DEVELOPMENT OF 50MW SOLAR PHOTOVOLTAIC PLANT AT MANDSUAR (M.P)

TITLE OF THE DRAWING / DOCUMENT	FQP FOR CIVIL WORKS
BHEL DRG NO	4-38142-00406
NTPC DRG No	5714-004-P4-QVC-Q-156

REV NO.	DATE	STATUS	PRPD. BY		CHKD. BY		APPRD. BY	
			INITITALS	SIGN	INITITALS		INITITALS	SIGN
0	27-04-2016	FOR APPROVAL	ASK		ARIE		CBK	

PESD	FIELD QUALITY PLAN										
	ITEM : CIVIL WORK			QP NO. :		1	PROJECT:	1X50MW SOLAR PV PROJECT AT MANDAUR, MP			
	SUB-SYSTEM : CIVIL AND STRUCTURAL STEEL WORKS			REV. NO .:		0	PACKAGE:	ALL CIVIL PACKAGES			
				DATE : 27-04-2016			CONTRACT NO.				
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1.0	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**D***	**10**
1.0	**GENERAL REQUIREMENTS**										
A	Availability of QA& QC manpower and laboratory		-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	
B	Sampling for testing of buliding materials, concrete mix design etc.		As agreed / required	A	Physical	As specified in FQP for various materials	Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations from specialist agency to be submitted to NTPC.
C	Submission of schedule of tests to be done monthly / quaterly		-	A	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	
D	Stacking and storage of construction materials and components at site		As per IS:4082	A	Physical	Random	Tech Specs and Const. Drawings and IS: 4082		SR	√	
2.0	**EXCAVATION AND FILLING IN FOUNDATION WORKS**										
	Excavations-										
2.1		Nature, type of soil/rock before and during excavations	As agreed / required	C	Visual	Random in eah shift	Tech Specs and Const. Drawings		SR		
2.2		Initial ground level before start of excavations	As agreed / required	C	Measurement	100%	Tech Specs and Const. Drawings		SR	√	
2.3		Final shape and Dimensions of excavations.	As agreed / required	C	Measurement	100%	Tech Specs and Const. Drawings		SR		
2.4		Final excavation lelvels	As agreed / required	B	Measuement	100%	Tech Specs and Const. Drawings		SR	√	
2.5		Side slope of final excavation	As agreed / required	B	Measurement	Random in eah shift	Tech Specs and Const. Drawings		SR		
	Fill/ Backfill -										
2.6	**Standard proctor Test**	Optimum moisture content and max. dry density before fill	As per IS: 2720, Proctor needle apparatus,etc.	B	Physical	One in every 2000 Cum for each type & Source of fill material	IS 2720 (Pt.VII), Tech Specs and Const. Drawings		SR/TR	√	
2.7	**Moisture content**	Moisture content of fill before compaction	As per IS: 2720, balance, oven, rapid moisture meter, etc.	B	Physical	One in every 2000 Cum for each type & Source of fill material	IS 2720 (Pt.II), Tech Specs and Const. Drawings		SR/TR	√	
2.8	**Degree Of Compaction Of Fill / Backfill**										
i		Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720/compaction test (core cutter), balance, rapid moisture meter etc.	A	Physical	One Sample in every 2000 SQm area for each compacted layer	IS 2720 (Pt. XXIX), Tech Specs and Const. Drawings OR IS 2720 (Pt. XXVIII), Tech Specs and Const. Drawings		SR/TR	√	

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1.0	2	3		4	5	6	7	8	9		10
3.0	**MATERIALS**										
3.1	**CEMENT**										
		Retesting of cement	As per IS:4031	A	Testing	At Random	As per relevant IS Codes		TR	√	Each consignment of cement shall be duly correlated with manufactureres TC.
3.2	**Coarse Aggregate**	Moisture content	As per IS:2386	B	Physical	Once for each stack of 100 Cu.M. or part there of	IS : 456 IS : 383/Tech Spec		SR/LB	√	During monsoon when this has to be done every day before start of concreting
ii		Specific gravity, water absorption	As per IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS:456, IS:383/Tech Spec		SR/LB/ TR	√	
iii		Sieve analysis, flakiness index, elongation index,	As per IS:2386	B	Physical	One per 100 cum., or part thereof	IS: 2386 Part-I, IS:383/Tech Spec		SR/LB	√	
iv		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	As per IS:2386	A	Physical	Once per source/ on every change of source	IS: 2386 Part-II, IS:383/Tech Spec		SR/LB/ TR	√	
v		Soundness	As per IS:2386	A	Physical	Once per source/ on every change of source	IS: 2386 Part-V, IS:383		SR/LB/ TR	√	
vi		Crushing value abrasion value and impact value	As per IS:2386	A	Physical	Once per source/ on every change of source	IS:383, IS-2386 Part IV/Tech Spec		SR/LB/ TR	√	
3.3	**Fine Aggregate**										
i		Moisture content, water absorption	balance , oven, rapid moisture meter etc	B	Physical	To be done every day before start of work	IS: 2386 Part-III IS:383		SR/LB/TR	√	
ii		Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale)	IS:2386	A	Physical	Once per source& for on every change of source	IS: 2386 Part-II, IS:383		SR/LB/TR	√	
iii		All other tests similar to coarse aggregates as mentioned above.					IS-2386, IS-383		SR/LB/TR	√	except test for flankiness index,elongation index, abrasion value, impact value
3.4	**Water**										
i		Complete tests as per IS:456	Buret, conical flask, pipette etc	B	Testing	One for each source.	IS:3025 part 22 and 23 (for test procedure), IS:456(for acceptance		SR/LB/TR	√	
3.5	**CONCRETE**										
i		Crushing strength (works Tests cubes)	IS:516	A	Physical	One set of 6 cubes per 50 CuM or part thereof for each grade of concrete per shift whichever is earlier.	IS:516, IS:456, NTPC Tech. Spec.		SR/LB/ TR	√	Min. of 6 cubes for each mix, 3 specimen shall be tested at 7 days remaining 3 shall be for 28 days comp. Strength.
ii		Workability - slump test	IS:1199	B	Physical	At the time of concrete pouring at site every two hrs	IS:456/NTPC Tech. Spec.		SR/LB/TR	√	
3.5.1	**Admixtures for Concrete**	Type of admixture	As per IS:9103	B	Review of MTC	For each lot received at site	Designed mix and IS:9103		MTC	√	Admixture of appd. Brand and tested quality shall be used (each lot of admixture will included with brochure in which the type of admixture and its properties shall be clearly indicated)

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3.6	Concrete conveying, placing& compaction										
i		Mixing of concrete shall be done in a approved mixer such as to produce a homogenous mix				To be calibrated at the time of starting and subsequently once in three months, and shall conform to IS:4925	Review of calibration chart/ Certificate, IS 4926			√	
ii		Arrangement for transportation & placement of concrete.	As required	C	Visual	100%	Before clearance for concreting		Inspection Report	√	
iii		Handling and Transportation of concrete	As required	C	Physical	100%	As per construction/erection methodology (to be approved one week prior to start of work)		SR		
iv		Placement of concrete	Visual	B	Physical	100%	As per construction/erection methodology and tech.specs / No segregation		SR	√	
v		Compacting	As required	C	Physical	At Random	IS:456		SR	√	
vi		Curing	As required	C	Physical	At Random	Period of curing as per IS 456 (use gunny bags / curing compound)		SR	√	
3.7	TEST/CHECK ON RCC STRUCTURE IN HARDENDED CONDITIONS										
i		Dimensional check on finished structures & Dimensional tolerances	As required	B	Measurement	Approved Drawing	As per IS:456/ tech. Specification.		SR/LB	√	
ii		Water Tightness Test of liquid retaining structure/ tanks	As required	B	Test	100%	IS:3370/ Tech. Specification		SR/LB	√	
3.8	REINFORCEMENT STEEL										
i		Physical and Chemical Properties for each lot as per relevant IS codes	As required/ agreed	A	Review of MTC	Each batch of delivery	IS : 1786, IS:432, IS:1566, Tech Specs and Const. Drawings		MTC	√	Applicable if steel is procured by Contractor
ii		Freedom from cracks surface flaws, Lamination.	As agreed / required	C	Visual	Random in each shift	IS: 1852, IS:432, IS:1786, Tech Specs and Const. Drawings		SR		To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.
3.9	PLACEMENT OF REINFORCEMENT STEEL										
i		Bar bending schedule with necessary lap, Spacers & Chairs	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502		SR	√	
ii		Bending of bars, cutting tolerance	As agreed / required	C	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502		SR	√	
iii		Acceptance - Cover, spacing of bars, spacers and chairs after the reinforcement cage is put inside the formwork	As agreed / required	B	Visual & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings		SR	√	

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3.10	STAGING AND FORMS										
i		Materials and accessories	As agreed / required	C	Visual	Once before start of work	As per relevant IS, Tech Specs and Const. Drawings		SR		
ii		Soundness of staging, shuttering and scaffolding including application of mould oil / release agent	As agreed / required	C	Visual	Once before start of work	As per manufacturer's spec.and as per 3696,4014, 4990, Tech Specs and Const. Drawings		SR		
iii		Acceptance of formwork before start of concreting		B	Physical / visual	Before start of each concreting	As per provisions and tolerances, Tech Specs and Const. Drawings		SR	√	
3.11	DAMP PROOF COURSE										
i		Material - Hot bitumen and water proofing materials etc	As agreed / required	B	Review of MTC	Each batch of delivery at site	Tech Specs and Const. Drawings, IS 702		SR	√	
ii		Acceptance of damp proof course	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings		SR		
3.12	GROUTING										
i		Material	As agreed / required	B	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	
		Type of mix - fluid mix, plastic mix, stiff mix etc.	As agreed / required	C	Physical	Prior to start of work	Tech Specs and Const. Drawings		SR	√	
ii		Mixing, placement, application and grout pressure	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
iii		Compressive strength	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of the grouts	As agreed / required	B	Physical	Each grout section	Tech Specs and Const. Drawings		SR		
4.00	BRICK MASONARY										
4.1	Test on Bricks										
		Dimensions , shape, compressive strength, water absorption.	As agreed / required	B	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings		Inspection Report	√	Efflorescence shall be checked at each source.
4.2	Masonry construction	Workmanship, verticality and alignment	As agreed / required	B	Visual/ Physical	100%	IS 2212, IS 1905 , Tech Specs and Const. Drawings		SR/LB		
5.00	FINISHING AND ALLIED WORKS								.		
5.1	PLASTERING - WORKMANSHIP										
i		Curing	As agreed / required	C	Physical	100%	Tech specifications, construction drawings and agreed methodology		SR		
ii		Thickness and finishing of plaster, grooves etc	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings		SR/LB		
iii		Truness of plastering system	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
5.2	STONE GRIT PLASTER/ GRANULAR TEXTURED COAT FINISH										
i		Material	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR	√	
ii		Thickness, finishing and grooves etc	As agreed / required	C	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings		SR	√	

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6.00	SHEETING AND OTHER WORKS										
6.1	PAINTING SYSTEM - CONCRETE WORKS AND PLASTERED MASONARY SURFACES										
i	Materials and accessories- Oil Bound, Acrylic Emulsion, Chemical Resistant, Oil Resistant Paint etc.	Shade, type from brand and manufacturer as approved by NTPC EIC	As agreed / required	B	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	
ii	Surface prepration	As required	As agreed / required	C	Physical /visual	Random in each shift	Tech Specs and Const. Drawings		SR		
iii	Acceptance of painted surfaces	As required	As agreed / required	B	Physical	Each surface at random	Tech Specs and Const. Drawings		SR		
6.1.1	PAINTING SYSTEM - STEEL WORKS (OTHER THAN STRUCTURAL STEEL WORKS)										
i		Painting Materials and accessories	-	B	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	
ii		Surface prepration	As agreed / required	C	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/ standards		SR	√	
iii		Primer Thickness	Elcometer	C	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
iv		DFT of paint	Elcometer	C	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
v		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR		
6.2	INSULATION WORKS										
i	Material	Insulation material, galvanised wire net, aluminium foil, fasteners	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR / LB	√	
ii		Acceptance of each type of installation	As agreed / required	B	Visual/ Physical	Each installation	Tech Specs and Const. Drawings		SR/LB		

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7.0	**DOORS , WINDOWS VENTILATORS & GRILL**										
7.1	**Fire proof doors**										
i		Source of supply	As agreed / required	A	Review of purchase order (unpriced copy) / drawings of suppliers / certificate of CBRI	For each source	Tech Specs and Const. Drawings		SR	√	Procured from Approved parties as per relevant IS/Tech, The door drawing proposed for supply should have been tested and approved by CBRI Roorkee for the similar dimensions for minimum 2 hours fire rating.
ii		Receipt inspection	As agreed / required	B	Visual/ Physical/ Review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR	√	
iii		Finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings		SR		
7.2	**False Ceiling**										
i		Materials (gypsum glass, glass fibre membrane, fibre board acoustical tiles etc)	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs and Const. Drawings		SR	√	Compare MTC with technical specification and requirement
ii		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings		SR		
7.3	**WATER PROOFING**										
		Methodology for the application of water proofing system	As required	B	Review	for each type of treatment	Tech Specs and Const. Drawings		SR	√	
7.7.1	**General Requirement- Water Proofing**										
i	Polyurethene based coating, polyester scrim cloth, extruded HD dimpled polyurethene	Material	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs /Const. Drawings		SR	√	MTC shall contain all the parameters specified in the technical specifications
ii		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings				
7.7.2	**Roof / Basement Treatment**										
i	Graded under bed	Levels / slopes	As required	C	Physical	100%	Tech Specs and Const. Drawings				
ii	Elastomaric coatings	Material- Primer coat, finishing coat	As required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
iii	Wearing course	Materials - PCC, chicken wire mesh, elastomeric sealant	As required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings				

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7.8	**Fencing and Gates**										
i	Zinc coated chain link fencing wire mesh (IS 4826,IS 2721), Reinforced barbed tape galvanised (IS 278) etc.	Materials	As agreed / required	B	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications / relevant IS Codes
ii		Acceptance of the installation	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings		SR		
7.9	**FLOOR FINISHES AND ALIED WORKS**										
7.9.1	**Cement Concrete Flooring**										
i		Glass/ PVC strips in joints	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings		SR		
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.2	**Tiles**										
i	**Ceramic, vitrified, glass mosaic, acid alkali resistant, heavy duty cement concrete tiles**	Materials	As agreed / required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	MTC shall contain all the parameters specified in the technical specifications / relevant IS Codes
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.3	**Interlocking Blocks**										
i		Materials	As agreed / required	B	Review of MTC	Each lot of delivery	Tech Specs and Const. Drawings		SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.9.4	**Kota Stone, Granite and Marble**										
i		Quality, texture, thickness, colour for each lot of delivery from approved source	As agreed / required	C	Physical	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	
ii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
7.10.6	**Acid / alkali and oil resistant high built seamless epoxy based resin and treatment**										
i	Material	Bricks, vitreous tiles, mortar, sealing, paints, coatings, sheets, fillers etc	As agreed / required	B	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR	√	Experienced workers under supervisors recommended/ appointed by manufacturer to be deployed
ii		Surface preparation	As agreed / required	C	Physical	Random in each shift	Tech Specs and Const. Drawings, IS 2395				
iii		Finishing and acceptance	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings		SR		
8.0	**WATER SUPPLY / SANITORY INSTALLATIONS**										
8.1	**Water supply fittings and fixtures**										
i	Materials	GI/ MS pipes and fittings	As agreed / required	B	Review of MTC	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii	Disinfection	Before use	As agreed / required	C	Physical	Each installation	Tech Specs and Const. Drawings		SR		
iii	Hydraulic test	Before use / leakage	As agreed / required	B	Physical	Each installation	Tech specs and const drawings		SR	√	
iv		Acceptance and working	As agreed / required	A	Acceptance	Random	Tech Specs and Const. Drawings		SR		

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8.2	**Sand cast iron / cast iron pipes**										
i	**Material**	SCI / CI pipes and fittings / joints	As agreed / required	B	Review of MTC	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings		SR		
8.3	**Sanitary fittings and fixtures**										
i	**Material**	Sanitory items and fixtures i.e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes, manhole cover and frames etc	As agreed / required	B	Physical	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Acceptance of installations of all sanitory items and fixtures	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings		SR		
8.4	**RCC Pipes**										
i	Material	RCC pipes	As agreed / required	B	Review of MTC	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings /IS 458		SR	√	
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings		SR		
8.5	**Water Storage Tanks**										
i	Material	Over head / loft type	As agreed / required	B	Physical	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings		SR	√	
ii		Aceptance and leakage	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings		SR		
9.0	**SPECIAL ITEMS**										
9.1	**Earthing Mat (Grounding System)**										
i	Material	Earthing mat	As agreed / required	B	Physical	Each lot of delivery as per Specifications	As per relevant IS and Tech. Specs / Manufacturer's, IS 3043		SR/MTC	√	
ii		Weld sizes & length	Visual/Tape	B	Visual/ Measurement	100%	Tech Specs and Const. Drawings				NTPC approved electrodes shall be used
iii		D P test	DP test Kit	B	Physical	10% at random of the offered lot	Tech Specs and Const. Drawings		TR	√	
iv		Earth test	Earthing test kit	A	Physical	100%	Tech Specs and Const. Drawings,		SR	√	
10.00	**STRUCTURAL STEEL MATERIAL (For Site Fabrication)**										
i	Procured by contractor	Structural steel procured from NTPC approved sources- Mechanical (YS, UTS, Elg, UT if specified),,and Chemical properties (CE as per IS)		A	Review	For each batch of each section delivered at site	Technical Specification and Construction Drawings, IS 2062, 8500		SR	√	Correlated MTC shall be verified.
10.1	**PRE-WELDING REQUIREMENTS**										
i		Welding Procedure Specification * (WPS*)	-	A	Review	Each Welding Process	Technical Specification and Construction Drawings, ASME-IX/ AWS D 1.1		WPS	√	*To be approved by CQA
ii		PQR and Welder's Qualification	-	A	Physical	Each welder	PQR/ WQR, AWS-D1.1/ASME-IX,		TR	√	
iii		Welding consumables	-	B	Physical	Random in each shift	Approved WPS, Latest NTPC		SR	√	

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1.0	2	3		4	5	6	7	8	9	D*	10
10.2	FIT-UP										
i		Marking and Cutting	Tape, ruler etc	B	Visual & Measurement	Each plate/ Section	Technical Specification and Construction Drawings/ Approved cutting plan		SR		
ii		Match markings for trial assembled components	-	B	Physical	Each fit-up	Technical Specification and Construction Drawings		SR		
iii		Weld Fit Up- Edge Preparation/ Gap/ Alignment	Tape, ruler etc	B	Physical	Each fit-up	Technical Specification and Construction Drawings, IS 7215		SR	√	If required suitable stiffners shall be provided to prevent deflection.
10.3	PRE HEATING (wherever applicable)										
i		Pre-Heating Temperature	Thermal chalk	B	Measurement	Each pre-heating	Technical Specification and Construction Drawings, Approved WPS		SR	√	
ii		Post Weld Heat Treatment (PWHT), if required	Thermo couple with time temperature recorder	A	Time & Temperature	Each PWHT	Technical Specification and Construction Drawings, Approved WPS		SR	√	
10.4	WELDING REQUIREMENTS										
i		Sequence of welding	-	B	Physical	Random in each shift	Technical Specification and Construction Drawings, Agreed scheme		SR		
ii		Removal/ grinding of temporary attachments	-	B	Measurement	All cleats/ attachments	Technical Specification and Construction Drawings, Approved Drg.		SR		
iii		Completeness after welding- Dimensions/ distortion	Weld gauge	B	Visual	Each structure component	Technical Specification and Construction Drawings, IS 822		SR	√	
iv		Completeness of welding (each butt & fillet weld)		B	Visual	Each structure component	Technical Specification and Construction Drawings, Approved Drg.		SR	√	
10.50	NON DESTRUCTIVE AND DESTRUCTIVE TESTING										
10.5.1	FILLET WELDS										
i		size and visual examination	As required/ agreed	B	Visual/ Measurement	100%	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		As per requirement of NTPC Engineer
ii		Dye Penetration Test	As required/ agreed	B	Physical	5% of Weld length with min. 300mm at each loaction	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		
10.5.2	BUTT WELDS										
i		Visual examination	As required/ agreed	B	Visual	Random in each shift	As per technical specifications and construction drawings, IS 822, AWS D 1.1		SR		As per requirement of NTPC Engineer
ii		DPT	As required/ agreed	B	Physical	100% on all butt welds after back gouging on root run and 10% on	As per technical specifications and construction drawings, IS 822, AWS D 1.1		IR		All butt welds to be back gouged before DPT
iii		Radiography Test	As required/ agreed	A	Physical	10%	As per technical specifications and construction drawings, IS 822, AWS D 1.1		IR	√	Wherever RT is not feasible UT to be carried out. In case of failure of any welds in SPOT/RT or UT the % of retesting shall be doubled at that particular loaction. Acceptance criteria of NDT on welds shall be as per AWS D1.1.

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10.60	FOUNDATION CHECKS										
i		Dimensions and levels- Shape, lines (including diagonal checks)	Theodolite, Tape etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings		SR	√	
ii		Foundation Bolts and Embedments- Verticality, Levels, pitch distance	Theodolite, Tape, Piano wires etc	B	Physical/ Measurement	Each Foundation	Tech Specs and Const. Drawings		SR	√	
10.70	PAINTING SYSTEM										
i		Painting Materials and accessories	-	A	Review of MTC	Each batch of delivery	Tech Specs and Const. Drawings		SR/MTC	√	Mfr.'s T.C. shall be correlated with the consignment received.
ii		Submission of painting methodology	-	B	For Review of painting system	Before start of painting work	Tech Specs and Const. Drawings				
iii		Surface prepration	As agreed / required	B	Physical /visual	Each Erection Mark	Tech Specs and Const. Drawings,		SR	√	
iv		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
v		DFT of paint	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR	√	
vi		Acceptance of painted surfaces	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings		SR		
10.80	PRE-ASSEMBLY CHECKS										
i		Punch Erection marks and match marks on members	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings				Markings for - Assembly designation, Part number, Weight, Any other important
ii		Pre-assembly as per match mark	-	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings				
iii		Camber, sweep and total length after trial assembly of structure.	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings		SR	√	
iv		Control assembly check at shop	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Every first and tenth set of identical structure	Tech Specs and Const. Drawings				
V		Completion of primer & intermediate coat of paint		B	Visual / Physical	Random	Tech Specs and Const. Drawings		SR		
10.90	ERECTION CHECKS										
i		Alignment, slopes, level, tolerances of erected member	Theodolite, Tape, plumb, piano wires etc	B	Measurement	Each structural member	Tech Specs and Const. Drawings		SR	√	
ii		Tightening of bolts/ Torque including foundation bolts with lock nuts	Wrench/ Torque wrench if specified	B	Visual/ Physical	Each structural member	Tech Specs and Const. Drawings		SR	√	
iii		Completion of all erection fillet & butt welds		B	Visual	Each structural member	Tech Specs and Const. Drawings		SR	√	
iv		Acceptance of erected structure	Theodolite, Tape, plumb, piano wires etc	B	Visual/ Physical	Each erected structure	Tech Specs and Const. Drawings, IS 7215 and IS 12843		SR	√	
10.10	PERMANENT BOLTS AND NUTS AND WASHERS										
i		Material- Permanent mild steel Bolts, mild steel Nuts, High strength structural Bolts, Washers-Dimensions, properties, Class, storage along with MTC	Screw gauge, Vernier, Tape etc.	A	Physical and MTC Review	Once for each lot of delivery	Tech Specs and Const. Drawings		SR/MTC	√	
ii		Contact surfaces before bolting	-	B	Physical	Random before asembly for bolting	Tech Specs and Const. Drawings, IS 4000		SR		
iii		Inspection of the assembled bolts	-	B	Physical	Randomly in each shift for assembeled bolts	Tech Specs and Const. Drawings, IS 4000		SR		
iv		Tensioning	As agreed / required	B	Physical	Randomly during snug tight test and after full tensinoning	Tech Specs and Const. Drawings, IS 4000		SR	√	
v		Acceptance of installed bolts	-	B	Physical	Each bolt	Tech Specs and Const. Drawings		SR		

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11.0	ROAD WORKS										
11.1	Construction of Sub-Grade and earthen/hard soulders										
i		Standard proctor Test	As per IS: 2720	B	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings,Section 900 of MORTH specification, IS 2720 (Pt.VII)		SR/TR	√	In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
ii		Moisture content of fill before compaction	As per IS: 2720	B	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt.II)		SR/TR		In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
iii		Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720	A	Physical	One in every 500 SQM area for each compacted layer.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII),		SR/TR	√	Both for embankment and cut formation quantum of check - One in every 1000 SQM area for each compacted layer.
iv		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings		SR		Template, straight edge
11.2	Water Bound Macadam (Non-Bituminous) for base course and sub-base course										
i		Aggregate Impact value	Agrregate Impact value Test Apparatus	A	Physical	One test per 200 cum of Test aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
ii		Grading	Set of IS Sieves	B	Physical	One test per 100 cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR		
iii		Flakiness index and elongation index	Flakiness test gauge	B	Physical	One test per 200cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR		
iv		Atterberg Limits of binding material	Atterberg limits determination	B	Physical	One test per 25 cum of binding material	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
v		Atterberg Limits of portion of agreggate passing 425 micron sieve	Atterberg limits determination	B	Physical	One test per 100cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification,		SR	√	
vi		Camber, surface, slope	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings		SR		Template, straight edge
11.3	Bituminous Macadam for base and binder course										
i		Quality of binder	Penetrometre with St. needle	B	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 73		SR	√	
ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	A	Physical	Once per source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
v		Water sensitivity of mix	As required / agreed	B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vi		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		

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vii		Water absorption of aggregate	As required / agreed			Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ix		Percentage of fractured faces	As required / agreed	B	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
x		Binder content and aggregate grading	Bitumen extractor	A	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
xi		Control of Temperature of binder and aggregate for mixing and of the mix at the time of laying and rolling	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xii		Rate of spread of mixed materials	As required / agreed	B	Physical	Regular control through checks of layer thickness	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xiii		Density of compacted Layer	As required / agreed	A	Physical	One test per 250 sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
11.4	**Bituminous Surfacing - Open graded premix carpet and Seal coat**										
i		Quality of binder	Penetrometre with St. needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ii		Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	A	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness test gauge	B	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
v		Water absorption test		B	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vi		Water sensitivity of mix	As required / agreed	A	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
vii		Grading of aggregates	Set of Sieves	B	Physical	One test per 25 cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	

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1.0	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**D***	**10**
ix		Polished stone value	As required as per BS:812(Part 114)	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
x		Temperature of binder at application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xi		Binder content	Bitumen extractor	A	Physical	One test per 500 cum & not less than two tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
xii		Rate of spread of materials	As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
xiii		Percentage of fractured faces	Bitumen extractor	B	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
11.5	**Tack Coat/ Prime coat/ fog coat**										
i		Quality of binder	Penetrometre with Standard needle	A	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
ii		Temperature of binder at application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
iii		Rate of spread of binder	As required / agreed	B	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
11.6	**RCC Pavements**	Concrete - Material, Mix design, Trial Mixes, Production, Transportation, Placement, Compaction, Curing, Test on green concrete, Test on hardened concrete etc.	As required / agreed	-	-	Refer FQP for concrete Works	Refer FQP for concrete Works, , Tech Specs and Const. Drawings, IRC & MORTH		-	–	FQP for Concrete Works shall be application for all concrete works
11.7	**Alignment, Level, Surface regularity and rectification**										
i		Horizontal alignment, Surface levels and Surface regularity	As required / agreed	B	Physical	As per section 900 of MORTH specification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR		
ii		Rectification	As required / agreed	B	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification		SR	√	
		Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR, TR, MTC, LB									
Manufacturer/ Sub-supplier	**Main-supplier**	**Categorization Witnessing & Accepting (As per NTPC QA&I System)** **Category 'A' FQA Engineer in association with Executing Engineer, Category 'B' Executing Engineer, Category 'C' Executing Engineer** ;**SR** = Site Register , **TR**= Test Report,**MfrTC =** Manufacturer's Test Certificate					**For NTPC USE**				
Signature		This document shall be read in conjunction with NTPC Tech. Specifications, BOQ, Drawings						**REVIEWED BY**	**APPROVED BY**		**APPROVAL SEAL**

THIS FQP SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATIONS/APPROVED DRAWINGS AND RELEVANT STANDARDS