

**SINGAPORE CONCRETE INSTITUTE****Precaster Accreditation Scheme: Desk Study Checklist**

Precaster Firm : \_\_\_\_\_  
 Date of Assessment : \_\_\_\_\_  
 Plant Location/Address : \_\_\_\_\_  
 Accreditation Grade Category : **PC1/PC2/PC3**  
 Accreditation Type : **New /Renewal**  
 Product Group(s) : **GS1/GS2/GS3/GC1/GC2/GA/\*PPVC**  
 Lead Auditor/Auditor : \_\_\_\_\_ (Name/Signature)  
 Observer : \_\_\_\_\_ (Name)

S/N	Assessment Area	Requirement			Conformity		Comment/ Observation
					Yes (√)	No (X)	
<b>1.</b>	<b>Management and Facilities</b>	Top management commitment and the effectiveness of QMS. Plan for the availability of resources for the plant and production.					
<b>1.1</b>	<b>Financial</b>	Audited Financial Report; or Final Closing Accounts.					
<b>1.1.1</b>	<b>Min. Paid-up Capital &amp; Net Worth</b>  (to be met separately)	<b>Category</b>	<b>Paid-up Capital (min.)</b>	<b>Net worth</b>			
		PC1	S\$1 M	≥ S\$1 M			
		PC2	S\$250K	≥ S\$250K			
		PC3	S\$50K	≥ S\$50K			
<b>1.2</b>	<b>Human Resource</b>	Competent staff based on appropriate education, training, skills and experience.					
<b>1.2.1</b>	<b>Professional, Supervisory &amp; Technical staff</b>	<b>Category</b>	<b>a) Professional</b>	<b>b) Supervisory</b>	<b>c) Technical</b>		
		PC1	2	3	8		
		PC2	1	2	5		
		PC3	0	2	3		
<b>1.2.2</b>	<b>Training</b>	PC1, PC2					
		a) Training programme & recent training records					
		b) At least one supervisor shall be trained in management and supervision of precast concrete projects in the past 12 months, preferably in the relevant GIP Workshop and Course conducted by BCA Academy					
		c) In-house training of workers in precast concrete production by QA/QC Supervisor or Engineer					
		PC3 : Training records					

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			Yes (v)	No (X)	
1.3	<b>Management Systems</b>	Certification by SAC or UKAS accredited Certification Body.			
1.3.1	<b>Management System</b>	PC1:ISO9001&14001&OHSAS18001 PC2:ISO9001 &OHSAS18001 PC3:ISO 9001  *Either OHSAS 18001 or SS506 or Bizsafe or ISO45001			
1.3.2	<b>Quality Plan</b>	PC1, PC2 & PC3: Project quality plan			
1.4	<b>Plant Facilities</b>	Available land, space & equipment for production & storage.			
1.4.1	<b>Capacity of Plants</b>	a) PC1: Min. Annual concrete vol. output <b>45,000m<sup>3</sup></b> OR min. production floor area <b>15,000m<sup>2</sup></b> PC2: Min. Annual concrete vol. output <b>10,500m<sup>3</sup></b> OR min. production floor area <b>3,500m<sup>2</sup></b> PC3: Min. Annual concrete vol. output <b>4,500m<sup>3</sup></b> OR min. production floor area <b>1,500 m<sup>2</sup></b>			
		b) PC1,PC2,PC3: Monitor & document monthly concrete vol. production output of plant(m <sup>3</sup> )			
1.4.2	<b>i) Equipment</b>	a) PC1,PC2,PC3: Scales & Measuring			
		b) PC1,PC2: Concrete cube compressive test machine PC3: Not required			
		c) PC1: Lifting gears & gantry crane (lifting capacity 10T and 16T or 20T) PC2: Lifting gears & gantry crane (lifting capacity 10T or 16T) PC3: min. 1 no. 5T gantry crane			
		d) PC1,PC2: All types of forms PC3: steel forms			
		e) PC1,PC2 <b>in GS2,GS3&amp;GC1</b> : For Pre-stress: stressing jack, saw machine or auto pre-stress machine PC3: Not required			
	<b>ii) Calibration</b>	PC1, PC2: In load sensors, pressure gauges, moisture meters and data loggers PC3: Not required			
1.4.3	<b>Mechanisation</b>  PC1, PC2 shall have automation and/or any productive machinery	PC1, PC2: In Production, Storage & Packaging e.g. pallet circulation system, robotics, auto concrete spreader, auto-bar bending, vibration table, external vibrator, steel mould forming machines.  PC3: Not required			

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1.4.4	<b>Information Technology(IT)</b>	In communication, documentation and record  PC1: LAN, BIM, Biometric Authentication System (BAS)  PC2: LAN, Internet access  PC3: Internet access			
<b>2.</b>	<b>Track Record &amp; Production Drawings</b>	Maintain completed projects records & their total contract value for at least 3 years and higher grade precaster shall demonstrate drawing capabilities.			
<b>2.1</b>	<b>Track Record</b>	Traceable and creditable track record.			
<b>2.1.1</b>	<b>Min. Contract Value (CV) for past 3 yrs</b>	PC1: CV ≥ S\$30 M PC2: S\$5 M ≤ CV < S\$30 M PC3: CV < S\$5 M			
<b>2.2</b>	<b>Shop drawings</b>	Presented in standard drawing format and have a master drawing list. (For overseas plant or outsourced, Precaster shall maintain a drawing control procedure)			
<b>2.2.1</b>	<b>Drawing staff</b>	PC1 : At least 2 staff trained in drawing and 1 staff is to be BIM-certified  PC2 : At least 1 staff trained in drawing  PC3 : Not required			
<b>2.2.2</b>	<b>Preparation &amp; Control of Shop drawings</b>	PC1: Drawing manual and procedure for control of drawing for production  PC2: Procedure for control of drawing for production  PC3: Not required			
<b>2.2.3</b>	<b>IT Provisions and Equipment</b>	PC1: BIM ready or compatible drawing software in at least 2 nos. desktop computers  PC2: Drawing software (Autocad) in at least 1 desktop computer  PC3: Not required			

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<b>3.</b>	<b>Quality Control In Production</b>	Conformance to standard requirements and performance in quality.			
<b>3.1</b>	<b>Raw Material</b>	Conform to current SS EN standards for material specification and testing.			
<b>3.1.1</b>	<b>Concrete</b>	PC1,PC2,PC3: Approved concrete mix design			
<b>3.1.2</b>	<b>Cement</b>	PC1,PC2,PC3: Maintain cement tests records			
<b>3.1.3</b>	<b>Sand</b>	Approved supplier PC1, PC2: Maintain sieve analysis & gradation records PC3 : Not required			
<b>3.1.4</b>	<b>Aggregate</b>	PC1,PC2: Approved supplier Maintain test records PC3: Not required			
<b>3.1.5</b>	<b>Admixture</b>	PC1, PC2: Maintain admixtures' specifications and tests records PC3: Not required			
<b>3.1.6</b>	<b>Reinforcing Steel Bar</b>	PC1, PC2, PC3: Approved supplier, Maintain mill certificates, heat numbers & tensile test records			
<b>3.1.7</b>	<b>Pre-stressing steel</b>	PC1,PC2 <i><b>in GS2,GS3&amp;GC1</b></i> Approved supplier, Maintain mill certificates, heat numbers & roll numbers records  PC3: Not required			
<b>3.1.8</b>	<b>Miscellaneous Materials</b>  e.g. metal inserts, lifting devices, packers, embedded steel	PC1, PC2: Approved supplier. Maintain test records of lifting devices, records of mill certificates & heat numbers for metal plates, inserts and any galvanising certificates for corrosion protection  PC3: Not required			
<b>3.2</b>	<b>Concrete Mix Supply</b>	In-house RMC batching plant shall be certified to quality standards. (If <b>external</b> RMC batching plant, the quality control records shall be maintained)			
<b>3.2.1</b>	<b>Certification of Batching Plant</b>  For overseas plant, it shall be certified to ISO 9001:2015 and RMC specified to EN206-1:2014	PC1, PC2: In Singapore and(Johor), RMC used for precast components shall be certified by SAC accredited CBs to SS EN 206- 1:2014, SS 544-1:2014, SS 544- 2:2014  PC3: Not required			

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<b>3.2.2</b>	<b>Storage and Handling of Aggregates</b>  If external RMC batching plant, maintain records from the approved supplier	a) PC1, PC2: <b>Sheltered or covered</b> to prevent exposure to weather and separate fine & coarse aggregates  PC3: Not required			
		b) PC1,PC2: Proper separation to prevent inter-mingling PC3: Not required			
		c) PC1,PC2: Maintenance of machinery, equipment & tools PC3: Not required			
<b>3.2.3</b>	<b>Concrete Testing</b>	a) PC1,PC2,PC3: Test by SAC-SINGLAS accredited laboratory or an ILAC-MRA partner			
		b) PC1: In-house laboratory facility have tests procedures and calibration certificates for gauges & sensors of equipment  PC2, PC3: Not required			
		c) PC1,PC2,PC3: Record of Concrete test cubes compressive strength test reports			
<b>3.3</b>	<b>Production</b>	Production planning, scheduling and management.			
<b>3.3.1</b>	<b>Operation Control</b>	PC1,PC2: Documented Quality Plan and QA/QC procedures			
		PC3: According to approved method statement			
<b>3.3.2</b>	<b>Inspection &amp; Test Plan (ITP)</b>	PC1: Documented ITP for Production and ITP for Batching Plant  PC2: Documented ITP for Production  PC3: Maintain test records of concrete, reinforcing steel and other materials or products test records			

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3.4	<b>Product Quality and Tolerance</b>	Documented quality control procedures shall be maintained at the plant.			
3.4.1	<b>Architectural and Concrete Finish</b>	PC1,PC2,PC3: a) No glaring surface defects			
		c) Approved method statements of repairs			
		c) Demonstrate in-process repair to concrete defect			
3.4.2	<b>Product Tolerance</b>  Verify min. 2 samples, either rebar/formwork or finished component	In general, they shall comply to the allowable tolerances:			
		(a) Dimension			
		(b) Alignment, plumb and level			
		(c) Exposed Surface			
		(d) Lifting points/inserts			
		(e) Blockouts			
		(f) Sleeve system/connections			
		(g) Interface requirements			
		(h) Joint rebar/formwork			
		(i) Cast-in-steel items			
(j) Bolted/welded connections					
3.5	<b>Storage, Protection and Delivery</b>	Pre-production planning for storage and delivery. Careful storage & protection to prevent damages. Safety at all times before, during and after delivery.			
3.5.1	<b>Procedures for Storage, Protection &amp; Delivery</b>	PC1, PC2: Documented procedures and implemented			
		PC3: Proper storage and protection required			
3.5.2	<b>Min. Concrete Strength Specified for De-moulding &amp; Lifting</b>	a) PC1, PC2, PC3:  For de-moulding, concrete test cubes compressive strength results shall determine if the minimum strength is achieved			
		b) PC1, PC2: Monitor 1, 3, 7 and 28 days concrete strength test results			
		PC3: Monitor 28 days concrete strength test results			

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3.5.3	Final Inspection & Acceptance of Precast Concrete Products	PC1,PC2, PC3: a) Records of post pour inspection by QA/QC supervisor or client's representative.  b) Records of the delivery order of the completed components approved for release by a responsible person			
3.6	(For group *PPVC only) In process trial assembly of PPVC modules	3.6.1 Method statement (MS) for assembly of PPVC modules			
		3.6.2 Demonstrate the in-process assembly and the QC checks			

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4	Product Range	Product(s) Identification and Product Group(s) Verification.	
4.1	Description of Product Group	Tick(✓) group	Briefly state the plant's main products
GS1	<b>Precast Concrete Products (No Prestressed Reinforcement):</b> Conventionally reinforced precast concrete elements, including piles, sheet panels, pile caps, retaining wall elements, planks, floor and roof slabs, joists, stairs, seating members, columns, beams, walls, spandrels, roof water tanks, household shelters, prefabricated bathroom units, PPVC shell and similar products.		
GS2	<b>Pre-stressed Repetitively Produced Products:</b> Precast concrete products that pre-stressed with <i>straight</i> , pre-tensioning, or post-tensioning strands. Included are hollow-core slabs, spun piles, other floor, roof and wall construction, that maybe wet cast, machine cast, extruded, or slip formed. Other products include, flat slabs, wall panels, planks and <i>all products in GS1</i> .		
GS3	<b>Pre-stressed Structural Products:</b> Precast concrete structural members that are pre-stressed with <i>deflected</i> , pre-tensioning, or post-tensioning strands. Included are stemmed members for roofs, floors, and walls, as well as beams, columns, spandrels, joists, seating members and <i>all products in GS1 and GS2</i> .		
GC1	<b>Bridge, Railway and Roadwork Structural Products:</b> Like box girder, T-shaped or I-shaped segments, undercarriages, road viaduct components, MRT/LRT viaduct components, pedestrian overhead bridge components, rail tunnel segments and ventilation shafts, railway ties/ sleepers, and earth retaining structures. Include pre-stressed and post-tensioned components, repetitive produced members and modular units, plus customisation and specialisation with architectural finishes, M&E service maintenance tunnels & ventilation shafts		
GC2	<b>Sewerage and Drainage Products:</b> Like manholes, box culverts, box drains, channels, circular pipes, underground tanks, sewerage tunnels, drainage tunnels, sluice channels, caissons, reservoirs, coastal protection structures. Include pre-stressed and post-tensioned components, repetitive produced members and modular units.		
GA	<b>Non-Structural Products:</b> Like internal partition wall, cladding, sun breaker, parapet wall, refuse chute, roofing tiles, lintol, interlocking block/paver, IC, electrical draw-pits, chamber rings, r.c covers, U-drains, cable trenches, M&E service ducts, noise barriers, road kerbs, drop inlets, utility masts/poles and masonry blocks.		
*PPVC	<b>PPVC Concrete Module:</b> 5 or 6 sided volumetric cast concrete body, U-shaped concrete body cast with precast panel walls, N-shaped concrete body cast with concrete slab		