


A-FORM  FORM NO BP-0021	BHARAT HEAVY ELECTRICALS LIMITED - BHOPAL MM DEPARTMENT ESTIMATE SHEET FOR ISSUE OF MATERIAL/COMPONENTS FROM BHEL CHECKLIST	A-FORM NO : A202W91 REV NO : 0 A-FORM DATE : 06-MAR-23 DATE : 07-MAR-23 PAGE : 1 / 1																																																																																																																																																																																		
DEPARTMENT : 202 PROJECT : KSEB RMU OF KUT PO NO : A202W91 END PRODUCT : WTM INDENT NO : 220220202 WORK ORDER NO : 39222A20305 PO DATE : DELY REQD : 30042023 INDENT DATE : 04032023 MATERIAL ISSUE DIV : 202 SUPP CODE : SUPP NAME :																																																																																																																																																																																				
DETAILS OF FINISHED GOODS																																																																																																																																																																																				
<table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">A-SLNO</th> <th style="width:15%;">PO IT NO</th> <th style="width:15%;">PI IT NO</th> <th style="width:20%;">QUANTITY REQUIRED</th> <th style="width:10%;">UNIT</th> <th style="width:10%;">SHOP NO</th> <th style="width:10%;">DEST CD</th> <th style="width:10%;">COST CD</th> <th style="width:10%;">H.CELL</th> </tr> </thead> <tbody> <tr> <td colspan="9">DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA</td> </tr> <tr> <td colspan="9" style="text-align: center;">FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS</td> </tr> <tr> <td>MATL CODE</td> <td>QTY PSL UNIT</td> <td>PSL UNIT</td> <td>RATE PSL UNIT</td> <td>TOTAL MATL TO BE ISSUED</td> <td>ISSUE PSL/ UNIT WIP</td> <td>SMIV/ PPMIV NO</td> <td>MATERIAL VALUE</td> <td>TARRIF HEAD</td> <td>MATL ISSUE QTY</td> </tr> <tr> <td colspan="9">DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA</td> </tr> <tr> <td></td> <td>1</td> <td>0</td> <td>1</td> <td></td> <td>2.000 NO</td> <td>202</td> <td>202</td> <td>202</td> <td>202</td> </tr> <tr> <td colspan="9">MACHINING OF PELTON RUNNER</td> </tr> <tr> <td>HT4392218015</td> <td>1.0000 NO</td> <td></td> <td>9583276.000</td> <td>2.00</td> <td>NO WIP</td> <td></td> <td>19166552.000</td> <td></td> <td>1.0000</td> </tr> <tr> <td colspan="9">FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .</td> </tr> <tr> <td></td> <td>2</td> <td>0</td> <td>1</td> <td></td> <td>1.000 NO</td> <td>202</td> <td>202</td> <td>202</td> <td>202</td> </tr> <tr> <td colspan="9">MACHINING OF PELTON RUNNER</td> </tr> <tr> <td>HT4392218015</td> <td>1.0000 NO</td> <td></td> <td>9583276.000</td> <td>1.00</td> <td>NO WIP</td> <td></td> <td>9583276.000</td> <td></td> <td>1.0000</td> </tr> <tr> <td colspan="9">FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .</td> </tr> <tr> <td></td> <td>3</td> <td>0</td> <td>1</td> <td></td> <td>1.000 NO</td> <td>202</td> <td>202</td> <td>202</td> <td>202</td> </tr> <tr> <td colspan="9">MACHINING OF PELTON RUNNER</td> </tr> <tr> <td>HT4392218015</td> <td>1.0000 NO</td> <td></td> <td>9583276.000</td> <td>1.00</td> <td>NO WIP</td> <td></td> <td>9583276.000</td> <td></td> <td>1.0000</td> </tr> <tr> <td colspan="9">FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .</td> </tr> <tr> <td colspan="7">REMARKS NOT APPLICABLE.</td> <td colspan="2">AFORM TOTAL 38333104.000</td> </tr> <tr> <td colspan="9">TOTAL NO OF CANCEL ITEM 0</td> </tr> </tbody></table>			A-SLNO	PO IT NO	PI IT NO	QUANTITY REQUIRED	UNIT	SHOP NO	DEST CD	COST CD	H.CELL	DESCRIPTION OF SUB-ASSEMBLY/ITEM & WEIGHT/VOLUME/AREA									FREE ISSUE MATERIAL PER UNIT OF FINISHED GOODS									MATL CODE	QTY PSL UNIT	PSL UNIT	RATE PSL UNIT	TOTAL MATL TO BE ISSUED	ISSUE PSL/ UNIT WIP	SMIV/ PPMIV NO	MATERIAL VALUE	TARRIF HEAD	MATL ISSUE QTY	DESCRIPTION OF FREE ISSUE MATERIAL AND WEIGHT /VOLUME/AREA										1	0	1		2.000 NO	202	202	202	202	MACHINING OF PELTON RUNNER									HT4392218015	1.0000 NO		9583276.000	2.00	NO WIP		19166552.000		1.0000	FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .										2	0	1		1.000 NO	202	202	202	202	MACHINING OF PELTON RUNNER									HT4392218015	1.0000 NO		9583276.000	1.00	NO WIP		9583276.000		1.0000	FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .										3	0	1		1.000 NO	202	202	202	202	MACHINING OF PELTON RUNNER									HT4392218015	1.0000 NO		9583276.000	1.00	NO WIP		9583276.000		1.0000	FORGED DISC OF ASTM A743 GRADE CA6NM / ASTM A473 M TYPE S41500 FOR PELTON RUNNER MACHINING TO DRG. NO. 12040720602 REV. 01 VAR. 00 # 001 R/M WT. = 10318.00 KG F/M WT. = 3329.00 KG .									REMARKS NOT APPLICABLE.							AFORM TOTAL 38333104.000		TOTAL NO OF CANCEL ITEM 0								
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1 MATERIAL TO BE ISSUED ON :- FREE ISSUE BASIS 2. TRANSPORT TO BE PROVIDED BY :- SUPPLIER 3. EXCISE DUTY ON ISSUE MATL TO BE BORNE BY :- SUPPLIER 4. SCRAP TO BE RETURNED :- NO 5 INVARIABLY ISSUE WT. TO BE RECORDED ON SMIV/PPMIV	SIGNATURE OF INDENTOR NAME DESIGNATION TELEPHONE <div style="text-align: center;">  Ram Kumar Verma अभियंता / Engineer </div>	SIGNATURE OF ASC EXECUTIVE NAME DESIGNATION TELEPHONE <div style="text-align: center;">  BISWAJIT DHIR अभियंता / Engineer </div>
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RPT-101

जल टरबाईन विनिर्माण प्रभाग / WTM Division
 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL

जल टरबाईन विनिर्माण प्रभाग / WTM Division
 बी.एच.ई.एल., भोपाल / B.H.E.L., BHOPAL

Technical Pre-Qualification Requirements for Machining of PELTON RUNNER,

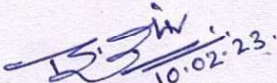
PI NO.- 220220202

Date:- 10/02/2023


Required machining of 4 no. Stainless steel (ASTM A 473 GR CA 6NM) Pelton Runner as per drawing 12040720602 rev. 01 (OD 2120.6 mm, weight 3329 kg) from forged Disc (Sketch Drawing no. 12040720603 rev. 00, weight-10318 kg, OD 2126 mm) & as per Annexure-A.

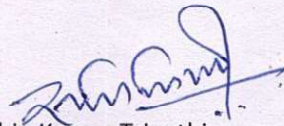
Following are the minimum eligibility requirements for machining of Pelton Runner for qualification of vendors.

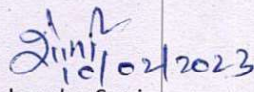
- (1) Availability of 5-Axis CNC machine / Equivalent of 5-Axis CNC machine (3-Axis CNC machine with programmable head), Machine make with specification & photo are required. Vender to ensure the capacity of machine to accommodate above forged disc.
- (2) Vendor should have experience for machining of at least one Pelton Runner (OD should be approx. 40% of the Runner OD covered in this enquiry). Dispatch date against this purchase order should be within last 10 years from the date of tender opening (techno-commercial). Vendor shall submit an unpriced copy of PO along with necessary documentary evidence in support of dispatch date.
- (3) Availability of Crane facility for lifting of 12 ton job or more considering factor of safety.
- (4) Availability of surface finish measuring instruments. Instruments make with spec & photo are required.
- (5) Vendor should be ready to accept a secrecy clause of maintaining strict confidentiality of the model/profile/data/information related to this purchase order. For this a declaration to be furnished by vendor on company letterhead signed by competitive authority.
- (6) Being a critical item, the bidders has to submit last three consecutive years CA audited financial report (Balance sheet and profit & loss account). Required financial soundness will be decided by our evaluation committee as per policy for MSME and no relaxation will be given to MSME vendor in experience criteria.


Biswajit Dhir
Engineer/WTM


Maqbul Ahmad
Manager/GJB


Rahul Pratap Singh
Mgr./HTE


Sachin Kumar Tripathi
Sr. DGM / WTM


Mahendra Soni
Manager / WTM

ANNEXURE-A

PI NO.- 220220202

Date:- 10.02.2023

PROJECT :- KUTTIYADI HYDROELECTRIC PROJECT (3X27.5 MW)

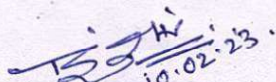
DESCRIPTION: - MACHINING OF 4 NOS. PELTON RUNNER AS PER DRAWING NO. 12040720602 REV 01, FROM FORGED STAINLESS STEEL DISC (SKETCH DRAWING NO. 12040720603 REV 00)

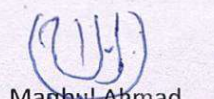
SCOPE OF WORK


- (1) Raw material for Pelton Runner i.e. forged disc will be issued from BHEL Bhopal after submitting Bank guarantee by the Vendor.
- (2) The material of forged Disc is ASTM A 473 GR CA 6NM/ASTM A 473 M TYPE S41500
- (3) Vendor to obtain 3D Model for Bucket profile details from BHEL Bhopal after PO placement.
- (4) Vendor to obtain inspection sheets of Pelton Runner from BHEL Bhopal after PO placement.
- (5) Pelton Runner having 22 nos. buckets will be machined from single disc forging with the help of 5-Axis CNC machine. However, vendors are free to machine these Pelton runners on equivalent 5-axis CNC machine (3-Axis CNC machine with programmable head), but the final dimension should be as per drawing.
- (6) Runner forging shall be supplied with fully finished machined ground and polished Buckets. However, faces and central bore should be in rough machined condition [leaving 5mm extra materials on tool point on both the faces (coupling face and face opposite to coupling face), central bore from the finished dimensions shown in section A-A of drawing no. 12040720602 rev 01, for final machining at BHEL Bhopal.
- (7) Coupling bore machining will be done at BHEL Bhopal not in the scope of vendor.
- (8) Vendor will supply two sets of Templates (as per inspection sheets). One set of Templates will be dispatched with first Runner & other set with last Runner.
- (9) Before start of Runner machining, vendor to obtain the confirmation regarding latest revision of drawing from BHEL Bhopal.
- (10) In case of any doubt during machining, vendor to consult BHEL Bhopal.
- (11) Delivery required in 90 to 120 days per Runner after issue of material.
- (12) Indent quantity to be split among two successful bidders in the ratio of 3:1. In case of severe delay by L1 vendor, 01 set can be allocated to L2 vendor & in case of only one successfully qualified bidder, order for all 04 nos. shall be placed on that successful bidder.

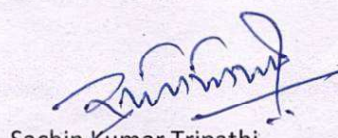
COMMON POINTS

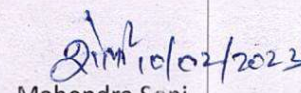
- (1) QA plan applicable
- (2) Required tools and fixture will be arranged by vendor.
- (3) Any checking gauge / measuring gauge will be arranged by vendor.
- (4) Inspection will be done at vendor's work by BHEL/Customer before dispatch.
- (5) Transportation to & fro from BHEL Bhopal works will be in vendor scope.
- (6) Scrap (approx. 6989.00 kg per Runner, RM wt. approx. 10318 kg, FM wt. approx. 3329 kg) charges will be deducted as per BHEL practice.

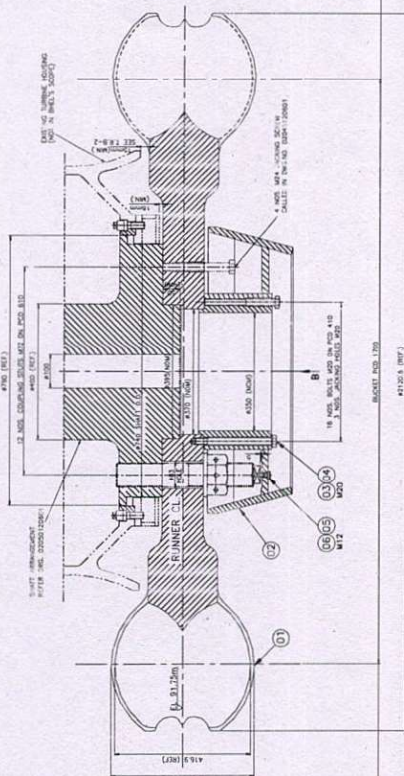

Biswajit Dhir
Engineer/WTM


Maqbul Ahmad
Manager/GJB

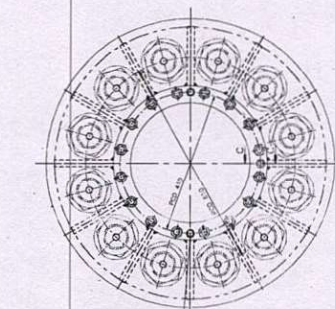

Rahul Pratap Singh
Mgr./HTE


Sachin Kumar Tripathi
Sr. DGM / WTM

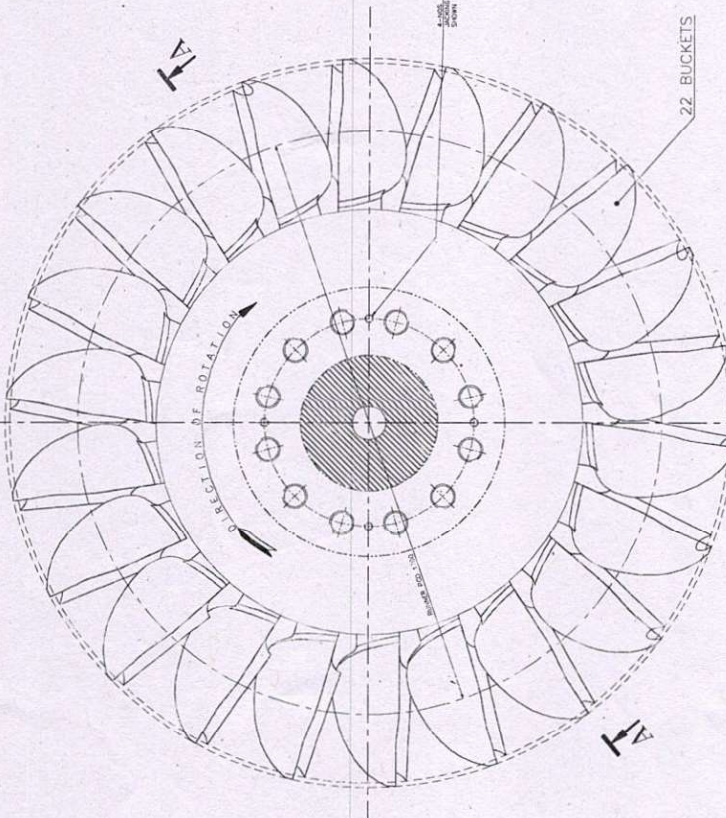

Mahendra Soni
Manager / WTM



SECTION-AA



NEW-B



PLAN
FROM GENERATOR END

TECHNICAL REQUIREMENTS

1. RUNNER TO BE STATISTICALLY BALANCED AT WORKS. MATERIAL TO BE PREFERABLY REMOVED FROM BOTTOM SIDE. IF REQUIRED, UNBALANCE MASS MAY BE REMOVED FROM TOP FACE ALSO.
2. PROOF ASSEMBLY OF RUNNER (ITEM 01) WITH RUNNER SHIELD (ITEM 02) TO BE CARRIED OUT.
3. FOR PACKING AND PRESERVATION OF ITEMS COVERED BY THIS DRAWING, REFER RTE PRODUCT STANDARD HTD00208.

AT SITE:

1. RUNNER COUPLING TUBS ARE TO BE TIGHTENED AS PER I.P.3.
2. MINIMUM 15 MM GAP TO BE ENSURED AT SITE BETWEEN RUNNER FLANGE AND HOUSING. IF REQUIRED MATERIAL TO BE REMOVED FROM HOUSING.
3. MINIMUM 16 MM GAP TO BE ENSURED BETWEEN RUNNER FLANGE AND LASTRINTH.
4. STORAGE & PRESERVATION OF ITEMS COVERED IN THIS DRAWING, AFTER THE PRODUCT STANDARD HD03200.

LITERATURE CITED

- SHAFT ARRANGEMENT: 0-205-01-20401

[illegible]

ADDITIONAL INFORMATION N/A.		PROJECT		KUTTIYADI HYDRO ELECTRIC PROJECT (3-27.5 MW)																																			
STATUS OF DRAWING		U		KERALA STATE ELECTRICITY BOARD LIMITED																																			
REVISIONS OF THIS DRAWING FORM-1, THE-1, WPP-1		CONTRACTOR		BHARAT HEAVY ELECTRICALS LTD. BHOPAL																																			
<table><tr><td>NO.</td><td>DATE</td><td>BY</td><td>CHKD.</td><td>DATE</td><td>NO.</td></tr><tr><td>1</td><td>26.2.74</td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td>26.2.74</td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td>26.2.74</td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td>26.2.74</td><td></td><td></td><td></td><td></td></tr></table>		NO.	DATE	BY	CHKD.	DATE	NO.	1	26.2.74					2	26.2.74					3	26.2.74					4	26.2.74												
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BINDER ARRANGEMENT (22 BODIES)				DATE BY CHKD. DATE NO.																																			

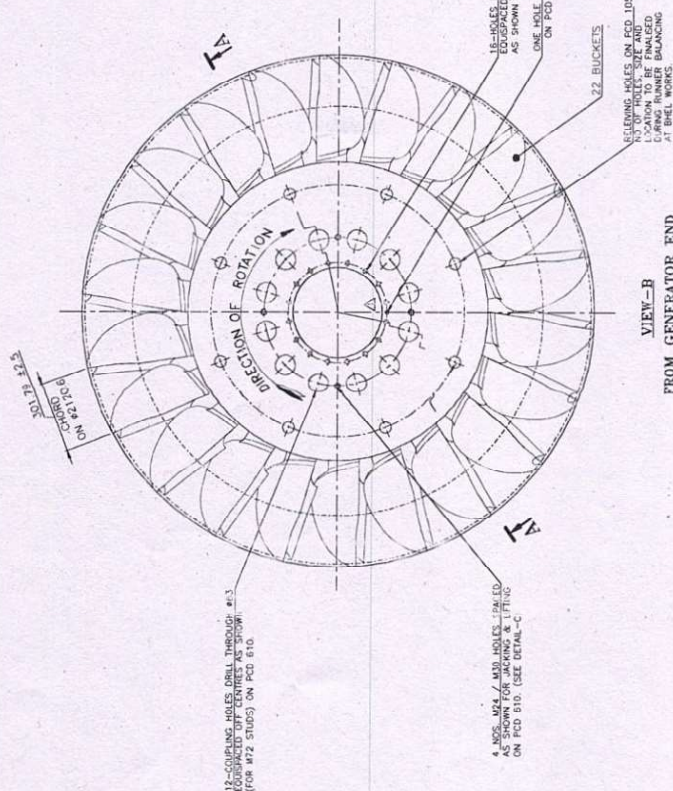
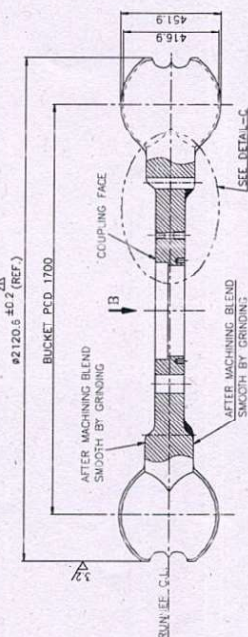
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10. THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. IT IS THE POLICY OF THE NATIONAL ARCHIVES TO MAKE AVAILABLE TO THE PUBLIC AS MUCH INFORMATION AS POSSIBLE, AND TO REMOVE UNNECESSARY RESTRICTIONS. IT IS THE POLICY OF THE NATIONAL ARCHIVES TO MAKE AVAILABLE TO THE PUBLIC AS MUCH INFORMATION AS POSSIBLE, AND TO REMOVE UNNECESSARY RESTRICTIONS.

3.2/ ☒ ALL OVER UNLESS OTHERWISE STATED.



SEE DETAIL - C




VIEW-B
FROM GENERATOR END

TECHNICAL REQUIREMENTS :-

1. MATERIAL OF RUNNER: CASTING ASTM A743 GRADE C836H.
2. RUNNER TO BE STATICALLY BALANCED AFTER FINISH GRINDING OF BUCKETS AND BEFORE FINISH MACHINING OF HUB BY ECCENTRIC MACHINING OF RUNNER. RUNNER TO BE FINALLY RE-BALANCED. (SEE T.R. 9)
3. ALL COUPLING HOLES ARE TO BE MADE ON CNC M/C FOR MAINTAINING INTERCHANGEABILITY.
4. DIMENSIONS MARKED THIS * TO BE STRICTLY MAINTAINED TO ACHIEVE INTERCHANGEABILITY.
5. HUB OF CURVE RUNNER INCLUDE WITH BUCKETS TO BE CARRIED OUT AFTER FINAL MACHINING AT BHEL'S WORKS WHEREVER WITH PRODUCT STANDARD HT 00253.
6. ALL SURFACES WHEREVER FINAL MACHINING/GRINDING HAS BEEN CARRIED OUT AT BHEL WORKS ARE TO BE SUBJECTED TO 100K MPI & DPT AS PER SPECIFICATION HT 00253.
7. AFTER FINAL FINISHING OF RUNNER PAINT AND PROTECT AS FOLLOWS--
 - a) ALL POLISHED PROFILES & SURFACES TO BE GIVEN TWO THICK COATS OF TRANSPARENT LACQUER
 - b) ROUGH GROUND BACK OF BUCKETS TWO THICK COATS OF RED ENAMEL PAINT
 - c) ALL OTHER MACHINED MATING SURFACES TO BE COATED WITH T.R.P. (CAT'G OF HT000303).
8. THERE SHALL BE STRICTLY NO CHIPPING MARKS OR SLING MARK LEFT ON THE RUNNER
9. DIMW. ± 0.10 TO ± 0.30 SHALL BE CONCENTRIC WITHIN 0.03MM.
10. RUNNER TO BE STATICALLY BALANCED PERMISSIBLE OUT OF BALANCE AS 17.5 Kg-cm.

[illegible]

		MANUFACTURER'S NAME AND ADDRESS:		STANDARD MANUFACTURING QUALITY PLAN				PO NO. & DATE (To be filled by the vendor)			
				ITEM: MACHINING OF PELTON RUNNER (FROM FORGED DISC)		QIP NO.: QA/HT/2143 REV.NO.: 00 DATE: 11/06/2022 PAGE: 01 OF 01					
				REFERENCE DOCUMENT: PURCHASE ORDER & BHEL DRAWING AND INSPECTION SHEET							

SL. NO	OPERATIONS & CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REF. DOC.	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		REMARKS
				M	B				D*	**		
1.	2.	3.	4.	5.		6.	7.	8.	D*	**	10.	11.
1.	Template check (check of templates with 1:1 drawing)	Critical	Measurement	100%	100%	1:1 drawing / BHEL drawing		QCR	✓	P	W	
2.	Checking of bucket Chord / pitch	Critical	Measurement	100% (each bucket)		Drawing /Drawing TR /BHEL inspection sheet		QCR	✓	P	W	Each bucket to be identified with running serial number hard punched
3.	Checking of bucket Inner & outer width	Critical	Measurement	100% (each bucket)		-do-		QCR	✓	P	W	
4.	Checking of bucket PCD	Critical	Measurement	100%	100%	-do-		IR	✓	P	W	
5.	Check of complete bucket profile (longitudinal & transverse) including root area, splitter section, bucket angle w.r.t. hub, blending radius & bucket thickness	Critical	Measurement	100% (each bucket)		-do-		QCR	✓	P	W	
6.	Final main dimensions (Runner OD, ID, Hub thickness)	Major	Measurement	100%	100%	-do-		QCR	✓	P	W	
7.	Surface finish (to be recorded separately for hub, central bore and each bucket inside & outside region)	Critical	Measurement	100%	100%	-do-		QCR	✓	P	W	
8.	Waviness check & undulation check	Major	Measurement	100% (each bucket)		-do-		QCR	✓	P	W	
9.	Visual inspection (check for sling, tool marks etc)	Minor	Measurement	100%	100%	-do-		QCR	✓	P	W	
10.	Identification	Major	Visual	100%	100%	-do-		CoC	✓	P	W	
11.	Packaging & bucket protection	Major	Visual	100%	100%	-do-		CoC	✓	P	V	Photographs to be approved by BHEL before dispatch
12.	Weight of finished runner	Minor	Measurement	100%	100%	-do-		QCR	✓	P	V	

T.R. Jadhav
By: Mgt. BWT.

Signature (BHEL)

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
**** M:** MANUFACTURER/SUB-SUPPLIER **C:** SUPPLIER/ SUPPLIER NOMINATED INSPECTION AGENCY, **B:**BHEL'S CUSTOMER/ BHEL QC/ BHEL APPOINTED INSPECTION AGENCY (OR ANY COMBINATION OF 2 AGENCIES)
P: PERFORM **W:** WITNESS AND **V:** VERIFICATION **IR:**INSPECTION REPORT
QCR-QC REPORT TC:TEST CERTIFICATE **RR** – REVIEW OF RECORD
COC: CERTIFICATE OF COMPLIANCE

ACCEPTED BY
(VENDOR'S QC REPRESENTATIVE)

- Upon observance of any forging defect during machining, vendor has to stop machining and inform BHEL regarding the same. Vendor to further proceed only after written confirmation from BHEL in such case.
- Compliance with this QAP does not absolve the vendor from their responsibility of machining and supply as per BHEL PO and drawing so as to give satisfactory performance upon commissioning.
- In case of any discrepancy / interpretational issue, BHEL PO and Drawing shall be binding.