



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

FIELD QUALITY PLAN

Item	Transmission Line
Applicability	BSPTCL
Date of Issue	15.01.2016
Validity	Till next revision

FQP No.	005
REV.	00

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S. No.	Description of Activity	Items to be Checked	Tests/Checks to be done	Ref. documents	Check/Testing		Counter Check/Test by BSPTCL	Accepting authority in BSPTCL
					Agency	Extent		
1.	Preliminary /Detailed Survey	a) Route alignment	Optimization of route length	a. Preliminary survey. b. Topographical map c. Tower spotting data given by Engg.	Contractor	100% at Field	100% based on record documents	Project In-charge
		b) Route profiling & tower spotting.	1. Ground clearance. 2. Cold wt. Span 3. Hot wt. Span 4. Sum of Adj. Span (wind span) 5. Angle of Devn. 6. Suitability of Tower spotting in hilly area	a. Sag template b. Tower Spotting data c. Route alignment	Contractor -do- -do- -do- -do- -do-	100% at Field -do- -do- -do- -do- -do-	100% based on record documents -do- -do- -do- Verification of 100% at Field	Site In-charge
2.	Check Survey	Tower Location & Final Length	i) Alignment ii) Final Length iii) Angel of deviation & pit marking-	a. Route alignment b. Tower Schedule c. Profile	Contractor -do-	100% at Field -do-	i) All angle towers in plains and 50% in hilly terrains. ii) Final length to be checked on 100% basis based on records/documents 20 % test check at site for physical verification.	Site Engineer
3.	Detailed Soil Investigation	a) Bore log	1. Depth of bore log 2. SPT Test 3. Collection of samples	As per BSPTCL Specification	Contractor	100% at Field	To witness 20% at Field	Site Engineer



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		b) Tests on samples	As per tech. Specs.	As per BSPTCL Specification	Contractor (Testing in BSPTCL accepted Lab)	100% by testing lab (Reports to be signed by Testing person & Checking person)	Review of lab test results (All soil reports to have signature of BSPTCL executive reviewing the report)	Site In-charge based on the guide line issued by BSPTCL in Annex-6
		c) Special foundations	As per tech. Specs	As per BSPTCL Specification	Contractor (Testing of samples in BSPTCL accepted Lab)	100% by testing lab (Reports to be signed by Testing person & Checking person)	Review of lab test results (All soil reports to have signature of BSPTCL executive reviewing the report)	Site In-charge based on the guide line issued by BSPTCL in Annex-6
4	Revetment	RR Masonry	a) Size of Stone	CPWD Spec.	Contractor	100% physical verification per source	Physical verification on random basis	Site Engineer



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			b) Water absorption	-Do-	-Do- (Testing in BSPTCL accepted Lab)	1 sample/ source	Review of Lab Test results	-Do-
			c) Cement : sand ratio in mortar	As per BSPTCL Specification	Contractor	100%	Physical verification in random.	-Do-



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5	Benching	Checking of Reduced Level	Reduced Level	As per approved drawings	Contractor	100%	100% by Site Engineer and 20% by Line In-charge	Site In-charge
6.	Tower Foundation							
		A) Materials 1. Cement	1. Brand approval	Cement of approved brands by BSPTCL may be procured.	Contractor	100%	Any new brand cement proposed by Contractor shall be submitted to BSPTCL for approval	BSPTCL-HQ
			2. Physical tests	As per document at Annexure-I of this FQP	Contractor Samples to be taken jointly with BSPTCL and tested at BSPTCL approved lab	Review of 100% MTC's and one sample for every batch number of manufacturer.	100% review of lab test results and MTC. Test results shall be sent by the Lab. by E-mail directly to BSPTCL; further, hard copy of test certificate shall also be sent by the Lab directly to BSPTCL by postal Address.	Site In-charge
			3. Chemical Tests Chemical composition of Cement	-do-	Contractor	Review of all MTC's	100% review of MTC test results	Site In-charge



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		2. a) Reinforcement Steel	1. Source approval	May be procured either from main producers directly or through the authorized dealers who can produce MTC from main producers with traceability.	Contractor	100%	Material shall be supplied from Main Producers / authorized dealers.	Site In-charge
			2. Physical and Chemical analysis test	As per annexure-2 of this FQP	Contractor to submit MTC	100% MTC's One sample* / 500MT / Manufacturer shall be jointly sealed by BSPTCL and tested at BSPTCL approved Lab. * Note: All sizes of 10mm and above shall be taken for testing in every 500MT.	100% review of MTC. Review of Lab test results. Test results shall be sent by the Lab. by E-mail directly to BSPTCL; further, hard copy of test certificate shall also be sent by the Lab. directly to BSPTCL by postal Address.	Site In-charge
		2. b) Miscellaneous structural steel .	Source Approval.	Source with material meeting BSPTCL Specification	contractor	As proposed by contractor	To verify documents.	Site In charge



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					Agency	Extent		
		3. Coarse Aggregates	1. Source approval	Source with materials meeting BSPTCL Specification	Contractor	Proposed by the Contractor, indicating the location of the quarry and based on the test results of Joint samples tested at BSPTCL accepted Lab.	To review the proposal based on the documents	Site In-charge Once approved, the particular quarry shall be used for all the running contracts under various packages.
			2. Physical tests	As per document at Annexure-3 of this FQP	Contractor	One sample per 1000 cum or part thereof per source for 765KV & above TL and One sample per 500 cum or part thereof per source for 500KV & below TL , Samples to be tested by Contractor in BSPTCL approved lab	100% review of lab test results. Out of these 100% samples, BSPTCL shall witness at TPL, 5 samples selected at random, spread during the overall execution period of contract.	Site In charge.
		4. Fine aggregate	1. Source approval	Source with materials meeting BSPTCL Specification	Contractor	Proposed by the Contractor, indicating the location of the quarry and based on the results of Joint samples tested in BSPTCL accepted lab.	To review the proposal based on the documents.	Project In-charge Once approved, the particular quarry shall be used for all the running contracts under various packages.
S.					Check/Testing		Counter Check/Test by	Accepting



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			2. Physical test	As per Annexure-4 of this FQP	Contractor	One sample per 1000 cum or part thereof per source for 765KV & above TL and One sample per 500 cum or part thereof per source for 500KV & below TL , Samples to be tested by Contractor in BSPTCL approved lab	100% review of lab test results. Out of these 100% samples, BSPTCL shall witness at TPL, 5 samples selected at random, spread during the overall execution period of contract.	Site In charge.
		5. Water	1. Cleanliness (Water shall be fresh and clean)	BSPTCL Specification	Contractor	100% visual check at Field	Verification at random	Site Engineer
			2. PH Value	- do -	Contractor at site with calibrated PH meter or any other approved method	One sample per source	100% review of the test results Ph not less than 6	Site Engineer
		B) Foundation Classification	1. Visual observation of soil strata 2. Ground water level 3. History of water table in adj. Area/surface water 4. Soil Investigation	BSPTCL Specification	Contractor	100% at Field	100% at Field	a. [other than b & c locations below] Recommendation by Site Engineer to be approved by Site in-charge after visiting at least 5% locations b. In case of WBC/SFR/FS / ULE



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			wherever required					<p>/ Raised Chimney based on recommendation by Site In-charge, to be approved by ESE,T/C after visiting at least 5% locations.</p> <p>****Project In-charge shall visit at least 2% locations for Test Check.</p> <p>c. For Spl. Fdns. (shallow depth, pile foundation, well foundation etc.) approval in principle shall be granted by the BSPTCL-HQ & site approvals shall be granted by ESE, T/C.</p>
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	C) Concrete Works a) Before concreting							
		1. Bottom of excavated earth	Depth of foundation	Construction Drgs.	Contractor	100% at Field	100% check by BSPTCL	Site Engineer
		2.P.C.C Grade , thickness & Size	Completeness	IS:456 and BSPTCL approved construction drawings & specification.	Joint Inspection by BSPTCL and CONTRACTOR	For all locations	For all locations	Site Engineer
		3. Stub setting	1) Centre Line 2) Diagonals 3) Level of stubs	Construction Drgs -do- -do-	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	*_* -do- *_* -do- *_* -do-
		4.Reinforcement steel	Placement	Bar bending schedule.	-do-	-do-	-do-	*_* -do- *_* At least 5% locations shall be cross verified by immediate Reporting Officer / Site In-charge, at random with respect to stub setting and reinforcement steel placement.



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	b) During concreting	1. Workability	Slump test	Range 25 mm to 55 mm refer document at Annexure-5 of this FQP	Contractor	Minimum One per day per location	check at random	Site Engineer
		2. Concrete Strength	Cubes Comp Strength	As per annexure-5 of this FQP	Contractor Casting of cubes at site. Cubes to be tested for 28 days strength at BSPTCL appd. Lab /BSPTCL Lab/At site (if testing machine installed by contractor is duly calibrated by NABL Lab.) Cubes at 100% location are to be taken in presence of BSPTCL officials	One sample of 3 cubes in each tower locations if all the legs are cast continuously without interruption. If otherwise, additional 3 cubes to be taken for every subsequent continuous casting case. Note: It is to be ensured that in every case 3 samples shall be selected in such a way that one each from start, middle and end of the casting process.	Normally testing shall be carried out at the cube Testing Facility installed by contractor at BSPTCL premises, in the witness of BSPTCL. Alternatively, samples shall be tested at BSPTCL approved Labs/ BSPTCL Lab. In this case, test results shall be sent by the Lab, by E-mail directly to BSPTCL; further, hard copy of Test Certificate shall also be sent by the Lab directly to BSPTCL by Postal Address. Further, BSPTCL to witness testing on 20% samples and also to review 100% test results.	Site Engineer. Out of testing on 10% samples to be witness by BSPTCL Site Engineer and at least 5% samples at random, shall be witnessed by Site In-charge. In-case of Site/BSPTCL Lab, 100% witness by BSPTCL Representative.



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		3.Chimney Concrete	Top level of chimney concrete w.r.t GL	Appd. Drgs.	Contractor	100% at Field	100% check by BSPTCL	Site Engineer
	c) After Concreting	Back filling	Completeness	As per Specification	Contractor	100%	100%	Site Engineer
7.	Pile Foundations	Refer FQP OF TRANSMISSION LINE PILE FOUNDATION						
8.	Tower Erection	1. Materials of Tower member/bolts & nuts/washers/accessories	Visual checking for 1. Stacking 2. Cleanliness 3. Galvanizing 4. Damages	Appd. Drgs./BOM	Contractor	100% at stores	100% verification of records	Site Engineer
		2. Erection of Super-structure	1. Sequence of erection	As per Appd. Drgs./BSPTCL specification	Contractor	100% at field	Random	Site Engineer
			2. Check for completeness	As per Appd. Drgs./BSPTCL specification	Contractor	100% at field	25% by Site Engr and random by Site Incharge.	Site In charge



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			3. Tightening of nuts and bolts	-do-	-do-	-do-	-do-	-do-
			4. Check for verticality	-do-	-do-	-do-	-do-	-do-
			5. Tack welding for bolts & nuts	BSPTCL Specification	Contractor	100% at Field	-do-	Site Engineer
		3. Tower footing resistance (TFR)	TFR at locations before and after earthing.	BSPTCL Specification	Contractor	100% at Field	20% locations to be verified	Site In-charge
9	Earthing	Pipe Type	Salt & charcoal	As per approved drawings	Contractor	100%	Checking of record 100% and physical verification in Random	Site Engineer
		Counterpoise Type	Length & Depth of earth electrode.	As per approved drawings	Contractor	100%	---do---	Site Engineer



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10	Stringing	1. Materials						
		a) Insulators	1. Visual check for cleanliness/glazing/cracks/and white spots.	BSPTCL Specification	Contractor	100% at Field	100% verification of records and to carry Physical verification random checks 10%	Site Engineer
			2. IR Value	Minimum acceptable value 2000 Mega ohm	-do-	Test shall be carried on 100% insulators using 5/10 kV (DC) Megger	100 % by Contractor and record review by BSPTCL and joint witnessing by BSPTCL on 05% insulator	Site In-charge
			3. Traceability (Make/batch No./Locations where installed)	Packing list/CIP	Contractor	100% at field	100% Review of records	Site Engineer



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		b) Conductor	On receipt, 1. Visual check of drum.	Packing list/CIP	Contractor	100% at stores	20% check	Site Engineer
			2. Check for seals and BSPTCL signed sticker on outer end	-do-	-do-	-do-	-do-	-do-
			3. Check depth from top of flange to the top of the outer most layer	-do-	-do-	-do-	-do-	-do-
		c) Earth wire	Check for seals at both ends	Packing list/ CIP	Contractor	100% at stores	20% check	-do-
		2. Field activity						
		a) Before Stringing	Readiness for stringing	Stringing procedures as per BSPTCL specification	Contractor	Readiness certificate to be submitted by the Contractor	Review of Certificate	Site In-charge



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		b) During stringing	(Conductor/Earth-wire)					
			1. Scratch/cut check (Visual)	Appd. Drawings/ BSPTCL Specn.	Contractor	100% at Field	100% verification of record & 20% Field check	Site Engineer
			2. Repair sleeve	-do-	-do-	-do-	-do-	-do-
			3. Mid span Joints	-do-	-do-	-do-	-do-	-do-
			4. Guying (in case of towers not designed for one side stringing)	Appd. Guying arrangement/BSPTCL Specn.	-do-	-do-	100%	Site Engineer
		c) After stringing	Check for,					
			1. Sag/Tension	Stringing Chart / tower Spotting data	-do-	-do-	100% verification of record & 20% field check	Site Engineer
			2. Electrical clearances	As per Appd. Drgs./BSPTCL specifications	-do-	-do-	-do-	-do-



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			i) Ground clearance	-do-	-do-	-do-	-do-	-do-
			ii) Live metal clearance etc.	-do-	-do-	-do-	-do-	-do-
			3. Jumpering	-do-	-do-	-do-	-do-	-do-
			4. Copper bond	As per Appd. Drgs./BSPTCL Specification	Contractor	100% at Field	100% record & Field Check 20%	Site Engineer
			5a). Placement of spacer/damper	As per Specn./Drgs/ placement chart	-do-	-do-	-do-	-do-
			5b) Tightening of bolts & nuts as per manufacturer recommendations.	-do -	-do-	100% with fixed torque wrench.	-do-	-do-
11.	Final Testing a) Pre-commissioning of lines	a) Readiness of lines for pre-commissioning	1. Completeness of line. 2. Meggar test of line	BSPTCL latest pre-commissioning procedures (Doc. No. D-2-01-70-01-00)	Joint inspection by BSPTCL and Contractor	100%	100%	Site In-charge



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	b)Commissioning of line	Readiness of lines for commissioning	1. Digital photograph of each tower to ascertain the completeness of tower.	a) BSPTCL latest pre-commissioning procedures b) Pre-commissioning Report	-do-	-do-	-do-	-do-



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ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR CEMENT

ORDINARY PORTLAND CEMENT					
S. No.	Name of the test	Ordinary Portland Cement 33 grade as per IS 269	Ordinary Portland Cement 43 grade as per IS 8112	Ordinary Portland Cement 53 grade as per IS 12269	Remarks
a)	Physical tests				To be conducted in appr. Lab
(i)	Fineness	Specific surface area shall not be less than 225 sq.m. per Kg. or 2250 Cm ² /gm.	Specific surface area shall not be less than 225 sq.m. per Kg or 2250 Cm ² /gm.	Specific surface area shall not be less than 225 sq.m. per Kg or 2250 Cm ² /gm.	Blaine's air permeability method as per IS 4031 (Part-2) / Sieve analysis as per IS 4031 (part-3)
(ii)	Compressive strength	72 ± 1 hour : Not less than 16 Mpa (16 N/mm ²) 168 ± 2 hour : Not less than 22 Mpa (22 N/mm ²) 672 ± 4 hour : Not less than 33 Mpa (33 N/mm ²)	72 ± 1 hour : Not less than 23 Mpa (23 N/mm ²) 168 ± 2 hour : Not less than 33Mpa (33 N/mm ²) 672 ± 4 hour : Not less than 43 Mpa (43 N/mm ²)	72 ± 1 hour : Not less than 27Mpa (27 N/mm ²) 168 ± 1 hour : Not less than 37Mpa (37 N/mm ²) 672 ± 1 hour : Not less than 53 Mpa (53 N/mm ²)	As per IS 4031 (Part-6)
(iii)	Initial & Final setting time	Initial setting time : Not less than 30 minutes Final setting time : Not more than 600 minutes	Initial setting time : Not less than 30 minutes Final setting time : Not more than 600 minutes	Initial setting time : Not less than 30 minutes Final setting time : Not more than 600 minutes	As per IS 4031 (Part-5) -do-
(iv)	Soundness	Unaerated cement shall not have an expansion of more than 10mm when tested by Le Chatlier and 0.8% by Autoclave test.	Unaerated cement shall not have an expansion of more than 10mm when tested by Le Chatlier and 0.8% by Autoclave test	Unaerated cement shall not have an expansion of more than 10mm when tested by Le Chatlier and 0.8% by Autoclave test.	Le Chatlier and Autoclave test as per IS 4031 (Part-3)



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S. No.	Name of the test	Ordinary Portland Cement 33 grade as per IS 269	Ordinary Portland Cement 43 grade as per IS 8112	Ordinary Portland Cement 53 grade as per IS 12269	Remarks
b)	Chemical composition tests				Review of MTC only
		a) Ratio of percentage of lime to percentage of silica, alumina & iron oxide 0.66 to 1.02	a) Ratio of percentage of lime to percentage of silica, alumina & iron oxide 0.66 to 1.02	a) Ratio of percentage of lime to percentage of silica, alumina & iron oxide 0.80 to 1.02%	
		b) Ratio of percentage of alumina to that of iron oxide Minimum 0.66%	a) Ratio of percentage of alumina to that of iron oxide Minimum 0.66	a) Ratio of percentage of alumina to that of iron oxide Minimum 0.66%	
		c) Insoluble residue, percentage by mass Max. 4.00%	c) Insoluble residue, percentage by mass Max. 2.00%	c) Insoluble residue, percentage by mass Max. 2.00%	
		d) Magnesia percentage by mass Max. 6%	d) Magnesia percentage by mass Max. 6%	d) Magnesia percentage by mass Max. 6%	
		e) Total sulphur content calculated as sulphuric anhydride (SO ₃), percentage by mass not more than 2.5 and 3.0 when tri-calcium aluminate percent by mass is 5 or less and greater than 5 respectively.	e) Total sulphur content calculated as sulphuric anhydride (SO ₃), percentage by mass not more than 2.5 and 3.0 when tri-calcium aluminate percent by mass is 5 or less and greater than 5 respectively.	e) Total sulphur content calculated as sulphuric anhydride (SO ₃), percentage by mass not more than 2.5 and 3.0 when tri-calcium aluminate percent by mass is 5 or less and greater than 5 respectively.	
		f) Total loss on ignition shall not be more than 5 percent	f) Total loss on ignition shall not be more than 5 percent	f) Total loss on ignition shall not be more than 5 percent	



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S. No.	Name of the test			Remarks
2.	PORTLAND POZZOLANA CEMENT AS PER IS 1489/2005			
a)	Physical tests	i) Fineness	Specific surface area shall not be less than 300 sq.m. per Kg. or 3000 Cm ² /gm	To be conducted in BSPTCL approved Lab
		ii) Compressive strength	a) 72 ± 1 hour : Not less than 16 Mpa (16 N/mm ²) b) 168 ± 2 hour : Not less than 22 Mpa (22 N/mm ²) c) 672 ± 4 hour : Not less than 33 Mpa (33 N/mm ²)	
		iii) Initial & Final setting time	Initial setting time : Not less than 30 minutes Final setting time : Not more than 600 minutes	
		iv) Soundness	Un aerated cement shall not have an expansion of more than 10mm Le chatlier test and 0.8% by Autoclave test as per IS 4031 (Part-3)	
b)	Chemical composition tests			
		a) Magnesia percentage by mass Max. 6%		Review of MTCC only
		b) Insoluble material, percentage by mass $x + 4(100-x)/100$ where x is the declared % of pozzolana in the PPC		-do-
		c) Total sulphur content calculated as sulphuric anhydride (SO ₃), percentage by mass not more than 3.0		-do-
		Total loss on ignition shall not be more than 5 percent		



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Annex-2

ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR REINFORCEMENT STEEL AS PER IS 1786-1985 Edition-4.3 (2004-12)

S. No.	Name of the test	Fe 415	Fe 500
i)	Chemical analysis test		
	Carbon	0.30 Percent Maximum	0.30 Percent Maximum
	Sulphur	0.060 Percent Maximum	0.055 Percent Maximum
	Phosphorus	0.060 Percent Maximum	0.055 Percent Maximum
	Sulphur & Phosphorus	0.11 Percent Maximum	0.105 Percent Maximum
ii)	Physical tests		
	a) Tensile Strength Minimum	10% more than actual 0.2% proof stress but not less than 485 N/Sq.mm.	8 % more than actual 0.2% proof stress but not less than 545 N/Sq.mm
	b) 0.2% of proof stress/Yield stress Minimum, N/mm ²	415	500
	c) Elongation percent , Minimum	14.5	12
iii)	Bend & Rebend tests	Pass	Pass



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ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR COARSE AGGREGATES AS PER IS 383

3.	Coarse Aggregates										
i)	Physical Tests										
	a) Determination of particles size	a. IS Sieve Designation	%age passing for Single-Sized Aggregate of nominal size					Percentage Passing for graded Aggregate of nominal size			
			40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
		63 mm	100	-	-	-	-	-	-	-	-
		40 mm	85 to 100	100	-	-	-	95 to 100	100	-	-
		20 mm	0 to 20	85 to 100	100	-	-	30 to 70	95 to 100	100	100
		16 mm	-	-	85 to 100	100	-	-	-	90-100	-
		12.5 mm	-	-	-	85 to 100	100	-	-	-	90 to 100
		10 mm	0 to 5	0 to 20	0 to 30	0 to 45	85 to 100	10 to 35	25 to 55	30 to 70	40 to 85
		4.75 mm	-	0 to 5	0 to 5	0 to 10	0 to 20	0 to 5	0 to 10	0 to 10	0 to 10
		2.36 mm	-	-	-	-	0 to 5	-	-	-	-
	b.	Flakiness index		Not to exceed 25%							
	c.	Crushing Value		Not to exceed 45%							
	d.	Presence of deletrious material		Total presence of deleterious materials not to exceed 5%							
	e.	Hardness		Abrasion value not more than 50%, Impact value not more than 45%							
	f.	Soundness test (for concrete work subject to frost action)		Not to exceed 12% when tested with sodium sulphate and 18% when tested with magnesium sulphate							



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ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR FINE AGGREGATES AS PER IS 383

4. Fine aggregates					
i)	Physical Tests	IS Sieve Designation	Percentage passing for		
			F.A. Zone I	F.A. Zone II	F.A. Zone III
a)	Determination of particle size				
		10 mm	100	100	100
		4.75 mm	90-100	90-100	90-100
		2.36 mm	60-95	75-100	85-100
		1.18 mm	30-70	55-90	75-100
		600 microns	15-34	35-59	60-79
		300 microns	5 to 20	8 to 30	12 to 40
		150 microns	0-10	0-10	0-10
b)	Silt content		Not to exceed 8%	Not to exceed 8%	Not to exceed 8%
c)	Presence of deleterious material	Total presence of deleterious materials shall not exceed 5%			
d)	Soundness Applicable to concrete work subject to frost action	12% when tested with sodium sulphate and 15% when tested with magnesium sulphate			



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Annex-5

ACCEPTANCE CRITERIA AND PERMISSIBLE LIMITS FOR CONCRETE WORK

1)	Concrete	a) Workability	Slump shall be recorded by slump cone method and it shall be between 25-55 mm.
		b) Compressive strength	For nominal (volumetric) concrete mixes compressive strength for 1:1.5:3 (Cement : Fine aggregates : Coarse aggregates) concrete 28 days strength shall be min 265Kg/cm² and for 1:2:4 (Cement: Fine Aggregate: Coarse Aggregate) nominal mix concrete 28 days strength shall be min 210Kg/cm².

Notes:

- 1) ACCEPTANCE CRITERIA BASED ON 28 DAYS COMPRESSIVE STRENGTHS FOR NOMINAL MIX CONCRETE:
 - a) On the basis of mandatory lab test result, in case of actual average compressive strength being less than specified strength but up to 70% of specified strength, concrete may be accepted and the rate payable shall be in the same proportion as the actual average compressive strength bears to specified compressive strength.
 - b) If the actual average strength of accepted sample is less than 70% of specified strength, the Site -in-charge shall reject the defective portion of work represent by sample and nothing shall be paid for the rejected work. Remedial measures necessary to retain the structure shall be taken at the risk and cost of contractor. If, however, the Engineer-in-charge / Project In-charge so desires, he may order additional tests to be carried out to ascertain if the structure can be retained/rectified. All the charges in connection with these additional tests shall be borne by the Contractor.
- 2) 53 Grade cement shall be used after obtaining specific approval of the Engineer in charge.
- 3) Portland slag cement conforming to IS:455 may be used as per Technical Specification.



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General Notes:

- 1) This Field Quality Plan is not to limit the supervisory checks which are otherwise required to be carried out during execution of work as per drawings/Technical specifications etc.
- 2) All materials under supply contract should have D.I. before they are erected.
- 3) Contractor shall be responsible for implementing/documenting the FQP. Documents shall be handed over by the contractor to BSPTCL after the completion of the work.
- 4) Project incharge means over all incharge of work. Site in-charge means in-charge of the line. Site engineer means in -charge of the section.
- 5) In case of deviation the approving authority will be one step above the officer designated for acceptance in this quality plan subject to minimum level of Line incharge.
- 6) Acceptance criteria and permissible limits for tests are indicated in the Annexures. However for further details/tests BSPTCL specification and relevant Indian standards shall be referred.
- 7) **Tests as mentioned in this FQP shall generally be followed. However E.I.C. reserves the right to order additional tests wherever required necessary at the cost of the agency.**
- 8) All counter checks/tests by BSPTCL shall be carried out by BSPTCL's officials' at least at the level of Site Engineer.
- 9) The authorized dealer means the dealer whose names are listed in the main producer's web site or certified by the main producers.
- 10) Accepting Authority for testing Laboratory shall be Regional Head.
- 11) Mobile Testing Labs owned by the contractor may also be acceptable if their facilities meet the testing requirements and the testing equipments are properly calibrated at-Third Party Labs where testing/calibration is to be carried out should be accredited by NABL or an agency operating in line with ISO/IEC 17011 and having full membership & MRA of ILAC/APLAC, subject to approval of project Incharge.
- 12) **READYMIX CONCRETE (RMC) IS ACCEPTABLE FOR USE. HOWEVER, SITE INCHARGE SHALL APPROVE THE SOURCE OF MATERIALS TO BE USED FOR RMC .The documentation to be maintained shall be as per IS 4926:2003 i.e i) Information to be supplied by the purchaser (clause 7)**
 - ii) **Information to be supplied by the producer (clause 8)**
 - iii) **Sampling for concrete strength should be one set of 3 nos of cubes for every 50 cu.m or part thereof for each day of concreting and 28 days compressive strength shall be tested in line with IS:456.**
- 14) Epoxy coating on reinforcement steel wherever required shall be done as per IS 13620.



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- 15) Cement is to be used in the order it is delivered (ie. First in First Out). Cement bought to works shall not be more than 6 weeks old from the date of manufacture. In case the cement remains in storage for more than 3 months, the cement shall be retested before use and shall be rejected, if it fails to conform to any of the requirements given in the relevant Indian Standard. Cement shall be packed in bags and stored in accordance with the provisions in IS -4082.
- 16) If e-mail facility is not available in BSPTCL approved Lab, report may be collected directly by BSPTCL/ Speed Post / Registered Post / UPC.
- 17) In case any Laboratory refuses to allow BSPTCL representative for witnessing the test, same shall be taken in writing and approval by BSPTCL-HQ.
- 18) **Bidders should thoroughly go through the QAP, MQP & FQP prior to submission of proposal of bids. No extra claim on account of implementation of this QAP, MQP & FQP under any circumstances shall be entertained. All destructive tests, wherever required in compliance of the MQP & FQP shall be done by the contractor without extra cost implications. These MQP & FQP shall be applicable for all the contracts. However the BSPTCL reserves the rights to waive off any testing at its discretion in the interest of the progress of the projects.**



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Annex-6

ENGINEERING GUIDE LINE FOR CHECKING / ACCEPTING SOIL INVESTIGATION REPORT:

Following are the guide line for checking and accepting the soil investigation report:

The soil investigation shall be carried out in line with the Technical Specification. The detailed soil Investigation Report should be signed by the soil investigating agency, Line Contractor and BSPTCL's Site Engineer and following points should be checked in the soil investigation report:

1) Normal Locations :

- a) Soil investigation report should contain the bore Log sheet indicating the variation of different soil strata.
- b) The Bearing capacity, Bulk density (γ) , Submerged Density(γ_{Sub}) , angle of repose (δ) in dry as well as wet condition and Angle of internal friction (ϕ) for different soil layers including at 3m depth shall be indicated in the Soil investigation report.
- c) Present water table and history of variation of water table at the tower location shall be indicated in the soil investigation report.
- d) Classification of foundation should be indicated based on the water table , Bearing capacity, Swelling Index, Soil type and the value of angle of repose (δ) in line with parameters indicated in the standard foundation drawings.

2) River Crossing /Special Locations:

- a) A sketch indicating profile of river crossing locations with borehole positions shall be indicated in the soil investigation report.
- b) Maximum discharge, Maximum velocity and Highest Flood Level (HFL) data (authenticated) of the river shall be enclosed in the Soil Investigation Report.
- c) Comprehensive Bore log Sheet indicating the depth of different Strata, Soil type , SPT value & water table for each bore hole is to be indicated in the soil investigation report.



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- d) Natural Ground Level (GL) for all the locations are to be indicated. **Note that the GL & HFL should be with respect to same reference. For example if HFL is given in RL, the ground level should be in terms of RL only. Mixing of level with respect to MSL (Mean Sea level) & RL should be avoided.**
- e) Whether the river is navigable or not is to be indicated in the soil investigation report.
- f) Silt factor calculation based on the laboratory test results of weighted mean diameter (d_m) of soil for different layers of the soil shall be furnished in the soil investigation report.
- g) Bulk density (γ), Submerged Density (γ_{Sub}), Value of Cohesion (**C**) and Angle of internal friction (ϕ) for different soil layers based on laboratory test results shall be indicated in the soil investigation report.
- h) If Rock is encountered prior to termination of bore hole (40m below existing Ground Level) , core drilling should be done. The details of core recovery (Run wise) and calculation of Rock Quality Designation (RQD) together with the photograph of core sample properly placed in a core Box are to be enclosed in the soil investigation report.
- i) If the refusal is not obtained or the type of soil encountered at 40m depth below existing ground level is very poor (like loose clay, organic deposit etc.) further boring should be continued up to a depth of 50m below Ground Level or refusal whichever is earlier and all relevant data upto termination depth of bore holes shall be furnished in the Soil Investigation Report as detailed above.