

Plant MRPL Mangalore	Client MRPL	Contract Code WSS for PFCC Flue Gas	Document ID 6723-IEX-G00-EC-0001-A102	Contract No. 66-6723	
	Indicative Inspection and Test plan for Process and Utility Packages				
					Rev

The tests indicated are general minimum requirements of tkIS India. All Tests, as applicable, have to be performed as specified in the Order, Order Attachments, Codes, tkIS India Specifications, Licensor's Specifications and Standards. In case of discrepancies between the Indicative Inspection Test Plan and the workshop documents Approved / Reviewed by LSTK Contractor, tkIS India the latter shall apply. The Manufacturer shall be responsible for the required Tests to be performed and for the Inspector to be invited in due time to witness the Tests. The Manufacturer shall try to perform as many individual Tests as possible on same day, provided that the fabrication process permits such a procedure

Activity	Inspection By									
	Packages									
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1	QAP Approval	Δ	■	■	■												
2	PROCEDURES																
a	Welding Procedure Qualification (WPS) / Procedure Qualification Records (PQR) acc. to ASME Code Section IX for all materials	Δ	☀	☀	X												
b	Establishment of fresh PQR / Mock-Up TTS, if required, to meet job specific requirements	Δ	☀	☀	X												
c	NDE and test procedures	Δ	☀	☀	X												
3	PIM (Pre-Inspection meeting)	Δ	■	■	X												
4	RAW MATERIAL																
a	Identification of raw material & review of Material Test Certificates for BQ, LAS, SS, Non-Ferrous & Seamless Pipes. Visual, Dimensional, NDT & Verification of all requirements as per the Order specifications including stamp transfer	Δ	■	■													
b	Identification of raw material & review of Material Test Certificates for all other materials (Non-Pressure parts). Verification of all requirements as per the Order specifications.	Δ	X	X													
c	NDT -- as specified in data sheet / order specification	Δ	X	X													
5	BOUGHT OUT MATERIAL																
a	Review of material test certificate for valves (GGC, Butterfly valve, Ball valve, Plug valve), Strainers, Steam traps, Insulation etc	Δ	X	X													
b	Review of material test certificate for safety valve- For all applicable tests	Δ	X	X													
6	FABRICATION: In Process- Metallic equipment (Vessel, Tanks, Filters, Interconnecting-Piping,)																
a	Cutting / Machining of weld edge for plates, pipes.	Δ	X	X													
b	Set-up for Longitudinal seam (LS). MT/PT of LS, as applicable.	Δ	□	□													
c	Formed parts : Profile, Dimensions, thickness, PT of Knuckle (inside & outside) / SF / Weld edges	Δ	■	■													
d	Heat treatment of formed parts, as applicable.	Δ	□	□													

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e	Set-up for Circumferential seam (CS). MT/PT of CS, as applicable.	Δ	□	□										
f	Set up & Welding of nozzle pipe to flange / fitting.	Δ	X	X										
g	Set up & Welding of nozzle to shell / dish end.	Δ	X	X										
h	MT/PT: back-chip prior to welding the reverse side and root pass weld for single side weld.	Δ	X	X										
i	Set up / welding of non-pressure part with pressure parts, Base frame for skid.	Δ	X	X										
j	Pneumatic test of nozzle reinforcement pads / lining / Slip on Flanges	Δ	□	□										
7	NON-DESTRUCTIVE TESTS prior to pressure test, after PWHT (If applicable)-Final													
a	RT : For Butt joints (– as specified in drawing / Design Data sheets)-Review of Films	Δ	X	X										
b	MPT/PT: 100% LS, CS inside and outside, tack & auxiliary welding (as per IDS/ Spec.)	Δ	X	X										
c	PT: 100% final layer of fillet welds and butt welds (as per IDS/ Order specification) PT: 100% first & top layer of lifting lugs & closing seams.(as per IDS)	Δ	X	X										
8	OTHER TESTS FOR HEAT EXCHANGERS													
a	Inspection of tube sheets and baffle plates	Δ	■	■										
b	Visual examination of shell inside	Δ	■	□										
c	Shell push-through gauge passing	Δ	■	X										
d	Inspection of tube bundle (Skeleton)	Δ	■	■										
e	Inspection of tube bundle (Final In case of floating / U-Tube type)	Δ	■	■										
f	Measuring of tube expansion – Random check	Δ	■	□										
g	PWHT- For components- As per drg.	Δ	X	X										
h	Visual and dimensional- Before hydro test & after PWHT(If applicable)	Δ	■	■										
i	Hydrostatic test – tube side (open bundle hydro test in case of tube side hydro test pressure is more for stationary and floating type heat exchanger)	Δ	■	■										

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j	Hydrostatic test – shell side	Δ	■	■										
k	Leakage test with helium (if required as per spec/drg)	Δ	■	■										
l	PT : transition radius channel to tube sheet after pressure test(if required as per spec/drg)	Δ	■	■										
9	SPECIAL TESTS FOR LINED EQPTS & PIPING													
a	Examination of surface preparation prior to lining or coating acc. codes & standards (this inspection shall be witnessed by the lining contractor)	Δ	□	X										
b	Lining procedure & Qualification test – As per applicable specification and Codes	Δ	X	X										
c	Identification of Test coupons & Testing for Lined Equipment	Δ	■	■										
d	Examination of lined or coated surfaces after Lining/coating (Plastic lining) like holiday test, hardness test etc. acc. to codes & standards.	Δ	■	X										
e	Hydro test / Vacuum test of Lined Equipments & Piping – As per drawing	Δ	■	■										
f	Visual & Spark testing of lined FRP equipment after vacuum test (wherever applicable).	Δ	■	■										
g	Visual and Spark testing of Lined FRP equipment after hydro test	Δ	■	■										
h	Trial assembly of internals after Lining – If applicable.	Δ	■	■										
10	FINAL INSPECTION: Metallic equipment (Vessel, Tanks, Filters, Interconnecting piping)													
a	PMI, if required as per specs/drgs, for Internals, if applicable.	Δ	■	■										
b	PWHT – If applicable.	Δ	X	X										
c	Visual (Inside/ Outside- As applicable) including base frame	Δ	■	□										
d	Final Dimension of equipment.	Δ	■	■										
e	Pneumatic test of nozzle reinforcement pads	Δ	■	□										
f	Pressure test – (Note: Sketch approved by designer required for saddle positions of vertical vessels, if tested horizontally.)	Δ	■	■										
g	Non-destructive tests after pressure test – if specified in drawing / Design Data sheets	Δ	□/X	□/X										

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h	Pickling, passivation - if applicable.	Δ	■	□										
i	Drying, cleanliness, inside and outside	Δ	■	□										
j	Assly. of Skid – Visual, Dimensional	Δ	■	■										
k	Verification of all items with P&ID, Piping specification	Δ	■	■										
l	Pneumatic test of interconnecting piping.	Δ	■	■										
m	Surface Preparation	Δ	■	□										
n	Painting- Visual and DFT measurement	Δ	□	□										
o	Nitrogen filling, Nozzle blanking, bolt hole & thread / Machined surface protection – if specified in drawing / Design Data sheets	Δ	□	□										
p	Marking / Stenciling of details	Δ	□	□										
11	Process items : Blowers, Pumps etc.,- Inspection as per ITP for Rotary Equipments.													
12	ELECTRICAL & Instrumentation Items- Inspection as per ITP for Electrical and Instrumentation Items.													
13	Pre-dispatch check :													
a	Verification of Items (as per BOM)	Δ	■	X										
b	Review of Test certificates / Statutory reports (as applicable)	Δ	■	■										
c	Verification of Spares & Loose items													
d	Packing & Marking	Δ	■	X										
e	Documents review & Issue of Inspection Release Note	--	■	■	X									
f	Review of Final Documents and Issue of Despatch Clearance	Δ	■	--	■									

SYMBOLS & LEGEND	
■	Hold point , fabrication shall be kept under hold until inspection has been performed or written clearance is obtained by vendor
□	Witness Point. Advise of inspection, Fabrication may be continued if inspector is not present after invitation issued in due time.
Δ	Preparation / Examination with test report

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X	Review of test report – including review of RT films.		
☼	Review documents Prior to start of fabrication		
I	Information		
CS	Circumferential Seam	PT Liquid Penetrant examination	t Thickness
NCS	Shell to Nozzle Seam	UT Ultrasonic examination	DN Nominal Pipe size(NPS)
AS	Attachment Seam	RT Radiographic examination	

Remarks :

1. LSTK contractor to prepare an IITP based on this IITP, Applicable specifications, standards and codes and submit to PMC for final approval
2. All requirements as per applicable GES shall be taken care during Engineering, Material Procurement, Manufacture, Inspection and testing.
3. Chloride free pickling agents shall be used for pickling.
4. All NDT as per ESA-AD6 (M)
5. Refer to tkIS-India std UNV416-01 & UN416-03 for welding including testing, post weld heat treatment and surface treatment.
6. Refer to tkIS-India std UNV416-02 for tube to tube sheet joint welding, expansion and mock up test qualification requirements
7. Refer to tkIS-India std UNV416-04 for water quality for leakage / pressure testing and flushing
8. PMI shall be carried out as per 6723-EQS-331-EB-0006
9. Wherever, grinding and welding is not possible, from other side, seam shall be welded by GTAW process with gas purging.
10. Any other test required due to manufacturing Process is to be carried out.
11. If any Statutory requirement is applicable for any item, the required documents shall be approved by the appropriate agency/ Statutory authority and inspection shall be carried out by the Authorized agency/Statutory agency, in addition to document approval and inspection by tkIS-India/TPIA/tkIS India , as applicable.
12. All materials and consumables shall be procured from project approved vendor list.
13. Hardness test for Parent metal, weld, HAZ, on Welding Procedure Qualification test piece, Production Test Coupon Plates and on Equipment, shall be carried out, if required as per GES/DDS/Approved drawings.
14. Simulation Heat Treatment shall be carried on Material, On Welding Procedure Qualification test piece and on Production test coupon Plate as per code & GES.
15. Test certificates, Inspection reports for all review stages shall be offered to visiting inspector during subsequent visit for review.
16. Methodology for completeness check shall be detailed in QAP submitted by the package vendor.

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17. All the requirements of MRPL specification EDB0001, EDB 0002, EDB 0003, EDB 0004, EDB 0005, EDB 0006, EDB0007, EDB0008, EDB0009, EDB0010, EDB0011, EDB0012, EDB0013, EDB0014, EDB0015, tkIS India –GES Specs, as applicable shall be met. In case of conflict in statements of various specifications, code and standards the stringent requirement amongst them shall be followed.
18. Owner / PMC shall have right to inspect at any stage and 15 days' notification is required for the witness inspection, if any.



Devesh Sharma
Inspection & Executing



Abhi Thomas
IN & EX Department

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Prepared by: LE	Checked by: SSP	Approved by: HDP