		TECHNOLOGICAL PROCESS NOT FOR PROCESS SHEET PRINT					Production Order	Date
Plant: P006		Equipment No: HEH2521					101911974	15.02.2021
Type		WBS Element		Customer / Project Name				Part No
		P-1032256100-17523		2x660 MW TANGEDCO UDANGUDI STPP STA				17523003
Drawing No.-Var		E.Rev.	T.Rev	Material No.		Name Of The Part		
31750501418-00		00	00	31750501418-00		TUBESHEET HPH 9 HUB THK 180		
Pos.No	BOM Qty	Ord Qty	MU	St.	Nt.Wt.	Remarks		MDCC
0001	1.000	1.000	EA	IS06	18,400.000			YES


BOM Details

Pos.No	IC	Material Code	P.No	Remarks			
Matl.Spec	SPK	Qty	MU	Size 1	Size 2	Size 3	Formula Key
0010	L	HE9718584560		17523004	MA by QC, CIB verifi by customer		
HE51155-NA		1.000	EA	0.000	0.000	0.000	0.000
Material Description : TUBESHEET FORGING				Reservation : 0013715602	Item : 0001	Picklist:1000640404	

Operation Details

Opr No	W.C.	Plant	Ctl. ky	Prep Time	Time/ PC(M)	Time/ PC(L)	Total Time	QC Signature		
PRT Cat	PRT No.			PRT Description						
Sub Operation Text										
0010	DE9863	P006	QM01	0.000	0.000	0.000	0.000			
TUBE LAYOUT DRG.NO.3-17501-02237/Rev 00 Lifting lug drawing : 4-17501-03123 Verification & correlation of material with TC & attestation of material & Review of TCs and Transfer of material attestation marks. Inspection by QC,CIB and verification by CUSTOMER.										
0020	DG4242	P006	ZP01	60.000	960.000	960.000	1,020.000			
REFER SIDE VIEW AND DET.-Q. Clamp with open end up wards. True the surface which is to be over laid and Turn Ø 1768/7 mm depth for OVERLAY with 45° chamfer.										
0030	DH9863	P006	QM01	0.000	0.000	0.000	0.000			
1. Carryout PT examination on surface to be overlaid 2. Measure the height " H " at different points. Inspection by QC and verification by CUSTOMER.										
0110	DH9523	P006	ZP01	30.000	0.000	120.000	150.000			
1.Clamp the tube sheet for overlay on manipulator and clamp preheating fixtures. Clean the surface to be over laid. 2.DURING OVERLAY at next operation ,dress up by cleaning (grind ,if necessary) after each layer. REFER DRG.NO.3-17501-00544 FOR WELD DETAILS AND WPS.										
0120	DH2884	P006	ZP01	60.000	5,682.000	5,682.000	5,742.000			
STRIP OVERLAY (DETAIL - W/1) BASIC LAYER :- USE 309 L STRIP SUBSEQUENT LAYER :- USE 308 L STRIP NOTE: Total thick of overlay should be 11 mm minimum										
0130	DH9863	P006	QM01	0.000	0.000	0.000	0.000			
Inspection of overlay surface. Check the thickness of overlay w.r.t height " H " at different points. Inspection by QC.										
Chkd. By		Dt.	ECR/ Rev No		Dt.	Pro.Plnr		Rate Fixr / Tool Plnr	Pg no	No.of Pgs
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		TECHNOLOGICAL PROCESS				Production Order		Date			
Plant:P006		Equipment No: HEH2521				101911974		15.02.2021			
Type		Work Order / PGMA		Customer				Part No			
		P-1032256100-17523/ 17523		2x660 MW TANGEDCO UDANGUDI STPP STA				17523003			
Drawing No.-Var		E.Rev.	T.Rev.	Material No.		Name Of The Part					
31750501418-00		00	00	31750501418-00		TUBESHEET HPH 9 HUB THK 180					
Pos.No	BOM Qty	Ord Qty	MU	St.	Nt.Wt.	Remarks					
0001	1.000	1.000	EA	IS06	18,400.000						
Operation Details											
Opr No	W.C.	Plant	Ctl. ky	Prep Time	Time/ PC(M)	Time/ PC(L)	Total Time	QC Signature			
PRT Cat	PRT No.			PRT Description							
Sub Operation Text											
0140	DG4242	P006	ZP01	60.000	480.000	480.000	540.000				
Clamp ,face over laid surface in flush with tube sheet surface. (i.e ,inside flat surface) Reverse Face to clean											
0150	DG9863	P006	QM01	0.000	0.000	0.000	0.000				
PT examination of over laid surface after machining. Inspection by QC and verification by CUSTOMER.											
0160	DM8576	P006	QM01	0.000	0.000	0.000	0.000				
U.T of over laid surface and over laid thickness. Acceptance STD. HE 71046. Inspection by QC,CIB and verification by CUSTOMER.											
0170	DH9523	P006	ZP01	30.000	0.000	60.000	90.000				
Refer drg no: 4-17501-03123 Prepare and fit one aux. lifting lug pad and lifting lug on tube sheet periphery as shown in the drawing.Tack weld during fit-up											
0173	DH9863	P006	QM01	0.000	0.000	0.000	0.000				
Inspection of fit-up by QC.											
0180	DH2852	P006	ZP01	15.000	300.000	300.000	315.000				
Preheat and weld the aux. pad to tube sheet and lug to pad as shown in the drawing. Pad to tube sheet by L20--1180 Lug to pad by 1/2V25+ L15--300											
0185	DH9421	P006	ZP01	0.000	0.000	0.000	0.000				
Back grind the lug to pad weld joint to sound metal.											
0186	DH9863	P006	QM01	0.000	0.000	0.000	0.000				
Conduct DP. Inspection by QC.											
0187	DH2852	P006	ZP01	15.000	180.000	180.000	195.000				
Welding of lug to pad by 1/2V30+L15--300 Clean the welds.											
0188	DH9863	P006	QM01	0.000	0.000	0.000	0.000				
Conduct DP. Inspection by QC.											
0189	DA9995	P006	ZP99	0.000	0.000	0.000	0.000				
Udangudi HPH Tubesheet drilling SCOPE OF WORK											
Chkd. By		Dt.	ECR/ Rev No		Dt.	Pro.Plnr		Rate Fixr / Tool Plnr		Pg no	No.of Pgs
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		TECHNOLOGICAL PROCESS				Production Order		Date			
Plant:P006		Equipment No: HEH2521				101911974		15.02.2021			
Type		Work Order / PGMA		Customer				Part No			
		P-1032256100-17523/ 17523		2x660 MW TANGEDCO UDANGUDI STPP STA				17523003			
Drawing No.-Var		E.Rev.	T.Rev.	Material No.		Name Of The Part					
31750501418-00		00	00	31750501418-00		TUBESHEET HPH 9 HUB THK 180					
Pos.No	BOM Qty	Ord Qty	MU	St.	Nt.Wt.	Remarks					
0001	1.000	1.000	EA	IS06	18,400.000						
Operation Details											
Opr No	W.C.	Plant	Ctl. ky	Prep Time	Time/ PC(M)	Time/ PC(L)	Total Time	QC Signature			
PRT Cat	PRT No.			PRT Description							
Sub Operation Text											
<p>Note:- This scope of work is for Tube sheet drilling of Udangudi-1 HP Heater</p> <p>Tube layout drg.no. :,3-17501-02237 Rev.00 Common drg. for all HP Heaters of Udangudi-1.</p> <p>Tube sheet drg.no. :,3-17505-01418 Rev.00 -- HP Heater -9.</p> <p>1.,,Tube sheet shall be loaded on vendors who were having the deep hole drilling machine facility. Drilling depth 660 mm minimum and crane capacity of 30T.</p> <p>2.,,A certificate to be produced along with technical bid by mentioning machine specifications , make and date of manufacturing of machine and machine condition.</p> <p>3.,,Tube sheet forging will be supplied with Stainless steel overlay, machining, inspections of overlaid surface, and hook welding on tube sheet for loading and unloading.</p> <p>4.,,Tube sheet supplied with material attestation marks by concerned inspection agencies as per the quality plan.</p> <p>5.,,Mock up piece (Drilling thk: 660 mm) - 1 no. per machine shall be made and available for our BHEL Hyd QC inspection with vendor material prior to start of tube holes drilling on actual job. Two clusters of 7 holes each length of 660 mm minimum.</p> <p>6.,,Clearance for drilling of tube holes to be taken from the BHEL Hyd QC.</p> <p>7.,,All notes given on Tube sheet drawing shall be followed.</p> <p>8.,,Mark axis on as per drawing and punch on marking at ends for further reference.</p> <p>9.,,Every marking on tube sheet shall get inspection by BHEL Hyd QC.</p> <p>10.,,All Tube holes to be drilled in single setting.</p> <p>11.,,Get inspection of Tube holes after every 10 cycles for finish, ovality, ligament and drift.</p> <p>12.,,Tube holes finish as indicated in the drawing shall be maintained.</p> <p>13.,,Tube holes shall be drilled according to tube holes layout and as per tube sheet drawing.</p> <p>14.,,Drift on Tube holes will not be acceptable.</p> <p>15.,,Tie rod holes to be drilled and tapped on shell side as per drawing.</p> <p>16.,,T3, T4 and T5 Tapped holes on periphery shall be done as per respective details of the drawing.</p> <p>17.,,Chamfering of Tube holes both on shell side and Tube side shall be done as per det.-P of drg.</p> <p>18.,,Get dimensional inspection of tube holes for layout, tube hole</p>											
Chkd. By		Dt.	ECR/ Rev No		Dt.	Pro.Plnr		Rate Fixr / Tool Plnr		Pg no	No.of Pgs
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		TECHNOLOGICAL PROCESS				Production Order		Date		
Plant:P006		Equipment No: HEH2521				101911974		15.02.2021		
Type		Work Order / PGMA		Customer				Part No		
		P-1032256100-17523/ 17523		2x660 MW TANGEDCO UDANGUDI STPP STA				17523003		
Drawing No.-Var		E.Rev.	T.Rev.	Material No.		Name Of The Part				
31750501418-00		00	00	31750501418-00		TUBESHEET HPH 9 HUB THK 180				
Pos.No	BOM Qty	Ord Qty	MU	St.	Nt.Wt.	Remarks				
0001	1.000	1.000	EA	IS06	18,400.000					
Operation Details										
Opr No	W.C.	Plant	Ctl. ky	Prep Time	Time/ PC(M)	Time/ PC(L)	Total Time	QC Signature		
PRT Cat	PRT No.			PRT Description						
Sub Operation Text										
finish, ovality, ligament and drift as per quality plan. 19.,,Tube holes shall be answered to the BHEL Hyd supplied Go-No Go gauge. 20.,,Any deviation on the job is not acceptable. 21.,,Easily removable rust preventive shall be applied on all machined surfaces. 22.,,Machining of shell side step as per det.-R and tube side weld bevel as per det.-Q will be carried out at our BHEL Hyd works. 23.,,Submit dimensional report sheet along with dispatch of Tube sheet. 24.,,Machined Tube sheet shall be covered properly while transportation. BHEL Hyd will not provide any packing material.										
0190	DG9414	P006	ZP04	0.000	0.000	0.000	0.000			
Mark the axes A B C D. Refer Tube Layout Drg. : 3-17501-02237.										
0200	DG4751	P006	ZP04	480.000	25,660.000	25,660.000	26,140.000			
Drill 6040 x Ø 16.13 +/- 0.05 holes from shell side. PITCH SPACERS :- 10-88-9392 GO-NOGO GAUGE :- 30-08-60041 3 spindle hours are issued.										
0210	DG9863	P006	QM01	0.000	0.000	0.000	0.000			
1.Inspection of holes after every 5 cycles. 2.Measure Skirt inside diameter and give dimension for turning the step on tube sheet.										
0220	DG4242	P006	ZP01	120.000	1,200.000	1,200.000	1,320.000			
Clamp with overlay surface down wards<(>,<)> turn the step (Ø 2048* mm) to dimensions given by inspector to depth 12 mm<(>,<)> step turn to dimension Ø2250** mm to a depth 12mm with bevels 45° and 45° as per DET." R ". Machine the reference line " 0 " to a depth of 1 mm. Reverse and machine the weld bevel as per Det.-Q. TOOL FOR R11 / 1.9°: 30-11-60094 CHECKING TEMPLATE FOR R11 / 1.9°:30-08-60060										
0230	DG9414	P006	ZP04	0.000	0.000	0.000	0.000			
MARK FOR 1.Tie rod holes 16 x M20 on SHELL side. 2.ON PERIPHARY : Mark 3 Holes as per Det.-S for T4 & T5. Mark 1 Holes as per Det.-T for T3.										
0240	DG9863	P006	QM01	0.000	0.000	0.000	0.000			
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		TECHNOLOGICAL PROCESS				Production Order		Date	
Plant:P006		Equipment No: HEH2521				101911974		15.02.2021	
Type		Work Order / PGMA		Customer				Part No	
		P-1032256100-17523/ 17523		2x660 MW TANGEDCO UDANGUDI STPP STA				17523003	
Drawing No.-Var		E.Rev.	T.Rev.	Material No.		Name Of The Part			
31750501418-00		00	00	31750501418-00		TUBESHEET HPH 9 HUB THK 180			
Pos.No	BOM Qty	Ord Qty	MU	St.	Nt.Wt.	Remarks			
0001	1.000	1.000	EA	IS06	18,400.000				
Operation Details									
Opr No	W.C.	Plant	Ctl. ky	Prep Time	Time/ PC(M)	Time/ PC(L)	Total Time	QC Signature	
PRT Cat	PRT No.			PRT Description					
Sub Operation Text									
Inspection of marking of holes on Tube Sheet. Inspection by QC.									
0250	DG4662	P006	ZP04	30.000	2,126.000	2,126.000	2,156.000		
SHELL SIDE : 1.Drill and tap 16 x M20 tie rod holes to depth 30 mm. 2.Chamfer the tube holes on shell side to R1.5 Det.-P. TOOL FOR R 1.5 : 10-26-9166 ON OVERLAY SIDE: Chamfer the tube holes to 0.8 x 45° as per Det.-P. TOOL FOR 0.8 x 45°: STD.									
0260	DG4821	P006	ZP04	120.000	240.000	240.000	360.000		
ON PERIPHERY. REFER Det.- S. 1. Pre-drill & drill 3 x Ø 23 ,drill Ø for 3/4"NPT ,drill Ø 34/16 mm and tap 3/4" NPT as per Det.-S for T4 & T5. 2. Pre-drill & drill 1 x Ø 18 ,drill Ø for 1/2"NPT ,drill Ø 28/16 mm and tap 1/2" NPT as per Det.-T for T3.									
0270	DG9863	P006	QM01	0.000	0.000	0.000	0.000		
Final inspection including dimensional conformity ,tube hole size ,finish ,ovality ,overlay thickness uniformity. Inspection by QC.									
0280	DH9284	P006	ZP01	12.000	0.000	60.000	72.000		
Gas cut the aux. hook and pad welded on tube sheet.									
0285	DH9421	P006	ZQ01	0.000	0.000	0.000	0.000		
0290	DH9421	P006	QFNL	0.000	0.000	0.000	0.000		
Clean and finish grind gas cut surfaces. Acceptance Std. AA 0621101. Send to WC - 3631 Further process with Skirt assembly in WC - 3631.									

Chkd. By	Dt.	ECR/ Rev No	Dt.	Pro.Plnr	Rate Fixr / Tool Plnr	Pg no	No.of Pgs
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Revision status of WPSes applicable for HE & Fab

S.No	WPS Number	WPS latest Revision	Description
1	WE001	04	QW-482 welding Procedure Specification
2	WE003	04	QW-482 welding Procedure Specification
3	WE004	02	WPS-WE004
4	WE005	01	WPS-WE005
5	WE006	07	Welding Procedure Specification
6	WE007	01	WPS-WE007
7	WE008	01	WPS-WE008
8	WE169	00	Welding Procedure Specification
9	WE170	00	Welding Procedure Specification
10	WE171	00	Welding Procedure Specification
11	WE172	00	Welding Procedure Specification
12	WE173	00	Welding Procedure Specification
13	WE174	00	Welding Procedure Specification
14	WE175	00	Welding Procedure Specification

SAP PRINT

Chkd. By	Dt.	ECR/ Rev No	Dt.	Pro.Plnr	Rate Fixr / Tool Plnr	Pg no	No.of Pgs
YPR	06.12.2022	00		KN	WA	6	6