Inspection & Test Plan - Bonded Anchors (100 Year Design Life)

Document No.:	1145-C200-FUL-QAC-ITP-0019	**Revision:**	00
Specification:	680 - Bonded Anchors, November 2018	**Date:**	28/05/2024
Other Referenced Documentation:	BTN 006, Code of Practice: Bonded Anchors, January 2021		

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				Method	Frequency	Category				
1	**Preliminaries - Materials**									
1.1	Bonded Anchor System - Chemical Adhesive	IFC Drawings 680.05 (a) 680.05 (b) (i - vi)	Bonded anchor systems shall be certified in accordance with a third party materials accreditation scheme shown below: i. ATIC SPEC 38 ii. EOTA EAD 330499-00 or 01-0601 iii. ICC-ES (USA) Enter: Teambinder Material Approval number [free text box]	Document Review	Once, per product, prior to commencement of Works	WP	Superintendent	This ITP		
1.2	Bonded Anchor System - Reinforcement	IFC Drawings 680.05 (c) 611.05 (a)	Where applicable, current ACRS certification for materials and for bar processing. Anchor bars need to remain uncoated (black) for durability purposes in fatigue loading. Note: Galvanised steel dowels are only to be used where maximum design life is 25 years and only permanently dry conditions. Note: ACRS certificate may cover both aspects or be for each separate portion (e.g 1 for the material supplier and another for the bar processor (bending, cropping and delivery) Enter: Teambinder Material Approval number [free text box]	Document Review	Where applicable, once for each supplier, 14 days of award of contract	WP	Superintendent	This ITP		
1.3	Bonded Anchor System - Stainless Steel Anchors	IFC Drawings 680.05 (c)	Where applicable, stainless steel grades 1.4401, 1.4404, 1.4362 and 1.4571 (marking A4) may not be used in conditions where the component is either permanently inundated in seawater or in the splash zone. Stainless steel grades 1.4529 (marking C) may be used in conditions where the component is either permanently inundated in seawater or in the splash zone. Enter: Teambinder Material Approval number [free text box]	Document Review	Where applicable, once, prior to commencement of Works	WP	Superintendent	This ITP		

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1	**Preliminaries - Materials (Continued)**									
1.4	Bonded Anchor System - Proprietary Threaded Anchor Rods & Metallic Bolts	IFC Drawings 680.05 (c)	Where applicable, bonded anchor systems shall be certified in accordance with a third party materials accreditation scheme shown below: i. ATIC SPEC 38 ii. EOTA EAD 330499-00 or 01-0601 iii. ICC-ES (USA) Enter: Teambinder Material Approval Number [free text box]	Document Review	Where applicable, once, prior to commencement of Works	WP	Superintendent	This ITP		
1.5	Ultimate Load Testing (for Alternate Product or Changes to Existing Product)	680.05 (a) 680.09 (b)	Where applicable, if an alternative system is proposed, where a bonded anchor system falls outside the scope of certification or where directed by the Superintendent, Ultimate Load Testing shall be performed to validate the bonded anchor system meets or exceeds the intended durability and load capacities. A sample of **5 no.** anchors per combination of adhesive type, anchor orientation, type, grade, diameter and concrete grade shall be installed in accordance with the manufacturer's installation instructions, load tested and results reported by a third-party accredited testing authority. Refer to section 5.2 if the Ultimate Load Test fails. Results of the Ultimate Load Testing to be submitted to the Superintendent. Enter: Teambinder Approval number [free text box]		Where applicable, 2 weeks prior to installation of anchors	HP	Superintendent	ConQA Hold Point Release		

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2	**Preliminaries - Documentation & Procedures**									
2.1	Design of Bonded Anchors Subject to Tensile Forces	680.04 BTN 006, Clause 2.6	If bonded anchors are proposed to be used in full or partial tension, submit full details of the proposal, including a Proof Engineering Certificate of Compliance, for the approval of the Superintendent. The Design Engineer must be a member of Engineers Australia and have a minimum of 5 years experience in the design and construction of bonded anchors. The Proof Engineer must be independent of the Design Engineer and be pre-qualified to DTP's level PE. Enter: Teambinder Approval number [free text box] or Attach: PE Certificate of Compliance	Document Review	Where applicable, 2 weeks prior to installation of anchors	HP	Superintendent	ConQA Hold Point Release		
2.2	Bonded Anchor Work Method Statement	680.11 680.07	Bonded anchor WMS, detailing the method for locating reinforcement/tendons/services, equipment to be used, load testing regime and repair of concrete (spalled and cracking) to be submitted for review to the Superintendent. Enter: Teambinder Approval number [free text box]	Document Review	Once, prior to trial installation	HP	Superintendent	ConQA Hold Point Release		
2.3	Load Testing Work Method Statement	680.09 (a)	Load Testing WMS, detailing the target loads (1.5x or 2x the design loads), load increments, duration for the load to be stained at each increment, testing frequency, measures if fail occurs and equipment to be used. Additional testing equipment requirements: i. capable of measuring the applied force to an accuracy of ±2% ii. capable of measuring the elongation with an accuracy of ±0.02 mm iii. have a valid calibration certificate The above is to be submitted for review to the Superintendent. Enter: Teambinder Approval number [free text box]	Document Review	Once, 1 week prior to prior testing	HP	Superintendent	ConQA Hold Point Release		

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2	**Preliminaries - Documentation & Procedures (Continued)**									
2.4	Competency & Training of Personnel	680.06	All bonded anchor installation crews and direct supervisory personnel shall either be: i. listed on the "AEFAC Certified List of Installers"; or ii. trained by the Supplier of the bonded anchor system. Evidence of either is to be submitted to the Superintendent. The bonded anchor tester shall be experienced in testing bonded anchors and test reporting. Enter: Teambinder Approval number [free text box]	Document Review	Once, prior to commencement of Works	WP	Superintendent	This ITP		
3	**Pre-installation Activities**									
3.1	Installation Equipment	680.07 Manufacturer's Installation Instructions	Bonded anchors shall be installed using the equipment specified by the bonded anchor system's installation instructions. This includes drill bits / dustless drill bits, diamond cores, roughening tools, cleaning brushes, mixing nozzles, piston plugs and extensions.	Visual	Each discrete population	IP				
3.2	Setting Out	680.08 (a) Bonded Anchors Work Procedure	Locations of bonded anchor holes shall be positioned at the design spacings and angles using a calibrated covermeter or ground penetrating radar (GPR) to ensure that no damage occurs to reinforcement, pre-stressing strand, ducting and embedded services. Where clashes are detected, adjust the anchor location if able to maintain the maximum and minimum spacings, edge distance and cover requirements. If unable to maintain these parameters, consult the Designer Engineer via the RFI process to provide updated locations. Note: The marked out locations shall be traceable to determine a discrete population of anchors and installed by the same work crew.	Measure Visual	Each anchor	IP	Surveyor SE/PE/SPE	This ITP		

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4	**Installation Activities**									
4.1	Hole Drilling/Coring	680.08 (a) & (b) Manufacturer's Installation Instructions	Holes shall be drilled or cored in the orientations, angles (if not perpendicular to the concrete surface) and depths shown on the IFC drawings. Drill or core diameters shall be those shown in the manufacturer's installation instructions.. Coring may require the internal surface of the hole to be roughened. If reinforcement is encountered during the drilling or coring process, cease drilling immediately and relocate the hole. Refer to section 5.4 for repair of abandoned holes. If reinforcement is damaged, consult the Designer Engineer via the RFI process to provide a clear direction moving forward prior to continuing installation of that discrete population of anchors.	Measure Visual	Each anchor	IP	SE/PE/SPE	This ITP		
4.2	Hole Cleaning	680.08 (a) & (b) Manufacturer's Installation Instructions	Hole cleaning shall commence as soon as practical following the drilling / coring process to remove debris, dust particles and moisture / free-standing water (where required). The process shall follow the manufacturer's installation instructions which is a repetitive sequence of brush cleaning and air flushing, resulting in no dust detected on a finger-tip when in contact with the internal wall of the hole. The minimum hole depth shall be verified before proceeding to the next step. Note: Where hollow-tipped drill bits are used in conjunction with a vacuum drill, cleaning may not be required - consult the manufacturer's installation instructions.	Visual	Each anchor	IP	SE/PE/SPE	This ITP		
4.3	Substrate Temperature	680.08 (b) Manufacturer's Installation Instructions	Bonded anchors shall not be installed where the temperature of the concrete is less than -5°C, or greater than 40°C or outside the limits shown on the manufacturer's installation instructions. Record: The substrate temperatures at the time of commencing the discrete population, the corresponding available working and curing times and the temperature at the completion of installation.	Measure Visual	Each discrete population	IP	SE/PE/SPE	This ITP		

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4	**Installation Activities (Continued)**									
4.4	Anchor Surface Condition	680.08 (b) Manufacturer's Installation Instructions	Anchors shall be clean, free from debris, oil and other contaminants. Note: Any substrate coatings may need to be factored into determining the embedment depth	Visual	Each anchor	IP	SE/PE/SPE	This ITP		
4.5	Adhesive Injection	680.08 (a) & (b) Manufacturer's Installation Instructions	Connect the specific adhesive, cartridge gun and required injection equipment (nozzle, tubes, piston plug and valves) for the task and discharge the initial adhesive to waste to ensure that only fully mixed product will be used in the Works. Note: Repeat the "initial discharge to waste" for each new mixing nozzle used and do not modify the nozzles. Inject the adhesive into the hole, starting from the base working towards the substrate surface at a rate that prevents the creation of air voids, until approximately 2/3 of the hole depth is reached, checked visually prior to the insertion of the anchor.	Measure Visual	Each anchor	IP	SE/PE/SPE	This ITP		
4.6	Anchor Insertion	680.08 (a) & (b) Manufacturer's Installation Instructions	While the adhesive is within the temperature dependent working time, the anchor shall be inserted and verified to the minimum embedment depth with a singular twisting motion, to ensure that the adhesive completely surrounds the anchor. Where required, the anchor shall be centralised within the hole using temporarily supports to provide a uniform film of adhesive around the anchor and Excessive adhesive shall be cleaned from the substrate surface. Loss of adhesive during the working time shall be prevented by sealing around the anchor as required.	Measure Visual	Each anchor	IP	SE/PE/SPE	This ITP		
4.7	Adhesive Curing	680.08 (a) & (b) Manufacturer's Installation Instructions	The anchor shall not be disturbed, moved, loaded or torqued during the specified temperature dependent curing period before proceeding to the next step.	Visual	Each anchor	IP	SE/PE/SPE	This ITP		

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5	**Post-installation Activities**									
5.1	Proof Load Testing	680.09 (c) Load Testing of Bonded Anchors Work Procedure Manufacturer's Installation Instructions	After completion of the curing period, bonded anchors shall be subject to proof load testing, as outlined in the approved Work Procedure for Load Testing of Bonded Anchors. **All (100%)** of anchors **subject to tensile loads,** a **combination** of shear and tensile loads or **fatigue loads,** shall be tested. All other anchors **not subject to tension** shall be tested at the greater number of 2.5% of the lot quantity or 5 no. anchors. Test results shall be equal to or greater than the factored tensile or shear loads and equal to or less than the maximum displacements shown in the Manufacturer's Installation Instructions. If any anchor fails the proof load or is displaced beyond the limits, the entire discrete population shall be tested for compliance. Refer to section 5.2 if the entire discrete population fails. Attach: Proof Load Test Results	Document Review	Each discrete population	IP	SE/PE/SPE	This ITP		
5.2	Failure of Load Testing	680.09 (d) Load Testing of Bonded Anchors Work Procedure	Should an anchor fail an Ultimate Load test, or an entire discrete population fail a Proof Load; rectification proposals must be provided to the Superintendent for assessment prior to any further installation. Enter: Teambinder Approval Number [free text box]	Document Review	Where applicable	HP	Superintendent	ConQA Hold Point Release		

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5.3	Surface Inspection - Cracks	Structural Concrete Crack Repair ITP	No cracks greater than the maximum widths shown below. Exposure classification: A = 0.2mm B1 = 0.2mm B2 = 0.15mm C,U = 0.10mm If cracking beyond the limits of the exposure classification is observed, follow Structural Concrete Crack Repair ITP (Specification 687), for investigation and repair.	Visual Measure	Where applicable, each lot	IP	SE/PE/SPE	This ITP		

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5	**Post-installation Activities (Continued)**									
5.4	Surface Inspection - Abandoned Holes & Post-testing Spalling	IFC Drawings Structural Concrete Patch Repair ITP 610.31 (a) - (n) 610.32	Where holes have been abandoned, follow Structural Concrete Patch Repair ITP (Specification 689) for repair. Where spalling around a tested anchor has occurred, preparation of the repair shall follow the Structural Concrete Patch Repair but the repair may allow for the newly cast concrete to create the cover.	Visual	Where applicable, each lot	IP	SE/PE/SPE	This ITP		
5.5	Non-conformance Report (NCR) Closure	Project Quality Management Plan	Ensure that any NCRs pertaining to the lot / element / Work area that this ITP covers, have been closed.	Document Review	Once, prior to closure of this lot / element / Work area	HP*	SE/PE/SPE	This ITP		
	Final Inspection									

The signature below verifies that this ITP has been completed in accordance with the FH's Quality system Procedures and verifies lot compliance with specifications

Print Name: Position: Signature: Date: / /