitled to impart to Countryside and Crest. In support of this argument the defendants rely on the letter from Mr Fisher to Mr Leader dated 2 March 2004 and its enclosures. These enclosures certainly included the letter from Mr Jorgensen dated 2 March, the technical report of Mr Petersen dated 2 March and the

table of results of the Dansk experiments. The defendants say they also included Mr Petersen's original memorandum of 25 February 2004. In the light of all the evidence I am doubtful that the memorandum of 25 February 2004 was sent to the defendants, but for the purposes of the immediately following discussion I will assume that it was. The defendants also rely on the contents of the letter sent by Mr Fisher to Apex on 20 July 2004.

245. I am unable to accept this submission. The documents to which I have referred did of course contain the proposed solution. They also contained a recognition that the slates removed from Aberfeldy had an inconsistent application of back coating and this made them more susceptible to curling as a result of higher water absorption. But the Letter contained a deal good more. It contained a recognition by Mr Jorgensen that the claimants had already tried to persuade the defendants to accept a similar solution (but without the written warranty), a statement that since Apex had been lost as a customer the claimants had little to lose by presenting the offer, with the implication that Mr Jorgensen thought the offer might well not be accepted, but it was worth making anyway, and an expression of his concern that Dansk should avoid being involved in litigation cases, particularly if it had a bad case.

246. In my judgment the defendants' submissions are further undermined by Mr Leader's evident interest in the Letter when shown it by Mr Cook and the steps he took thereafter to show the Letter to Countryside and to Crest. He clearly formed the view that it added to the information he already possessed and, if disclosed to Countryside and Crest, could be used to encourage the claimants to agree to the demands he had made.

247. I turn then to the second element of the cause of action for breach of confidence, namely that the information must have been communicated in circumstances importing an obligation of confidence. The defendants submitted that the Letter was not communicated to Mr Cook in such circumstances because he was not asked to keep the Letter confidential and he was not asked to return it when he ceased to be retained by Cembrit UK. I am wholly satisfied in the light of the cross examination of Mr Cook that he realised that the copy of the Letter supplied to him by Cembrit UK was confidential. He suggested that it ceased to be confidential when his relationship with Cembrit UK came to an end. I reject his evidence on that point. He accepted under cross examination that he was not very happy about supplying the copy of the Letter to Mr Leader and he only agreed to show the Letter to the defendants' solicitors and permit them to take a copy on the basis that his identity as its source would remain confidential. When asked why, he said he supposed he felt vulnerable and accepted that this was possibly because it was evidently an internal letter of the company that had instructed him. He also felt the need to justify the disclosure and originally did so on the basis that some of the photographs provided to him were of roof sections which had been deliberately prepared by the claimants to present a misleading impression of the cause of the curling and lifting. That particular contention is no longer pursued. In all the circumstances I have no doubt that Mr Cook fully appreciated that he was handing over to Mr Leader a confidential document.

248. Mr Leader was very frank. He said he was a little surprised to see what the Letter said and he was a little surprised that Mr Cook showed it to him. Further, he accepted that he would not have expected Stanger to send to the claimants any report

commissioned by Apex without his consent. Once again, I am quite satisfied that Mr Leader appreciated that he had taken possession of a confidential document.

249. The claimants maintain that the third element of the cause of action for breach of confidence is established by the use made by Apex and Mr Leader of the copy of the Letter in providing it Countryside and Crest. In response, the defendants say that the use was not wrongful for two reasons. First, they did so to correct false information disseminated by the claimants and secondly, to avoid unnecessary and unjustified litigation. This same defence is raised in relation to the copyright claim, together with a defence of fair dealing. It is to these I now turn.

Justification

250. It is well settled that the public interest in the preservation of confidence may be outweighed by a countervailing public interest in favour of disclosure. A party who has received confidential information may have a just cause or excuse for disclosure and it may even be his duty to reveal what he knows.

251. In this case the defendants contend that the significance of the Letter was that it showed the claimants did not honestly believe that there was no defect in the Zeeland slates but, on the contrary, that their tests showed that there was inadequate coating of the back side and this caused the curling. Although the defendants had other documents to similar effect, the Letter was more impressive, coming from the highest level, and more focused. The disclosure of the Letter by the defendants to Countryside and Crest was justified to correct the apparently false information disseminated by the claimants in their solicitors' letter of 25 November 2004, the text of which I have set out in paragraph [104] of this judgment, particularly as this false information was calculated to frustrate attempts to resolve the problems promptly, fairly and properly without litigation, and to result in Apex being sued by Countryside and Crest for a problem which was not its fault. In all these circumstances the defendants submitted that the justification for disclosure outweighed the claimants' limited interest in protecting any remaining confidential information in the Letter.

252. I am unable to accept these submissions. First, the letter of 25 November 2004 must, I think, be seen in context. It was written against the background of Mr Leader's publicity campaign to which I have referred in paragraphs [100] to [102] of this judgment. Countryside was itself aware of this proposed campaign and, by letter of 20 October 2004, asked Apex not to proceed with it. It feared that the campaign was likely to push the claimants into the position of defending their preferred position of repairing the roofs and that, in the event of publicity, they would undoubtedly be cautious about opening up the floodgates for claims for other projects to be re-roofed. Nevertheless, Apex did proceed and on 18 November 2004 Construction News published the article to which I have referred and which led Mr Leader to telephone Mr Penrose and leave the gleeful message that "*he was going to get well rough from here on in*". Faced with this campaign I think it is hardly surprising that the claimants felt they had no alternative but to take the hard line expressed by their solicitors in the letter of 25 November 2004.

253. Second, in so far as the claimants knew of any defects in the Zeeland slates they had already disclosed them to the defendants. The Letter recorded that the tests conducted by Dansk and Stanger reached the same conclusion, namely "*that the curling is*

caused by imbalance between the front and the back side of the slates due to differences in the paint layer thickness on the front and the back side." As I have explained, this same information was disclosed in the materials sent by Mr Fisher to Mr Leader on 2 March 2004 and in the letter sent by Mr Fisher to Mr Robertson on 20 July 2004. It was also disclosed at the meeting which took place at the offices of Countryside on 22 March 2004.

254. Third, Dansk did not understand why some of the slates were performing without any problem. I am quite satisfied on the evidence that they were puzzled by this. To this extent the claimants felt they had not got to the bottom of the problem. This qualification does not appear from the Letter. Moreover, the position had moved on by the time the defendants made use of the Letter as they did. As I have explained, in December 2004 the parties had agreed to appoint independent experts to investigate the cause of the curling.

255. Fourth, Dansk did not believe that the problems at Aberfeldy justified any re-roofing. Indeed Mr Jorgensen says this in the fifth paragraph of the Letter. Dansk did not therefore believe it had no answer to the demands made by the defendants.

256. Fifth, the last three paragraphs of the Letter suggest that Dansk thought the offer to be made to Apex might well not be accepted but that Dansk had little to lose by making it because the claimants had already lost Apex as a customer, that Dansk wished to avoid being involved in court cases and this was particularly so if it might have a bad case. These implied, contrary to the fact, that Dansk thought it had no answer to the demands Apex was making.

257. Sixth, I have no doubt that the primary purpose of the disclosure by the defendants of the Letter to Crest and Countryside was to enable those companies to use it to exert pressure upon the claimants and force them to capitulate and agree to pay the costs of re-roofing all of the problem roofs at Aberfeldy and Greenhithe. This is entirely consistent with the launch by the defendants of the publicity campaign and the message left by Mr Leader on Mr Penrose's telephone answering machine on 18 November 2004. In providing the copy of the Letter as they did, the defendants put in the hands of Countryside and Crest a document which contained confidential information as to the approach which the claimants proposed to take to the dispute and their anxiety about litigation, and which was liable to be misconstrued as an acceptance by the claimants that they had no answer to the defendants' contentions that the claimants ought to pay to have all the relevant slopes re-roofed. It was prejudicial and out of context. I do not accept that the disclosure was justified either in the public interest or with a view to avoiding unnecessary and unjustified litigation. On the contrary, it seems to me the disclosure was likely to lead to litigation and, in the event, that is what exactly happened.

Fair dealing

258. Fair dealing for the purpose of criticism of another work does not infringe copyright, provided that it is accompanied by sufficient acknowledgment. The defendants say that this defence is available because their objective in copying the Letter and providing it to Crest and Countryside was to criticise the statements made by the claimants in the solicitors' letter of 25 November 2004. For the reasons I have already given, I do not accept that the purpose of copying the Letter was to criticise

the letter of 25 November 2004 at all. In my judgment the defendants used the Letter as they did as a tactic to attempt to force the claimants to capitulate to their demands. For the reasons which I have already given, I do not believe that they were justified in so doing.

Disclosure of the identity of the source

259. The claimants contend that they were entitled to bring proceedings for disclosure of the name of the source on the basis that the source was a wrongdoer: *Norwich Pharmacal Co. v Customs and Excise Commissioners* [1974] AC 133.

260. For the reasons which I have given, I am satisfied that the defendants and Mr Cook knew at all times that the Letter contained confidential information which belonged to the claimants. In my judgment Mr Cook had no right to disclose the Letter to Mr Leader and his doing so amounted to a breach of confidence. In those circumstances, I believe that the claimants were, prima facie, entitled to an order for disclosure.

261. The defendants contend, however, that disclosure was never an appropriate remedy for the following reasons. First, it is said that such an order is discretionary and should not be granted unless it is necessary and in particular, it is shown that the identity of the source cannot be obtained in any other way. In the present case they argue that the claimants failed to make any adequate effort to identify the source. I reject this submission. The claimants took steps to identify the source by investigating their computer systems and compiling lists of potential leaks. Mr Cook was considered and discounted because he was a consultant. The claimants had no reason to suspect Mr Cook and there is no reason to suppose that if he had been asked he would have admitted that he was the source. Indeed, when he disclosed the Letter he specifically requested that his identity be withheld.

262. Second, it is argued that the claimants failed to disclose the purposes for which the disclosure would be used. I reject this submission too. Mr Fisher explained his concern that the source might be an employee or an ex-employee with access to the claimants' internal e mails and correspondence and that they were concerned to find the person responsible so as to take steps to prevent any further such disclosures.

263. Third, it is submitted that the remedy is discretionary and should be refused if the claimants have themselves been guilty of improper conduct. I do not accept that the claimants have been guilty of improper conduct in relation to the Letter.

264. Finally, the defendants contend that disclosure would interfere with the freedom of expression guaranteed by art.10 of the European Convention on Human Rights. For the reasons I have given, I do not believe that the disclosure had anything to with freedom of expression. Mr Cook had no justification in disclosing the Letter to the defendants and the claimants had a legitimate interest in identifying any disloyal employee or consultant.

Conclusions

265. My conclusions are therefore as follows:

i) The claimants' Zeeland slates installed at Aberfeldy and Greenhithe which have lifted were not of satisfactory quality.

ii) It has not been established that the Zeeland slates installed at Aberfeldy and Greenhithe which have curled but not lifted were not of satisfactory quality.

iii) The Letter is the subject of copyright and was protected by the law of confidential information. What, if any, relief the claimants may be entitled to is a matter upon which I have not yet heard submissions. The claimants were justified in bringing the claim for infringement of copyright and breach of confidence and for disclosure of the source of the Letter. The claim for unlawful interference with goods fails.

266. I will hear argument as to the appropriate form of order if it cannot be agreed.