

Section F – CONCRETE WORK

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Section F – CONCRETE WORK

F.0 **Compliance with Materials and Workmanship with the Building Regulations**

In order to demonstrate conformity with the Building Regulations (Part D; Materials and workmanship), and with the Construction Products regulation (regulation (EU) No.305/2011) as set out in national rules for Ireland (S.I. No.225 of 2013), the Contractor shall provide proof (a Declaration of Performance (DoP)) and (where applicable) A CE marking for all building products to be placed in the works.

The Contractor shall ensure that the product to be incorporated in the works, while complying with CPR, is fit for the use for which it is required to demonstrate this means of manufacturer's confirmation, or independent testing certificate.

GENERALLY

F.1 **Concrete Generally**

All concrete shall be ready mixed concrete unless otherwise approved, in which case a supplementary specification will be issued. The Contractor shall ensure that the ready mixed concrete supplier is provided with copies of Clauses F1 to F13 and F26 to F28.

F.2 **Dimensions**

Figured dimensions on detailed drawings of reinforced concrete indicate measurements to actual concrete faces and do not include for any plaster or other finish which will be additional to such dimensions.

F.3 to F.4 **Nil**

MATERIALS

F.5 **Portland Cement**

All Portland Cement used in the construction of the works shall comply with the requirements of IS EN 197-1:2011 and IS EN 197-2:2014. Manufacturers of the cement shall be licensed under the Irish Standard Mark Licensing Scheme of the N.S.A.I.

Suppliers of cement, concrete, concrete products and other cement-based products shall certify that the cement used in these products complies in all respects with the above provisions. Copies of this certificate shall be submitted to the Architect with the first delivery and thereafter on request.

Both the Standard Mark and information prescribed under the licensing scheme shall be inscribed on each bag of cement or in the case of bulk cement accompanying the delivery documentation of each delivery.

F.6 **Aggregates**

All fine aggregate (sand) and coarse aggregate shall be well washed and graded and shall conform to IS EN 12620:2013.

Pit run material will not be permitted to be used for reinforced concrete work.

Marine aggregates shall not be permitted.

Aggregates for exposed concrete shall be free from all impurities likely to cause discoloration.

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F.7 **Mixing Water**

Mixing water shall be from the municipal supply only and comply with IS EN 1008:2002.

No water shall be added after mixing.

F.8 **Admixtures**

No admixtures or cement replacement materials shall be used unless approved or instructed by the Architect in writing. Any admixture shall comply with IS EN 934-2:2009 (+A1: 2012).

Permission will not be given for the use of admixtures containing calcium chloride.

F.9 **Curing Compounds**

Curing compounds shall be a spray applied liquid membrane complying with Clause 1027 of "Specification for Road Works: " NRA. (Sika Antisol 90, or equivalent).

F.10 to F.11 **Nil**

F.12 **Readymixed Concrete generally**

Readymixed concrete, in all respects, including mixing, transporting and delivery, shall comply with the requirements of IS EN 1996-1-1: 2005 (+A1:2012) and IS EN 206-1:2002 as Designed mixes. Composition of the mixes shall conform to Clause F.13 except when otherwise approved or instructed by the Architect in writing.

Concrete shall be obtained from a depot approved by the Architect who may visit it at any time to assure himself that the provisions of this Specification are complied with. The Contractor shall make written application to the Architect stating the name of the supplier and the address of the particular depot. Written approval must be obtained prior to the commencement of concreting. Such approval will be in respect of one depot only and supplies shall not be obtained from any depot other than that approved without the written consent of the Architect.

Concrete for exposed work shall be of uniform colour and texture consistent with the appropriate approved sample and the Contractor shall inform the supplier whenever any batch is required for such work. The appropriate Mix Designation, as shown in Clause F.13 shall, without exception, be quoted in all documentation relating to the concrete specified in this Contract. Delivery tickets in accordance with IS EN 206-1: 2002 shall be provided by the supplier for each batch. In addition to the requirements of IS EN 206-1: 2002, each ticket shall state the actual cement content of the batch. The Contractor shall retain all delivery tickets until the end of the Defects Liability Period.

F.13 **Concrete mixes**

Unless otherwise specified the concrete mixes in the various sections of the works shall be designed mixes in accordance with IS EN 1996-1-1:2005 (+A1:2012) and IS EN 206-1:2002 as set out in Table A below. General locations of the mixes are indicated in Table B.

The characteristic strengths shown in the Tables are to be regarded as absolute minimal. In the event of any portion of the structures giving characteristic strength tests less than the stated minima, the Architect may require the Contractor to carry out a loading test in the manner outlined in BS EN 1992-1-1:2005 and should such a test prove unsatisfactory the Contractor will be required to take down the defective structure and replace it at his own expense. Whether or not the loading test is satisfactory the cost of such test is to be borne by the Contractor.

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TABLE A - DESIGNED MIXES				
Mix Designation	F-40	F-30	F-20	F-7.5 Lean Mix
Cement Type	OPC	OPC	OPC	OPC
Characteristic Strength (N/mm ²)	40	30	20	7.5
Aggregate Size	20mm	20mm	20mm	20mm
Minimum Cement Content (kg/m)	350	300	220	100
Slump (± 25mm)	5m	50mm	50mm	50mm

TABLE B - LOCATION OF CONCRETE MIXES	
Mix Designation	Location
F-40	Slabs to Caravan Bays (Halting Sites Only) Retaining Walls Kerbs and Channel Blocks
F-30	Foundations to walls. Floor slabs. R.C. Ring Beams and Columns Concrete Padstones.
F-20	Paving to perimeter of dwellings. Driveways, Public Footpaths, Bases to fence posts, railings, bollards, barriers etc, Benching, haunching and surrounds to drains, pipes, ducts, and covers to manholes.
F-7.5	Lean mix for filling and making up formation levels. Cavity wall fill

F.14
to
F.15

Nil

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F.16 Reinforcement

Reinforcement shall comply with the following standards:-

- | | | |
|------|---------------------------|--------------------------|
| i. | Mild Steel | - BS 4449:2005 +A2: 2009 |
| ii. | Cold Worked deformed bars | - BS 4449:2005 +A2: 2009 |
| iii. | Steel fabric | - BS 4483:2005 |

All reinforcement shall be stored by type, size and length either off the ground on properly constructed racks or on clean surfaced areas. All reinforcement is to be certified by an independent third party as complying with BS 4449:2005+A2: 2009, i.e. CARES or equivalent third party certification body for reinforcing steel.

F.17 Expansion Joint Filler

Expansion joint filler shall be bitumen impregnated fibre board ("Flexcell" or equivalent) 13mm thick unless otherwise shown on drawings.

F.18 Nil

F.19 Precast concrete window cills

Precast concrete window cills shall be of approved manufacture to the dimensions shown on the drawings and complying with IS 89-1:1981 in respect of materials and workmanship.

Aggregates used shall be free from pyrite or other impurity. Contractors may be required to obtain and provide proof of testing of aggregates for pyrite content.

F.20 Prestressed concrete lintols

Precast prestressed concrete lintols shall comply with IS EN 845-2:2013 (+NA:2013).

Aggregates used shall be free from pyrite or other impurity. Contractors may be required to obtain and provide proof of testing of aggregates for pyrite content.

F.21 Precast concrete door cills

Precast concrete door cills shall be of approved manufacture to the dimensions shown on the drawings. Reinforcement shall be 4 No. 6mm dia. M.S. Bars and materials and workmanship shall generally be in accordance with I.S. 89-1:1981.

F.22 Precast concrete chimney cappings

Precast concrete chimney cappings shall be to the sizes shown on the drawings. Reinforcement shall be a minimum of 2 No. 8mm M.S. bars all round.

F.23 to F.25 Nil

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TESTING

F.26 Testing Generally

Testing shall be carried out in accordance with IS EN 206-1:2002 and the provisions of Clause B33, B34 and B35.

Sampling and testing of concrete shall be in as set out in Clauses F.27 and F.28 or as otherwise specified by the Architect. Where there is no appropriate provision in the relevant “Standards” the methods to be used shall be agreed prior to carrying out the work.

The Contractor shall supply all necessary apparatus for testing of concrete in the field.

F.27 Slump Tests to Concrete

A slump test shall be taken on each delivery of concrete and results recorded.

The slump tests shall be carried out in accordance with IS EN 12350-1:2009,

IS EN 12350-2:2009 and IS EN 12350-4:2009. A load from which the result of a slump test exceeds the appropriate permitted tolerance shall be adjudged not to be in accordance with this Specification.

F.28 Cube Tests to Concrete

The Contractor shall make a set of three 150mm test cubes, from a sample taken from a single batch from each 21 cubic metres of concrete, of each designed mix, or from each days supply if less than this, or at a greater frequency if directed by the Architect.

All tests shall be conducted in the presence of the Job’s Architect or Clerk of Works.

The cubes shall comply with IS EN 12390-1:2012 and shall be made, stored and cured in a curing tank in accordance with IS EN 12390-2:2009. Cubes shall be properly identified and delivered to an approved test laboratory, as Clause B.34, for testing in accordance with IS EN 12390-3:2009(+COR:2011), IS EN 12390-6:2009 and IS EN 12390-7:2009.

For every sample and test a record shall be kept on site including the part or parts of the structure represented.

Single cubes from each set, as described above, shall be tested for compressive strength at 7 days, and the remaining two at 28 days, unless otherwise instructed by the Architect.

In the absence of more accurate data, the values obtained from 7-day cubes may be compared with the required values by conversion into equivalent 28-day values by incrementing by one third (or such other factor as decided by the Architect).

Each result shall be judged for compliance against the characteristic strength given in Tables A & B.

As a consequence of non-compliance, the Contractor shall bear the costs of any further testing required to establish the acceptability of the concrete in the works. The result obtained from a 7 day cube shall not of itself constitute a proof of non-compliance, or of compliance.

F.29
to
F.30

Nil

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WORKMANSHIP

F.31 Plant and Method

Before the commencement of any work, the Contractor shall submit the following for the Architect's written approval:

- (i) The concreting method including the methods of transporting, placing and compacting.
- (ii) Details of formwork proposals and the methods of achieving surface finishes including fixing of linings together with position of joints.
- (iii) The proposed position and type of every construction joint not already shown on the Architect's drawings.

Such approvals by the Architect shall not be deemed to relieve the Contractor or his obligations to comply with any of the provisions herein.

F.32 Reinforcement

Reinforcement shall be free from all loose mill scale, loose rust, oil, grease or similar defects, immediately before placing the concrete. It shall be bent cold exactly to detail using an approved bending machine. Hooks, bobs, bends, etc., where not specifically detailed are to be in accordance with BS 8666:2005 (+A1:2008). Each bundle of bent bars shall be clearly tagged with the bar list number. Reinforcement shall be placed in the exact position shown on drawings with all intersections securely tied with 1.6mm dia. soft iron tying wire, or tack welded in accordance with BS EN ISO 17660-1:2006 and BS EN ISO 17660-2:2006.

The designated cover (25mm minimum) generally in accordance with BS EN 1992-1-1: 2005 (+COR:2010), shall be maintained by approved purpose made spacers or concrete pads fixed to the reinforcement, the use of pieces of brick, block tile or timber will not be permitted.

No laps or splices in bars shall be made except those detailed on the drawings, without prior approval of the Architect. The size and position of the reinforcing bars or mesh shall be approved by the Architect before concreting commences. The insertion of reinforcement into concrete already placed, the lengthening of bars by welding and the re-bending of incorrectly bent bars will not be permitted. For concrete having exposed surfaces, reinforcement shall be assembled and placed in such a manner as to avoid any damage to formwork faces.

Where reinforced concrete slabs or walls are constructed against tanking care shall be taken in positioning reinforcement to avoid damage to tanking.

F.33 Formwork

Formwork shall be true to line, level, face and profile and be of robust construction adequately framed, braced, strutted, cramped, tied and propped to restrict deformation due to constructional loads to not more than 5mm and to entirely eliminate deformation of the form faces by warping or buckling.

Wire ties will not be permitted. Formwork shall be grout-tight under all conditions including vibration when specified or used. Formwork shall be designed to allow prefabrication of conveniently sized elements to facilitate ease of handling and assembly, to permit striking without force, shock or any damage whatever to the concrete member or formwork face and to permit the removal of sides without disturbing soffits and without disturbing necessary props.

Propping shall be carried down to an approved bearing, shall not be supported by timber floors and shall be so arranged that formwork may be lowered smoothly.

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Re-propping will not be permitted. Provision shall be made for cleaning out and draining. Formwork shall be constructed of material or lined with material as may be necessary to produce a satisfactory surface to receive applied finishes as indicated or to achieve the finishes specified in Clause F.46 and in such a manner as to eliminate screw or nail head imperfections. Before each use, form faces shall be treated with the minimum amount of an approved mould oil necessary to obtain a clean release. The use of cement retarders will not be permitted. Immediately prior to concreting, formwork shall be thoroughly cleaned out and re-checked.

No placing shall commence until the Clerk of Works has inspected the formwork and given his consent for concreting to proceed, but such consent shall not relieve the Contractor of his responsibility for its sufficiency. After striking, formwork shall be cleaned, stacked and protected and, before re-use, shall be serviced, made good or replaced with new as may be necessary to maintain the finish and standard specified.

F.34 **Nil**

F.35 **Tolerances**

The maximum tolerances within which concrete work shall be constructed are as follows:-

- | | | |
|----|--|--------|
| 1. | All setting out dimensions | + 6mm |
| 2. | Sections of concrete members | + 3mm |
| 3. | Surface level of floor slabs | + 6mm |
| 4. | Plumb of columns and walls in storey height | + 6mm |
| 5. | Plumb of columns and walls in full building height | + 20mm |

Any rectification of work not constructed within the tolerance set out above, shall be entirely at the responsibility and expense of the Contractor.

F.36 **Concreting in Cold Weather**

Concrete shall not be placed on or against frozen ground or frost covered formwork. Placing of concrete at air temperature below 3° will not be permitted unless the Contractor first obtains the Architect's written approval of detailed proposals for sufficient heating and shielding to ensure a minimum temperature of 4° in the concrete when placed and thereafter to maintain a temperature in the concrete of not less than 3° until thoroughly hardened.

Guidance on suitable precautions may be found on the Concrete Society website www.concrete.org.uk.

All concrete damaged by frost shall be removed and replaced by the Contractor at his own expense. A continuous daily record of the maximum and minimum air temperature shall be maintained in an approved manner on site.

F.37 **Placing and compaction**

The concrete shall be placed and compacted in its final position within 2 hours of mixing, The time of mixing shall be recorded on the delivery note for each load.

When the concrete is delivered, the complete batch shall be discharged in one operation and the concrete so discharged shall not be modified by the addition of further water or in any other manner.

No traffic whatsoever, wheeled or foot, shall take place over reinforcement or placed concrete and the Contractor shall provide all necessary stools, walkways, platforms and barrow runs.

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Concrete shall be placed in this final position as rapidly as practicable by methods which preclude segregation or loss of ingredients; compaction shall be completed before initial set commences. Partially set concrete shall not be re-worked or used. "Flowing" in formwork shall be avoided by placing and compacting in shallow layers in quick succession. All concrete shall be deposited as near to its final position as practicable to avoid rehandling. No concrete shall be dropped a distance of more than 2 metres.

Concrete shall be thoroughly compacted and carefully worked, with suitable tools, into formwork and round reinforcement and fixtures so as to avoid displacement. A competent steel fixer shall attend throughout to correct any unavoidable displacement.

Where compaction is by means of vibrators, these shall be of an approved pattern of the immersion type. Accidental contact with reinforcement shall be avoided. Vibration shall be executed by a competent operative and shall not be carried out to the detriment of adjacent partly hardened concrete.

No surplus water shall be visible on the surface of concrete on completion of compaction.

Foundations shall be placed in their full depth in one operation and the top surface carefully levelled. The greatest care shall be taken when depositing concrete in foundations to ensure that it is rammed closely against the face of the trenches in order that there is no subsequent settlement or disturbance to the ground.

Concrete placed in timbered excavations shall be well rammed close against the excavation face as the timber is withdrawn. Where this cannot be done, the runners or poling boards must be left in and not subsequently removed.

All concreting shall be continuous to completion or to an approved construction joint.

All defective concrete caused by bad placement, compaction or defective formwork shall be removed and replaced, as directed by the Architect, at the Contractors expense.

F.38 **Construction Joints**

All construction joints shall be straight, truly vertical or level as the case may be, of the profile shown and formed in the exact positions shown on drawings or previously approved. Vertical joints shall be formed against adequately secured rigid stop boards, designed to pass the continuous steel reinforcement without temporary binding or displacement. An adequate and acceptable key for succeeding work shall be formed.

As early as possible on the day after casting, stop boards shall be removed and the joint faces vigorously wire brushed and washed to remove laitance and expose the coarse aggregate. Similar exposure of horizontal joint faces shall be effected an hour after placing carefully using a soft brush and water.

Immediately before placing adjacent concrete, the joint face shall be dry brushed or pressure blown thoroughly clean, wetted and treated with a thin layer of freshly mixed mortar similar in all respects to that present in the concrete to be placed. For exposed finishes, care shall be exercised to preserve an unbroken line at the exposed edge of the joint. Any necessary construction joints in mass concrete strip foundations shall be halved and lapped with a projection equivalent to half the depth.

Construction joints shall also be arranged to minimise the effect of shrinkage.

F.39 **Nil**

F.40 **Striking times and loading of foundations etc.**

It shall be the Contractor's responsibility that no distortion, damage, overloading or undue deflection is caused to the structure by the striking of formwork by the Architect reserves the right to delay the

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time of striking in the interest of the work. Formwork shall not be struck until the concrete has sufficiently hardened. The following striking times given in days (24 hours) are the absolute minimum that will be permitted for the following average air temperatures:-

Type of Formwork	Minimum Period Before Striking		
	Temperature		
	3°C	7°C	16°C
Walls, columns, Beams and Slab Sides	4	2	1
Slab Soffits	8	6	4
Beams Soffits	18	14	9
Slab Props	19	15	10
Beam Props	28	21	16
The number of days during which the temperature is at freezing point or below shall be added to the times given			
Times for intermediate air temperatures may be interpolated, pro rata.			

Notwithstanding the provisions made for striking times and curing of concrete no construction work or loading of foundations and other concrete elements (i.e. slabs, beams etc.) shall take place less than 48 hours after placing of the concrete or as may otherwise be determined by the Architect.

F.41 Curing

Both before and after striking formwork all concrete shall be prevented from drying out for seven days by, unless otherwise directed by the Architect, application of a liquid membrane curing compound as Clause F.9 used in accordance with the manufacturers instructions.

Curing compounds shall not be used where the concrete is to receive a screed or other finish.

Where formwork does not allow for the use of curing compounds or when directed by the Architect not to use them one of the following methods shall be used:

- (i) Covering with a layer of sacking canvas, hessian or similar absorbent material and kept constantly wet.
- (ii) Covering with polythene sheeting, the concrete first being thoroughly wetted.

Any other method approved by the Architect.

The Contractor shall employ workmen in addition to watchmen during weekends and holidays to ensure that the above conditions are complied with.

F.42 Damage from Disturbance etc

The Contractor shall be responsible for preventing damage to all in-situ and precast concrete work from disturbance, shock vibration, premature loading or overloading.

F.43 Holes, Chases and Casting In

No holes or chases shall be cut in concrete work without the prior written approval of the Architect. The Contractor shall ensure that all necessary holes and chases, including fixing holes for railings and balustrades, etc., are carefully formed in the correct positions by requisite measures prior to the placing of concrete. Conduits, pipes and special fixings shall be concreted in where required and the

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exact positions demanded. It shall be the Contractor's responsibility to ensure full co-ordination with sub-contractors in the setting out for this purpose.

F.44
to
F.45

Nil

F.46

Surface Finishes

Samples - Before the execution of any specified finish, the Contractor shall prepare 1.25 m square samples for the Architect's approval, using the methods agreed by the Architect for the actual work. No concreting in any finish shall be attempted until the approval of a sample. Approved samples shall be retained till the completion of all such work and closely adhered to throughout the work. Any subsequent change of mix for work where a sample panel has been prepared shall ensure that colour and texture is consistent with the approved sample. Rejected samples shall be demolished and removed. Any deviations from the approved sample shall be reported for inspection by the Architect, who will direct as to whether the work in question shall be rectified or entirely renewed. Such directions shall be executed forthwith.

Fair-faced surfaces shall be free from honeycombing, stains, fins, lippings, nail holes or excessive air holes and shall be of uniform colour and texture. Form markings, if evident, shall be controlled and regular.

Smooth-faced surfaces shall be obtained with suitable, smooth impervious form linings, free from all surface defects. The resulting surface shall be entirely free from honeycombing, stains, fins, lippings, lining joint marks, nail and screw marks, raised grain marks, air holes or any other imperfections and shall be of uniform colour, tone and surface texture.

External rendered surfaces. All external surfaces to receive rendering, cement backings or plasterwork shall be keyed by lining the formwork with grooved rubber mats to produce an adequate mechanical key.

Trowel finish - After compaction to finished levels the concrete shall be wood floated and lightly steel trowelled to a smooth even face free from honeycombing, air holes or other imperfections.

Power Float Finish After compaction and at initial set power float the concrete to a smooth even face free from honeycombing, air holes or other imperfections. Then polish to a glazed surface free of blade marks.

SCHEDULE OF CONCRETE FINISHES	
FINISH	LOCATION
Fair Faced	i. Risers to external steps. ii. Kerbs.
Smooth-faced	NIL
Trowel Finish	i. Treads of external steps (edges to be bull nosed).
Power Float	i. Floors to houses.

F.47

Damp Proof Membranes

Lay polythene sheet D.P.M's under ground floor slabs where shown on drawings and in accordance with Clause G52.

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F.48 **Radon Barriers**

Supply and lay radon barriers or combined DPM/ radon barriers where shown on the drawings and in accordance with Clauses G/ R/ 1 to G/ R/15.

F.49
to
F.50

Nil

CONCRETE PAVINGS AND HARDSTANDINGS

F.51 **Generally**

The foregoing clauses where applicable shall apply also to this sub-section except as varied hereunder. For construction of roadways see separate specification.

F.52 **Services**

Before any foundation work to the footpaths and other external paving drains, sewers, cable ducts or other special formation work shall be completed.

Public Authorities such as gas, electricity, telephone, water etc. will be informed by the Council of their intention to construct the works and will be supplied with drawings of proposed works. This will not in any way relieve the Contractors of their responsibility for giving due notice to the aforementioned Authorities and for ensuring that all the cable ducts, pipe crossings etc. are completed.

If, through neglect on the part of the Contractor, additional work of any kind is necessary in the provision of works below formation level, the cost of this additional work will be borne by the Contractor.

The Contractor shall take every precaution and bear every expense necessary to preserve from damage and leave in working condition all surface fittings of waterworks, drainage, or other undertaking. All such fittings shall be left in clean, usable condition.

F.53 **Levels and Alignment**

All levels and alignments of paths and paving shall be carefully set out and frequently checked. All care shall be taken to ensure that the correct cross sections are maintained The finished face of footpaths shall be formed so as to provide adequate fall to, satisfactory run off to surface water outlets, gullies etc.

The horizontal alignment of kerbs shall be smooth and unbroken. Curved sections shall accurately represent the curves shown on drawings and shall be so constructed that width of channel is constant.

F.54 **Concrete Bays**

Where concrete pavings are laid in bays, the bays shall be laid "hit and miss" fashion and the adjoining bays shall not be laid until the previous work is sufficiently mature.

Where construction joints are now shown in the contract the Contractor shall submit for approval proposals for the layout of construction joints before concreting is started

F.55 **Surface Finishes to Pavings**

The concrete shall be fully compacted and brought to finished levels and a dense surface with a tamping beam having a 75mm wide steel shod foot and weighing not less than 10 kg per m.sq. Where shown as being reinforced the concrete shall first be placed, compacted and levelled 50mm

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below finished levels, the reinforcement mesh placed with 150mm laps and the remaining concrete placed, compacted and levelled as before.

Tamped finish - After compaction to finished levels, concrete so shown shall be lightly tamped with a light beam having a 19mm wide foot to give regular, parallel and equally spaced shallow markings.

Brushed finish - After compaction to finished levels, concrete so shown shall be wood floated and lightly steel trowelled to a smooth face and lightly dragged with a soft broom in parallel strokes at right angles to the length of the work.

Trowel finish - After compaction to finished levels, concrete so shown shall be wood floated and lightly steel trowelled to a smooth even surface.

SCHEDULE OF CONCRETE FINISHES TO PAVINGS	
FINISH	LOCATION
Tamped	i. Hardstandings to caravans
	ii. Skip Areas
Brushed	i. Footpaths
	ii. Aprons to meter rooms etc.
	iii. Paths and Driveways to Houses
Trowel	i. Tops of Kerbs (with bull nosed edge)

All edges to concrete including either side of joints are to be finished smooth with a bullnose trowel.

F.56 **Nil**

F.57 **Expansion Joints in Concrete Hardstandings**

Expansion joints between bays of hardstandings and between perimeter of hardstandings and walls shall be 13mm wide and shall be formed with impregnated sheet as Clause F.17 extending for the full depth and 10mm above the top of the slab. When directed the joint shall be raked out to a depth of 20mm to remove the fibrous sheet and all dust, stones, etc., and shall be sealed while dry with a hot applied joint sealing compound complying with IS EN 14188-1:2004 used in accordance with the manufacturer's instructions.

F.58 **Movement Joints in Kerbs and Pavings**

Movement joints in kerbs and pavings shall be formed at centres not exceeding 3600mm in either direction.

The joints shall comprise a double thickness of bituminous roofing felt. The jointing material shall be laid straight, set truly vertical at right angles to the kerbing and shall extend the full depth of the concrete. It shall be neatly cut off at surface level and the surface of the concrete shall be carefully finished to the same level on each side of the joints.

F.59 **Curing of in-site Concrete Pavings and Hardstandings**

Protection from adverse weather conditions or other damage, and subsequent curing of concrete pavings shall be commenced as soon as practicable after laying and shall be continued for at least 5 days.

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The initial protection shall be provided by a liquid curing compound in accordance with Clause F9 and used in accordance with the manufacturer's instructions.

F.60 Damage

Any surface damaged by the elements, protective covering, footmarks etc. shall be taken up and replaced by new surfacing at the Contractor's expense.

Appendix A: List of References and Standards. (Part 1)

Item	Clause No.	Reference	Comment
1.	F.5	IS EN 197-1:2011	Cement – Part 1: Composition, specifications and conformity criteria for common cements. (to replace IS EN 197-1:2004)
2.	F.5	IS EN 197-2:2014	Cement – Part 2: Conformity evaluation. (to replace IS EN 197-2:2001)
3.	F.6	IS EN 12620:2013	Aggregates for concrete.
4.	F.7	IS EN 1008:2002	Mixing water for concrete – Specification for assessing the suitability of water, including water recovered from processes in the concrete industry, As mixing water for concrete.
5.	F.8	IS EN 934-2:2009	Admixtures for concrete, mortar and grout – Part 2: concrete admixtures – Definitions, Requirements, Conformity, Marking and labeling.
6.	F.9	'Specification for Road Works; road pavements – concrete materials' www.nra.ie	Clause 1027: Curing (to replace clause 1022 of the same document.)
7.	F.12	IS EN 1996-1-1:2005(+A1:2012)	Eurocode 6: Design of Masonry structures – Part 1-1: General rules for reinforced and unreinforced masonry structures (to replace IS 326:2004)
8.	F.12	IS EN 206-1:2002	Concrete – Part 1: Specification, Performance, Production and Conformity (including Irish National Annex)
9.	F.13	IS EN 1992-1-1:2005(+COR 2010)	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings (including Irish National Annex)
10.	F.16	BS 4449:2005(+A2:2009)	Steel for the reinforcement of concrete. Weldable

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			reinforcing steel. Bar, coil and decoiled products. Specification.
11.	F.16	BS 4483:2005	Steel fabric for the reinforcement of concrete. Specification.
12.	F.19	IS 89:1981	Window cills.
13.	F.20	IS EN 845-2:2013(+NA:2013)	Specification for ancillary components for masonry – Part 2: Lintels (including Irish National Annex)

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Appendix A: List of References and Standards, continued... (Part 2)

Item	Clause No.	Reference	Comment
14.	F.27	IS EN 12350-1:2009	Testing Fresh Concrete – Part 1: Sampling.
		IS EN 12350-2:2009	Testing Fresh Concrete – Part 2: Slump test.
		IS EN 12350-4:2009	Testing Fresh Concrete – Part 4: Degree of compactability.
15.	F.28	IS EN 12390-1:2012	Testing Hardened Concrete – Part 1: Shape, Dimension and other requirements for specimens and moulds. (to replace IS EN 12390-1:2000)
		IS EN 12390-2:2009	Testing Hardened Concrete – Part 2: Making and curing specimens for strength tests.
		IS EN 12390-3:2009 (+COR 2011)	Testing Hardened Concrete – Part 3: Compressive strength of test specimens.
		IS EN 12390-6:2009	Testing Hardened Concrete – Part 6: tensile strength of test specimens.
		IS EN 12390-7:2009	Testing Hardened Concrete – Part 7: Density of hardened concrete. (to replace IS EN 12390-7:2009)
16.	F.32	BS 8666:2005	Scheduling, Dimensioning, Bending and cutting of steel reinforcement for concrete – Specification (incorporating Amendment No.1)
17.	F32.	BS EN ISO 17660-1:2006	Welding – Welding of reinforcing steel – Part 1: load-bearing welded joints.
		BS EN ISO 17660-2:2006	Welding – Welding of reinforcing steel – Part2: Non Load-bearing welded joints.
18.	F32	IS EN 1992-1-1:2005(+COR:2010)	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings (including Irish National Annex)
19.	F.36	www.concrete.org.uk	Guidance on concrete work in cold weather.
			Replaces references to “Winter concreting” (Cement and Concrete Association) and “Winter Building” (HMSO) – no longer easily available.
20.	F.57	IS EN 14188-1:2004	Joint fillers and sealants – Part 1: Specification for hot applied sealants.

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Appendix B: Amendments List	
Date of Amendments	Amendments
1/05/2014	This section was amended by Barry Sheils and approved by David Byrne, Senior Architect, Fingal County Council.
24/06/2014	F 19, F20 – Aggregates for concrete lintols and cills to be free from pyrite. Contractors may be asked for confirmation. David Byrene, Senior Architect.