Specification

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Structural Performance Specification
For the Design, Supply and Application
Of Overcladding Systems to Grenfell Tower

For

Studio E

LO1212-SPEC-001
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Curtins Consulting
40 Compton Street
London
EC1V 0AP
T. [redacted]
F.
www.curtins.com

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1.0 General

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Best practice techniques coupled with high standards of workmanship and good quality materials must be used at all times. All works shall be designed, supplied and constructed by the Contractor.

General principles to be follows for this project:

1.1 Relevant Standards

All materials must comply fully with all relevant British or European standards. All materials and packaging should carry the relevant British Standard (BS) identification or Kitemark, CE mark or British Board or Agreement (BBA) reference. Any product seen without any of the above marks or to which proof of compliance cannot be satisfactorily determined, shall be excluded from the work.

1.2 Storage

All materials must be properly stored and fixed in a workmanlike manner. Any installation must fully comply with the manufacturer's recommendations; this is to include the provision of any fixings or ancillary equipment that may be relevant.

1.3 Compliance

All design, components and workmanship shall comply with the requirements of any Inspectorate of Public Health or Environmental Health and/or their appointed or designated officers.

1.4 Statutory Authorities

All materials and workmanship and design shall comply with the requirements of all Statutory Authorities, where appropriate, including regional electricity companies, British Gas/Transco, local water companies, local Highway Authority/Drainage Authority etc.

1.5 Samples

Samples may be required for any product or material proposed for use in work where requested.

1.6 Component Life

All design, components and workmanship are to achieve a minimum design life of 30 years. Minor components in any item, structure or substructure are to achieve the same minimum 30 year design life.

1.7 Appliance Standards

In the event that two or more standards or requirements apply then the higher standard shall apply.

1.8 References

Where a standard type or publication is referred to, the latest version published with all relevant amendments shall be the version which is to apply.

1.9 Protection of Finishes

All finishes are to be protected from excessive drying, inclement weather, extremes of temperature, vibration, impact and shock. Full details are to be submitted on methodology and additional measures necessary to allow work to continue during cold weather.

2.0 Materials

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All materials used in the works must: -

- Require low levels of future maintenance.
- Be fit for their intended purpose and location.
- Have a high resistance to wear, deterioration and corrosion.
- Not contain any deleterious materials (see 4 for list of materials not to be incorporated into the works).
- Not pose a risk to health and safety.
- Not contain, create during manufacture or subsequently produce any substances which are harmful to the environment.
- If natural products, be derived from sustainable sources.
- Be, wherever possible, manufactured from recyclable materials wherever these meet the acceptable standards. In particular plastics should carry material identification markings.
- Be (if specified material) common to other properties, of a similar nature, in the surrounding area.
- Be new, free from defect and be of consistent size, shape, colour, appearance, quality and manufacture with other materials used elsewhere in work to that property.

3.0 Prohibited Materials

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The following form of material must not be used in any form on this project:

- Asbestos.
- Fibreglass (GRP excepted).
- Lead based paint.
- Sea dredged aggregates.
- PFA (pulverised fuel ash).
- High alumina cement.
- Calcium chloride concrete additives.
- Mundic blocks.
- Mundic concrete.
- Urea formaldehyde foam/insulation products.
- Any products that contravenes the Montreal Protocol (i.e. contains or produces CFC's and/or HCFC's etc).

4.0 Compliance with General Standards

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All design, components and workmanship must comply with the requirements and recommendations contained in the following:

- All Statutory Instruments.
- Applicable British or European Standards and Codes of Practice.
- BS 8000 (Workmanship on building sites).
- The Building Regulations 2000 and subsequent amendments.
- The Construction Products Regulations 1991.
- The Construction Products (Amendments) Regulations 1994.
- Construction (Design and Management) Regulations 2007.
- BRE Digests and Information Papers.
- Secured by Design (as published by the Association of Chief Police Officers).
- Standards for varying needs.

In addition to these general standards, further, specific standards of compliance are listed below in Section 5: -

5.0 Specific Standards of Compliance

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- BS 5250, 2002: The Control of Condensation in Buildings.
- BS 5628 Part 3, 2001: Design of Structural Masonry.
- BS 5262, 1991: CP for External Renderings.
- BS 5925, 1991: Ventilation Requirements.
- BS 6093, 1993: CP for Joints and Jointing.
- BS 6367, 1983: Rainfall Intensity.
- BS 6399, 1996 Part 1: Dead Loads.
- BS 6399, 1988 Part 3: Imposed and Snow Loading.
- BS 6399, 1997 Part 2: CP for Wind Loads on Buildings.
- BS 6651, 1999: CP for the Protection of Structures against Lightning.
- BS 7543, 2003: Durability of Buildings and Building Elements Products and Components.
- BS 8104 1992: CP for Assessing Exposure of Walls to Wind Driven Rain.
- BS 8200, 1985: CP for the Design of Non Loadbearing Vertical Enclosures of Buildings.
- BS 8200, Part 10, 1995: CP for Plastering and Rendering.
- BSEN 1364: 1999 Fire resistance tests for non-loadbearing elements.
- BSEN 12056: 2000 Gravity Drainage Systems inside Buildings.
- BRE Digest 228, 1979: Estimation of Thermal and Moisture movements and Stresses.
- BRE Digest 401, 1995 : Replacing Wall Ties.
- BRE Publication: Fire Performance of External Thermal Insulation for Walls of Multi Storey Buildings", 2nd edition 2003.
- CIRIA Special Publication 87: Wall Technology.
- UEA tc MOAT 22: Directive for the Assessment of External Insulation Systems for Walls.
- Centre for Walling & Cladding Technology (WWCT): Standards for Walls with Vertical Rainscreens 1998.

6.0 Design

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In designing his over-cladding systems the Constructor must take full account of the geographical location of these buildings and the climate thereabouts. In particular he needs to consider the effects of:-

- Driving Rain – classified as "very severe" (see BS5628 Part 3).
- The interference of weather on his programming of the works.
- Location: In close proximity to major urban highways with the subsequent risk of air and water borne pollutants.
- The need to avoid infestation / colonisation of the Works by insects, rodents, bats, birds etc.
- The overall integrity of the Works.
- The resistance to hard body and soft body impacts (for specific minimum recommendations see BS 8200).
- Overall weather-tightness.
- Compatibility of components both the new components and their relationship with existing components.
- Design features and projections. Some design features tend to concentrate water on certain areas of wall which in effect increases the exposure in these locations and increases the risk of staining from pollutants carried by the water. Other design features can reduce the effects of water run off down a wall.
- The avoidance of interstitial condensation.
- The need for effective fire barriers.
- The minimisation of future maintenance.
- The ease of undertaking repairs / replacements should it be necessary.

Guidance on the above is given in the CIRIA publication 87 "Wall Technology".

7.0 Overcladding

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7.1 External Insulation and Zinc Cladding System

7.1.1 The Constructor is to acquaint himself with the condition of the external face of the buildings and is to ensure that all existing surfaces are sound, dimensionally stable, clean and free of loose material prior to the installation of the overcladding. Any necessary repairs to the structure should be carried out by the contractor prior to the application of the overcladding system.

7.1.4 The Constructor is to state his chosen over-cladding manufacturer when returning his tender submission.

7.1.5 The Constructor is to acquaint himself with the condition of the external face of the building and is to ensure that all existing surfaces are sound, dimensionally stable, clean and free of loose material prior to the installation of the overcladding. Any necessary repairs to the structure should be carried out by the Constructor prior to the application of the overcladding system. If required by the overcladding system manufacturer, the entire wall surface area is to be treated with a fungicidal wash. This shall be a low odour, fast-drying, lead free solution, applied in accordance with the manufacturer's instructions

7.1.6 The installation shall be weathertight under all anticipated conditions and able to resist all dead loads, design live loads including impact, wind and thermal loads without damage to the system or compromising the performance of the system throughout the thirty year term.

7.1.7 The Constructor shall not bury any existing cables beneath the insulation without the approval of the Client.

7.1.8 If the Constructor proposes not to include movement joints in his over-cladding scheme then he must clearly state that the system will not subsequently crack and supply calculations to justify his design philosophy. If movement joints are to be introduced, the Constructor's proposals must clearly indicate where these are to be located and give details of their construction.

7.1.10 The design of the over-cladding system shall be such that there is no deterioration from thermal shock when tested in accordance with UEA tc MOAT 22 paragraph 2.5.2. Frost penetration damage shall not be allowed to occur to the constituent parts of the system. They shall retain sufficient flexibility to withstand thermal shock associated with climatic changes and so maintain their performance and temperatures ranging from –20 deg to +80 deg c.

7.1.11 The over-cladding system shall have the ability to withstand possible impact and other loading without permanent deterioration or spalling when tested in accordance with B.R.E. Current Paper 6/81 and BS 8200. Notwithstanding the requirements of the foregoing standards the finished wall must have an impact resistance not less than 10NM.

7.1.12 The system shall resist the penetration of liquid water for at least 10 days when tested in accordance with MOAT 22, paragraph 2.5.1.

7.1.13 The system should comply fully with the recommendations of the BRE document "Fire Performance of External Thermal Insulation for Walls of Multi Storey Buildings", second edition, 2003.

7.1.14 The system shall not be a fire risk at any stage of installation, nor shall it constitute a fire hazard after completion if for any reason the insulant becomes exposed.

7.1.15 The over-cladding system shall be designed such that the additional load transmitted to existing structure shall not impose additional stresses to the extent that subsequent structural damage to superstructure or foundations occurs.

7.1.16 The system is to be designed fully in accordance with the requirements of BS 6399 part 2 and BS5427: Part 1. The Constructor will be expected to submit fully detailed calculations before a contract for the Works is underway. The assessment of wind loads on the permanent works shall address local factors and the effects of other buildings in close proximity (eg: funnelling). Special attention shall be given to negative and positive wind loads at corners, and roof eaves etc. on all sides of the buildings including the effect of cyclic loading.

7.1.17 The System shall be free from CFCs, HCFCs, and all other environmentally damaging gases.

7.1.18 The Constructor must allow in his tender costs for carrying out a vertical, horizontal and level survey in connection with the overall alignment of the buildings to enable the new overcladding to be correctly aligned to obtain a true face between two storey levels (movement joints).

Tolerances (vertical) of +/- 3mm will be accepted over the two storey height with +/- 3mm (horizontal) and +/- 6mm (horizontal) over 6000mm and 25000mm respectively.

7.1.19 The Constructor is to allow for 5% of all fixings to be tested to at least 2.0 times working load without damage or deterioration. Certificates shall be supplied to identify the location of the tested fixing, test load and deformation under load. Such tests must be conducted to test not only the tie and immediate area of embedment or fixing but also the substrate by ensuring adequate numbers of ties are installed to avoid high concentrated loads being conveyed to the structure that subsequently lead to damage of the substrate and/or structure.

7.1.20 All metallic movement beads, corner beads, bellcast beads, edge beads, etc. shall be produced from austenitic stainless steel grade 304 or powder coated aluminium to BS 1474: 1972. All metal to metal fixings in contact shall be done in such a way as to avoid bimetallic corrosion between different metals.

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7.1.21 Unless the Constructor deliberately intends not to use movement joints in his system, the Constructor must specify the location and size of all proposed movement joints. Any PVC nosing that is required shall be purpose extruded to match the colour of the proposed rendered finish. A metallic nosing will not be accepted unless colour coated to match i.e. aluminium or stainless steel.

7.1.22 Adhesives shall not be used as a primary or permanent means of fixing the over-cladding to the structure. The retention and stability of the insulation and finished wall cladding system must be achieved by mechanical fixings only.

7.1.23 A minimum factor of safety of 6 for fixings will be required and the Constructor must provide full design calculations with his tender on the structural adequacy of the system and fixings.

7.1.24 The System Supplier shall provide a drawing showing the typical arrangement of insulation and mesh fixings, particularly at openings, corners (internal and external).

The system should bear in mind that: -

1. On no account shall four panel corners meet at any one point.

2. On no account shall a panel fixing be used to support more than one panel.

7.1.25 If non - structural grid systems are to be used then the insulation slabs shall be secured to the existing prepared substrate using proprietary mechanical fixings. The system appliers must ensure that all fixings that penetrate through the insulation must coincide with any "dab" adhesive to ensure that deformation of the insulation is kept to a minimum and that the insulation does not come into direct contact with the substrate.

7.1.26 The Constructor shall allow in his tender for inspections, testing and making good at all necessary locations to determine the actual length of all fixings required. All costs associated with ordering and supply of these fixings are deemed to be included in the tender price. On no account shall additional costs on the ground of lack of knowledge or late receipt/supply of fixings be entertained.

7.1.27 The Constructor shall allow in his tender price for abortive drilling during the works and he shall make good all holes.

7.1.28 Holes shall be drilled in accordance with the manufacturer's recommendation. (The Constructor is to allow in his costs for drilling through brick, reinforced concrete, concrete, and other materials likely to be encountered). Loose spoil and dust from the substrate shall be removed from the holes prior to inserting the fixing.

7.1.29 The fixings shall be installed in accordance with the manufacturer's instructions. The fixings shall be tightened to their required setting in accordance with the manufacturer's specification.

7.1.31 Bedding mortar shall be a high impact polymer modified cement based premixed mortar incorporating selected aggregates suitable for application of the reinforcing mesh.

7.1.32 Reinforcing mesh generally shall be alkali resistant, glass fibre mesh with armoured mesh applied to the ground floor area. If steel meshes are to be proposed then they must be stainless steel.

7.1.33 If sealants are required (e.g. at movement joints or at the interface of dissimilar materials) then they shall be proprietary two-part polysulphide sealant installed as per the manufacturer's instructions or as specified by the cladding system suppliers.

7.2.4 The cladding system shall meet the requirements of rain screen cladding as specified in the Standard for Walls with Ventilated Rainscreens (CWCT 1998), Section H92 – "Rainscreen Cladding" of the NBS Specification 2000, and the Guide to Good Practice for Facades (by CWCT 1996).

7.2.5 The minimum performance requirements of the RSC are as follows:-

Performance requirement / criteria	Standard & Clause No.	
	CWCT*	NBS H92
Applied loads	2.5 2.7 2.9	320 330 335 340
Weather tightness	2.13 2.15	390 400 410 420
Cavity ventilation	2.14	
Deflection	2.6	350
Movement	2.10 2.11 2.12	380
Thermal performance	2.16	430
Condensation	2.17	440 450
Acoustic and noise performance	2.18 2.19	460 465 470
Fire performance	2.20	480 485 490
Fixings and bracketry	2.3	
Tolerances		370
Testing	See table 2	See table 2

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* Standard for Walls with Ventilated Rainscreen.

The rain screen cladding system must satisfy the tests as described in CWCT and NBS H92 a summarised below: -

Test	CWCT Standard for testing ventilated rainscreens clauses	H92 NBS clauses
Standard tests		
Air permeability tests (in situ)	3.3 and 3.3.2	585
Air permeability tests (in situ), include test pressure and allowable leakage	3.3, 3.3.2 and 3.3.3	590
Air permeability tests include test pressure, and allowable leakage. The difference conditions are: - • Overcladding a new or existing backing wall with a proprietary rainscreen system utilising a drained and ventilated cavity. • Overcladding a new or existing backing wall with a proprietary rainscreen system utilising pressure equalisation. • Overcladding a new backing with a bespoke rainscreen system utilising a drained and ventilated cavity. • Overcladding a new backing with a bespoke rainscreen system utilising pressure equalisation. • An integral system utilising pressure equalisation.	Relevant clauses 3.3 and 3.3.1 3.3, 3.3.1 and 3.3.3 3.3 and 3.3.1 3.3, 3.3.1 and 3.3.3 3.3.1 and 3.3.3	595
Weather tightness/ water penetration tests, large specimen	3.4	610
Weather tightness/ water penetration tests, small specimen	3.4	615
Wind loading test, large specimen – air barrier	3.5.1	620
Wind loading test – rainscreen	3.5.2	625
Fatigue loading test, small specimen – rainscreen	3.6	630
Discretionary Tests		
Building movement/ racking test, large specimen	3.10.1	635
Thermal cycling regime, large specimen	3.10.2	640
Sparge bar test, large specimen	3.10.3	645
Hosepipe test, large specimen	3.10.4	650
Ultimate strength test	3.11	655
Additional tests		

Test	CWCT Standard for testing ventilated rainscreens clauses	H92 NBS clauses
Soft impact test Hard impact test Weathering test Thermal performance test Fire testing	 3.12.1 3.12.1 3.12.2 3.12.4 3.12.5	
Destructive testing of fixings to determine the ultimate load	2.3.2.2	670
Site fixing test	2.3.3	672
Site sparge test	3.10.3	680
Site hosepipe test	3.10.4	685

7.2.6 Tolerances for the rain screen cladding are to be as follows:

Maximum permitted component and installation tolerances: -

1.	Permitted Deviation of overall Panel width.	+2.0mm-2.0mm
2.	Permitted deviation in panel length for panels up to 2400mm.	+3.0mm-2.0mm
3.	Maximum permitted deviation in length of two opposite sides of panel.	+2.0mm-2.0mm
4.	Squareness of panels: When the longest of two adjacent sides of the panel is taken as the base line, the deviation of the shorter side measured from a perpendicular to the baseline at any point along the baseline not to exceed.	+2.0mm-2.0mm
5.	Flatness: Deviation under a 1.0m straight edge placed anywhere on a flat surface not to exceed.	3.0mm
6.	Alignment of joints between adjacent panels: deviation of panel corner from protected lines of adjacent panels not to exceed.	2.0mm

7.	Alignment of faces to adjacent panels: Deviation of panel edge under a 1.0m straight edge placed across adjacent panel not to exceed.	1.0mm

8.0 Concrete Repairs

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8.1 Prior to overcladding the Constructor is to hammer-test the sections of all existing exposed concrete and remove all loose concrete. If the removed concrete does not jeopardise the condition of any reinforcement that may be in the vicinity (e.g. because it still has adequate concrete cover), than no further concrete repair action is needed if it is to be overclad. If the renewed concrete does expose reinforcement or jeopardise the condition of reinforcement in the vicinity (e.g. because the cover has become insufficient) then the constructor must undertake a concrete repair to protect the life of the reinforcement.

8.2 Due consideration shall be given to the location of the concrete repairs and therefore the required finish. Where repairs are to receive protection from the elements by the overcladding system, they need only be undertaken using a high strength mortar with an un-specified surface finish, sufficient to maintain the continued performance of the reinforced concrete structural member under repair throughout the life of the overcladding.

8.3 All concrete repairs shall be undertaken in accordance with Section 9, Curtins Concrete Repair Specification and Curtins Concrete Repair Notes.

9.0 Miscellaneous Minor Concrete Repairs

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9.1 Concrete Works General

9.1.1 Design

Design is to conform to the appropriate Codes of Practice and to be suitable for the structure. The design shall comply with the requirements of BS 8110- 1 and 2, including surface finishes. Calcium Chloride shall not be used. Do not use High Alumina Cement. Do not use Sea Dredged Aggregates.

9.1.2 Components

Water to be clean and free from harmful matter. Where tests are required they shall comply with the requirements of BS 3148. Ordinary Portland cement, Rapid Hardening, White or Coloured to comply with BS 12.Sulphate-resisting Portland Cement to comply with BS 4027.Supersulphated Cement to comply with BS 4248.

Aggregates to comply with BS 882 and be tested in accordance with BS 812. The drying shrinkage of concrete using the proposed aggregate shall not exceed 0.075% when tested in accordance with BS 812-120. Concrete mixes to comply with BS 5328 and the table shown in Part 2.1E of this section.

9.1.2 Ancillary Components

Timber inserts shall be dovetailed in section and shall be treated with a timber preservative complying with BS 1282 : Type WB or OS and shall be obtained from an agent authorized by the maker.
Mild steel bar reinforcement shall comply with BS 4449, Grade 250 (Designated by the letter R).
High Tensile bar reinforcement shall comply with BS 4449.
Steel Fabric reinforcement shall comply with BS 4483.
Accurately cold bent reinforcement to comply with BS 4466.
Formwork to comply with BS 8000-2.
Reinforcement distance pieces to be concrete blocks or custom made plastics.

9.1.4 Workmanship

Concrete to be produced in accordance with Clauses 7 and 13 of BS 5328. Any special requirements in contract documents are to be met.

Concrete to be transported, placed and compacted into position in accordance with the requirements of BS 8110-1, Clause 6.5. Placed to ensure that segregation does not take place and compacted so as to form a solid mass free from voids.

Concrete to comply with BS 8000-2 sections 2.1 and 2.2 unless otherwise stated in contract documents with respect of the following:

9.0 Miscellaneous Minor Concrete Repairs

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Materials and Handling

Weather conditions

Mixing

Transporting concrete on site

Materials, handling and preparation

In-situ concrete

Concrete mixes to comply with BS 5328, to be suitable for location and use and/or be of the specific grade stated in contract documents.

Concrete to be tested in accordance with BS 1881 and BS 8110-2.
Admixtures are not permitted.

Formwork to be soundly constructed, rigid and grout tight as below.

Prior to placing of concrete formwork to be thoroughly cleaned treated with a suitable release agent.
Minimum period before striking formwork (concrete made with ordinary or sulphate-resisting Portland Cement) to be as indicated in the following table: -

Type of Formwork	Minimum period before striking		
	Surface temperature of concrete		
	16°C & above	7°C	T (any temp. between 0°C & 25°C)
Vertical formwork to columns and large beams	12 hours	18 hours	300hrs/(T + 10)
Soffit formwork to slabs	4 days	6 days	100days/(T + 10)
Soffit formwork to beams and props to slabs	10 days	15 days	250days/(T + 10)
Props to beams	14 days	21 days	360days/(T + 10)

9.0 Miscellaneous Minor Concrete Repairs

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Reinforcement to comply with BS 8000-2.
Cutting & bending, fixing, surface condition and welding of reinforcement to comply with BS 8110-1, section 7.

Reinforcement to be accurately placed, maintained in position by soft iron tying wire and the use of suitable distance pieces.

Reinforcement to be free from loose rust, millscale, dirt and oil and not contaminated with formwork release oil.

Concrete is to be cured in compliance with BS 8110-1, clause 6.6 and whilst being cured is to be protected from excessive drying, inclement weather, extremes of temperature, vibration, impact and shock.

Full details are to be submitted to allow concreting work to continue in cold weather and the mandatory essential precautions of paragraph 6.71 and the recommendations of paragraph 6.72 in BS: 8110-1 are to be observed.

Where 'fair finished' concrete is required this will be Type 'C' in accordance with BS 8110-1 unless otherwise specified.

Where the finished concrete surface is to be covered up by the permanent works, the surface finish may be left rough.

Granolithic finish is to be applied monolithically, that is within 3 hours of the concrete of the main concrete being placed.

On 'non-slip' finishes the exposed surfaces to be sprinkled with a coarse carborundum powder, at the rate of 0.5 kg/sq m, and the powder lightly trowelled into the green concrete.

9.0 Miscellaneous Minor Concrete Repairs

9.1.5 Material

Concrete Mixes

Type of mix: DESIGNED		D	D	D	D	D	D	D
Grade of Concrete		C7.5	C15	C20	C25	C30	C35	C40
Type of cement	BS No.	12 and 146						
Type of aggregate	Coarse: BS No.	882						
	Fine: BS No.	882						
Nominal aggregate maximum size (mm)		20	20	20	20	20	20	20
Minimum cement content (kg/cu m)		120	180	220	240	275	300	325
Sampling rate (cu m)		100	50	50	50	50	50	50
Temperature of fresh concrete (^{o}C)	**Maximum** 30 Minimum 5							

9.2 Concrete Repairs for Defective Local Areas

9.2.1 Design

Select a suitable repair system, determined by the repair situation
Summary of repair situations: -

- Repairs of spalled areas of concrete due to corroded reinforcement where replacement cover is less than 12mm.
- Repairs of spalled areas of concrete due to corroded reinforcement where replacement cover is more than 12mm.
- Repair of damaged concrete not due to corrosion of reinforcement.

- Repair of cracks by trowel application.
- Protective non-elastomeric surface sealing treatment.
- Protective elastomeric surface treatment.

- Repair of vertical or horizontal concrete surfaces and the filling of minor holes and defects to provide a fair-faced finish where such repairs shall remain exposed following completion of the permanent works. All other repairs may be provided with a rough finish.

9.2.2 Components

Repair system chosen to suit the design criteria.
Mortar selected for a repair in a specific element of a structure having the minimum compressive strength specified in Table 1 shown in Part 5.2.5E of this section.

Gauging liquid, supplied in the recommended quality to formulate the repair material, for each repair system of pre packed materials.

9.2.3 Ancillary Components

Formwork, soundly constructed, rigid & grout tight to comply with BS 8000-2 unless otherwise specified in contract documentation.

9.2.4 Workmanship

Concrete repair material to be mixed and applied strictly in accordance with the manufacturer's instructions ensuring that all recommendations are fully observed. The selected repair system to be used throughout. Remove all dirt, grease and other surface contaminants by grit blasting or high pressure water jetting or a combination of both. Remove any existing deteriorated or inadequate surface coatings and cement laitance. Hand hammer test all concrete areas.
All surface defects including cracks, honeycombing, blowholes etc, to be exposed by abrasive blast cleaning.

All visibly damaged concrete to be mechanically broken out back to a sound alkaline base and to expose the full extent of any corroded reinforcement

Edges of the repair area to be sawn or disc-cut. The minimum depth of cut will be not less than 10mm or as specified by the manufacturer of the chosen repair material, whichever is the greater, unless otherwise instructed.

10.0 Warranties

The Constructor is expected to provide on completion of the Works a “Product and Installation” warranty (i.e. Product + labour) to cover against defect for a minimum period of at least 20 years from the date of Practical. The System must in addition have an expected life span of at least 30 years. The Constructor must specify in his tender any special maintenance requirements the client is expected to perform in order for the System to achieve a life of at least 30 years without replacement or repair (other than that caused by excessive physical misuse or vandalism).