

CHECKLIST FOR 3D MODEL REVIEW																		
Project -			Design Review Stage- % INTERNAL/EXTERNAL									Date:- to						
Sr. No.	CATEGORY	PROJECT TYPE (Onshore / Offshore / All)	CHECK ITEMS & POINTS	POINTS TO BE CHECKED BY DISCIPLINE								MODLE REVIEW TYPE						Remarks
				PIPG	STRL	MECH	PROC	HSE	ELEC	INST	CLIENT	30%		60%		90%		
INTERNAL	EXTERNAL	INTERNAL	EXTERNAL									INTERNAL	EXTERNAL					
A	GEN		GENERAL															
1	GEN	All	Confirm & share with all assign engineers & reviewers which items are NOT intend to model in this project. The information encourages all the parties concerned to remind and confirm that space or model may already be occupied by pthers for the unmodelled items before construction. Otherwise unexpected interfaces or design change will be occurred. (Modeling of non L&T scope & future facilities shall be shown as block volume with necessary tie-ins).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
2	GEN	All	3D Co-ordinator responsibility - Check comments from previous design review(if any) are closed.	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	
3	GEN	All	3D Co-ordinator responsibility - Varify clash free report before starting the design review.	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	
4	GEN	All	3D Co-ordinator responsibility - Ensure the Modeling Ccek List is completed.	Y	Y	Y			Y	Y								
5	GEN	All	Has the prevailing wind direction is checked & found acceptable (wrt tank farms, LPG storage, or gas plants, buildings, stacks, flares, areas containing H2S, HF & WHRU exhaust?)	O	O		Y	Y			Y	Y	Y	Y	Y	Y	Y	
6	GEN	All	Check with client if any additional volume blocking is required for installation, fabrication, material handling, maintenance etc. (ex- Fixed Tank Cleaning, Cargo Oil Pumps, existing facility, man holes etc) & block the volume as per client requirement.	O	Y	Y		Y			O	Y		Y		Y		
7	GEN	All	3D Admin responsibility - Check if color coding is used for modeling as per client specification or LTV standard.	Y								Y		Y		Y		
8	GEN	All	Are the Access Way & Escape Ways properly defined wrt logical approach to modules, units & facilities & clash freeness? Are Horizontal & Vertical clearances required for them are acceptable as per project specification or standard engineering practice?	O	Y	Y		O			Y	Y	Y	Y	Y	Y	Y	
9	GEN	All	Potential tripping hazards to be identified & should be removed completely.	Y	Y	Y		O	Y	Y	Y	Y	Y	Y	Y	Y	Y	
10	GEN	All	Is erection & installation possible during construction (especially for equipments & skids) & final lifting (on barge/ FPSO / platform) of lifts / modules / skids?	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
11	GEN	All	Check ladder location is not affecting escape route or material handling route.	O	Y	Y	Y				Y			Y	Y	Y	Y	
12	GEN	All	Check for two escape routes & staircases preferably diagonally opposite are provided as per safety layout.	O	Y	Y	Y	O			Y	Y	Y	Y	Y	Y	Y	
13	GEN	All	Check & Block volumes for maintenance / access / operational clearance for vendor equipments / skids.	Y		O	Y		O	O				Y		Y		
14	GEN	All	Check Bottom of Steel for bottom tier pipe rack or deck is meeting the requirement of movement of items (vehicle, material handling or personel) below it .	O	Y	O					Y	Y	Y	Y	Y	Y	Y	
15	GEN	All	Address the offshore hook-ups & offshore welds in interface / splice zone.	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
16	GEN	All	Have a sterile area been provided around the flare stack?	O	Y		Y	Y			Y	Y	Y	Y	Y	Y	Y	
17	GEN	Onshore	Onshore Related-Have appropriate seperation distances been taken into account between units, storage areas & buildings as well as public fences?	O	Y		Y	Y			Y	Y	Y	Y	Y	Y	Y	
18	GEN	Onshore	Onshore Related - Have separation distances within the plot area been taken into account? Consider furnace, column, main equipment, flare, any vent outlet to 'safe location', oil collecting areas like sewers.	Y			Y	Y			Y	Y	Y	Y	Y	Y	Y	
19	GEN	Onshore	Onshore Related - Check for paving / base foundation structure is designed to support heavy equipments, towers & cranes		Y	Y					Y	Y	Y	Y	Y	Y	Y	
20	GEN	All	Are remote shutdown panels of Remote Operated Valves (ROVs) and depressurising valves installed at safe distances and can they be easily reached in case of emergency?	O			Y	Y		O	Y	Y	Y	Y	Y	Y	Y	
21	GEN	All	All 'NOTES' as listed in P&IDs needs to be varified.	Y		Y	Y	Y	Y	Y								
22	GEN	All	Check for proper smooth connections between platforms / modules.	Y	Y	Y					Y			Y	Y	Y	Y	
23	GEN	Onshore	Onshore Related - Are the emergency/smothering steam headers at a safe distance from the equipments to be protected. E.g. in hydrogen service or furnaces?	Y			Y	Y			Y	Y	Y	Y	Y	Y	Y	
24	GEN	All	Check location of fire proofing of steel structurea wrt credible fires. Protection for vessels, columns, flare headers, main pipe rack if required.		O		Y	Y			Y	Y	Y	Y	Y	Y	Y	
25	GEN	All	Are water deluge manifolds safely located in relation to the equipment they protect	O			Y	Y			Y	Y	Y	Y	Y	Y	Y	
26	GEN	All	Are TV cameras for plant monitoring stratagically located to enable a good view of the high risk areas				Y	Y	O	Y	Y			Y	Y	Y	Y	
27	GEN	All	Check for minimum number of flange joints for systems with auto ignition temperature and with toxic materials.	O			O	Y			Y			Y	Y	Y	Y	
28	GEN	All	There should be an all around access to equipments & process units. This space shall be as per required design guidelines or as approved during equipment layout phase.	O		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	

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29	GEN	Onshore	Onshore Related - Check that the distance around the plants is in accordance with any local regulations, including noise limitations.	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	
B	PROC		PROCESS															
1	PROC	All	Check for proper draining from pump casing and pump strainers	Y			O	Y			Y			Y	Y	Y	Y	
2	PROC	All	Check for proper draining from drains of process filters and coalescers	Y			O	Y			Y			Y	Y	Y	Y	
3	PROC	Onshore	Onshore -related - Check drainage from fuel filters of furnaces	Y			O	Y			Y			Y	Y	Y	Y	
4	PROC	All	Are drains from sample points of plants and storage tanks shall be minimised by, for ex.- closed loops?	Y			O	Y			Y			Y	Y	Y	Y	
5	PROC	All	Check drainage from instruments in analyser houses also vent to atmosphere from analysre house to be checked.	Y			O	Y		Y	Y			Y	Y	Y	Y	
6	PROC	All	Check drainage of sour or spent seal and lube oils from compressors.	Y		Y	O	Y			Y			Y	Y	Y	Y	
7	PROC	All	Check for equipment critical nozzle elevations wrt P&IDs & process point of view.	Y		Y	O				Y	Y	Y	Y	Y	Y	Y	
8	PROC	All	Check all process critical lines for its routing wrt no pocket or drain provision, pump suction & discharge, pressure drop critical, NPSH criticality, minimum distances to be followed, removable spool pieces, etc...	Y			O				Y	Y	Y	Y	Y	Y	Y	
9	PROC	All	Check that vapor disengaging space (vertical section of line before any horizontal run) has been provided on column side draw offs.	Y			Y					Y		Y		Y		
10	PROC	All	Check the straight run provided at the down stream of condensate service CV with flash conditions.	Y			O					Y		Y		Y		
11	PROC	Onshore	Onshore Related - Check that steam lines for purging of lines and equipment is dry, provided with low point drains upstream of last block valves in steam line.	Y			O					Y		Y		Y		
12	PROC	Onshore	Onshore Related - Stripping steam piping to have block valve located on the horizontal and next to inlet nozzle; any small section of line between valve and nozzle to be slope towards vessel from last valve. This valve must be accesible. This line must be short.	Y			O				Y	Y	Y	Y	Y	Y	Y	
13	PROC	Onshore	Onshore Related - Check that stripping steam pipes to columns have a drain pipe for condensate removal and a vent pipe near to the column	Y			O				Y	Y	Y	Y	Y	Y	Y	
14	PROC	All	Check that operators manipulating drain valves of open drain systems can see the drained effluent. Provide drip pans as required.	O			Y	Y				Y		Y		Y		
15	PROC	All	Check that water seals trapped in goosenecks can be displaced by hydrocarbons. i.e., ensure enough static head of liquid is available. Applicable for identified process lines & open drain lines. Open drain lines normally will have drain 'U' seal to prevent back flow from header.	O			Y				Y	Y	Y	Y	Y	Y	Y	
16	PROC	All	Check to see if drain boxes (if any) are at proper location.	(Y)			O				Y	Y	Y	Y	Y	Y	Y	
17	PROC	Onshore	Onshore Related - Check that there are no open sewer pits near hot pumps, furnaces etc.	O		Y	Y				Y	Y	Y	Y	Y	Y	Y	
18	PROC	Onshore	Onshore Related - Check that inlet valves of silencers on steam pipes for warming up or start up are operable in safe manner without risk of pouring hot condensate from silencer outlet on the operator below.	O			Y	Y			Y	Y	Y	Y	Y	Y	Y	
19	PROC	All	Check that pockets in vapor lines where condensation may occur. Has the external heating is required on such pockets where pocket is unavoidable.	Y			O					Y		Y		Y		
20	PROC	All	Check for straight length of inlet pipes as specified as inlets to seperators, column, KODs & cyclones.	O		Y	Y				Y	Y	Y	Y	Y	Y	Y	
21	PROC	Onshore	Onshore Related - Check for minimum angle provided for pipes containing solids	O			Y				Y	Y	Y	Y	Y	Y	Y	
22	PROC	All	Check that check valves or double block valves been installed in utility connections to process equipments & piping as per process requirement.	Y			O				Y			Y	Y	Y	Y	
23	PROC	All	Dead leg formation to be checked for all piping system. Check if dead leg formation can not be avoided a suitable pipe spec should be chosen in cusultation with client.	Y			O				Y	Y	Y	Y	Y	Y	Y	
24	PROC	All	Check absorber gas feed inlets for pockets near the inlet to avoid absorbent entering the gas inlet pipe	O			Y				Y	Y	Y	Y	Y	Y	Y	
25	PROC	All	Check for volumes which must be drained when a filter or pump needs to be opened. If the volume is very large, enlarge the size of drain valves to achive a reasonable draining time				O					Y		Y		Y		
C	HSE		Health Safety & Environment										-					
1	HSE	All	The longest straight path that can be allowed without any side ways opening shall not be greater than maximum escape route dead length dring fire situation (Normally dead end escape route should not be greater than 7m).	O				O			Y	Y	Y	Y	Y	Y	Y	
2	HSE	All	Check if any process liquid drained from equipment can be handled in an environmentally acceptable manner, in line with general approach of closed loops for liquid draining or vents. If required install funnels to the oil collecting system	Y			Y	O			Y			Y	Y	Y	Y	
3	HSE	Onshore	Onshore Related - Check that steam exhaust can not cause personnel hazards either from spraying droplets of hot water or causing icy or wet surfaces.	Y			Y	O				Y		Y		Y		

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4	HSE	All	Check that the suction of the air blower of an analyser house or control room is taken from non-hazardous area.				Y	O		O	Y	Y	Y	Y	Y	Y	Y	
5	HSE	Onshore	Onshore Related - LPG Storage: are safety requirements fulfilled, including distances, valves, piping, pressure relief provisions, civil aspects.	Y	Y	Y	Y	O			Y	Y	Y	Y	Y	Y	Y	
6	HSE	Onshore	Onshore Related - Are tanks and bund areas accessible for fire fighting equipment?	Y	Y		Y	O			Y	Y	Y	Y	Y	Y	Y	
7	HSE	Onshore	Onshore Related - Are tanks draining to the environmentally acceptable location	Y			Y	O			Y	Y	Y	Y	Y	Y	Y	
8	HSE	All	Are fire detectors and tubing present on hot pumps & LPG pumps				Y	O		O	Y			Y	Y	Y	Y	
9	HSE	All	Are detectors, warning & alarm lights for fire, gas smoke and H2S strategically located				Y	O		O	Y			Y	Y	Y	Y	
10	HSE	All	Check location of fire fighting hydrants, monitors & hose reels considering coverage of all potential fire areas. Check accesibility of units in case of manual fire fighting operations.	Y				O			Y	Y	Y	Y	Y	Y	Y	
11	HSE	All	Check access of unit for mobile fire fighting equipment and rescue work.	Y				O				Y		Y		Y		
12	HSE	All	can fire duluge manifolds safely accessed?	Y				O			Y	Y	Y	Y	Y	Y	Y	
13	HSE	Onshore	Onshore Related - Can fire truck manoeuvre easily?	Y				O			Y	Y	Y	Y	Y	Y	Y	
14	HSE	Onshore	Onshore Related - Can all locations be reached by a fire truck if one road is blocked?	Y				O			Y	Y	Y	Y	Y	Y	Y	
15	HSE	All	Check for side entries to platform from escape / access ladders. All escape & access ladders should route at ground level to an open area to allow an unobstructed escape way. Clearance for man height to be ensured above access platform & for step-on	Y				O				Y		Y		Y		
16	HSE	All	Check that if any hydrocarbons can be released from line discharging to the atmosphere or vented at safe locationensure that hot equipments are not located below discharge points to the atnosphere (for waste gas seal vessel pay special attention to this check).	Y				Y										
17	HSE	All	Check outlet ducts of WHRU are oriented in down stream direction of wind & exhaust from ducts will not affect any personnel or facility in plant, platform, etc	Y				Y			Y	Y	Y	Y	Y	Y	Y	
18	HSE	All	For columns with structured packing, ensure there is a steam and water hose connection point nearby to fight any spontaneous fire when opening the man-way.	Y			Y	O			Y			Y	Y	Y	Y	
D	VENT		Relief and vent system										-					
1	VENT	All	Check for requirement of bleed ring in upstream of PSV or control valve.	O								Y		Y		Y		
2	VENT	All	Check that Bleed valves should be located as close to isolation valve in vertical pipe run.	O								Y		Y		Y		
3	VENT	All	Check for PSV upstream & downstream lines for pressure drop as per "3% rule" given in API RP-520.	Y			O					Y		Y		Y		
4	VENT	All	Check that relief valves discharging to the atmosphere are vented at safe location and direction. Drain (weep) holes shall be provided on atmospheric discharge where liquid can accumulate.	O			Y				Y	Y	Y	Y	Y	Y	Y	
5	VENT	All	In an all liquid system if the Relief Valve is located close to grade, the set pressure shall be checked considering liquid head pressure.	Y			O					Y		Y		Y		
6	VENT	All	Check that inlet pipes to relief valves are self-draining into process equipment. Check if the relief valve is shown on header as per P&ID then it should be located on the main header.	O			(Y)					Y		Y		Y		
7	VENT	All	Check that safety/relief valves piping as short as possible when discharging into closed system.	O								Y		Y		Y		
8	VENT	All	Is reactor vent gas safely routed considering regeneration?	Y			Y					Y		Y		Y		
9	VENT	All	Ensure that flame arrestors in pipes to the atmosphere can be accessed for removal and maintenance.	O								Y		Y		Y		
10	VENT	All	Check in case of gate valves are used for flare block valves that spindles of valve are in horizontal position. This prevents a blocked flare pipe if the wedge will fall down.	O								Y		Y		Y		
E	LAYOUT		LAYOUT															

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1	LAYOUT	All	Check for personal protection requirements near walkways or accesible ares for cold & hot pipes / surfaces as depicted in P&IDs.	O			Y	Y			Y			Y	Y	Y	Y	
2	LAYOUT	All	Check drainage from heat exchanger when opened for bundle cleaning or repairs. Consider also the effect of liquid spillage when opening both heads as well as when pulling the bundle.	O		O	Y	Y			Y			Y	Y	Y	Y	
3	LAYOUT	All	Check drainage for pipes at battery limit prior to spading the unit.	O			Y	Y			Y			Y	Y	Y	Y	
4	LAYOUT	Onshore	Onshore Related - Check that liquid collected in open oil collecting pit inside the unit is prevented from evaporation, e.g. by covering with closed plate.	Y		Y	Y	Y			Y			Y	Y	Y	Y	
5	LAYOUT	All	Check that drain valve in drain line is as close as possible to check valve of flowline.	O										Y		Y		
6	LAYOUT	All	Purging connection should have good accesability.	O			Y					Y		Y		Y		
7	LAYOUT	Onshore	Onshore Related - Has the tank farm been designed in accordance with the agreed specifications, inclusive of seperation distances?	O			Y	Y			Y	Y	Y	Y	Y	Y	Y	
8	LAYOUT	Onshore	Onshore Related - Tankfarms: Is the layout logical wrt battery limits, pipe racks, blending and loading areas.	O	Y	Y					Y	Y	Y	Y	Y	Y	Y	
9	LAYOUT	Onshore	Onshore Related - Storage tanks with blanketing system: Is layout adequate including its vapor routing?	O			Y	Y			Y			Y	Y	Y	Y	
10	LAYOUT	Onshore	Onshore Related - Vapor recovery system: Consider layout and maintenance aspects	O		O	Y	Y			Y			Y	Y	Y	Y	
11	LAYOUT	Onshore	Onshore Related - Jetties: are adequate working envelopes provided for hoses and loading arms and is the width of Jetty sufficient for the required equipment?	O		Y	Y				Y	Y	Y	Y	Y	Y	Y	
12	LAYOUT	Onshore	Onshore Related - For tankfarms and pipe tracks: Can rain water and spilled oil drained adequately?	O			Y				Y	Y	Y	Y	Y	Y	Y	
13	LAYOUT	Onshore	Onshore Related - Check for consideration of the elevation of movement facilities in case of large oil spills to surrounding plant.	O		Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	
14	LAYOUT	All	Check for bolt removal space availability at joints if any.	O														
15	LAYOUT	All	Check minimum 400mm clearance or minimum as per project design basis of is maintained between deck / platform level and BOP of pipe / control valve .	O														
16	LAYOUT	All	Check wether all inline items like valves, strainers, PCVs, PSVs, SDVs, ESDVs, FTs, SP items etc are modelled as per latest vendor drawings.	O		Y				Y	Y			Y	Y	Y	Y	
17	LAYOUT	All	Access for operation & maintainability should be ensured for chemical injection points, corrosion coupon location, inline items.	O										Y		Y		
18	LAYOUT	All	Valve handles to be modelled as per the P&ID requirement (LC, NC, etc). Review the impact of all the valve handles in close & open position.	O			Y							Y		Y		
19	LAYOUT	All	For closely located valves check for accessibility, operability & maintability.	O		Y	Y				Y	Y	Y	Y	Y	Y	Y	
20	LAYOUT	All	Check for gas line bypass routed under header may lead to collection of condensate & can form dead leg, chaange routing in such case.	O			Y					Y		Y		Y		
21	LAYOUT	All	Check for horizontal operational / maintenance clearance for valves is required (due to thermal expansion in lines, espially vertical lines) where valve pulling is required before lowering them on deck.	O		Y					Y			Y	Y	Y	Y	
22	LAYOUT	All	Check direction of flow for angle & three way valve.	O			(Y)					Y		Y		Y		
23	LAYOUT	All	Check orientation of cone type strainers, FT , ESDV as per vendor drawing & subsequent maintenance requirement for same.	O			Y			Y	Y	Y	Y	Y	Y	Y	Y	
24	LAYOUT	All	Check that if any Rotating / vibrating equipments are on cantilever section & structural suitability or project specifcations against it.	O	Y	Y		Y			Y	Y	Y	Y	Y	Y	Y	
25	LAYOUT	Onshore	Onshore Related - Fire-risk pumps handing liquids above their auto ignition temperature or handling very light liquids as propane and butane shall be located: - in the open; - in non-congested areas; - at least 3m from pipe racks and major process structures; - so that they are accessible for fire fighting; - so that escalation of a possible pool fire from e.g. a seal failure is prevented.	O				Y			Y	Y	Y	Y	Y	Y	Y	
26	LAYOUT	Onshore	Onshore Related - Only pumps handling burnable liquids below their auto-ignition temperature may be placed in between pipe rack and equipment like columns.	O				Y			Y	Y	Y	Y	Y	Y	Y	
27	LAYOUT	All	Check for spray coverage & nos. of spray nozzles for identified pumps & equipments (& secondary support for equipments) as per fire fighting summary.	O			O	Y			Y			Y	Y	Y	Y	
28	LAYOUT	Onshore	Onshore Related - Check wether the layout of spray pipes and nozzles is adequate to cool LPG vessels.	O			Y	Y			Y			Y	Y	Y	Y	
29	LAYOUT	All	Check that manual emergency shutdown valves are place in safe visible location providing easy escape during emergency for operators.	O				Y			Y	Y	Y	Y	Y	Y	Y	

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30	LAYOUT	All	Check that relief valve outlets are self draining towards flare header. An exception may be made for liquid (DN 25 x DN 25) thermal relief valves which do not need to be self draining on both sides if the pipes would become too long. Check that connections are made on top or on the side (if PROC permits) of the flare header. Ensure that process relief valves and process thermal relief valves are not routed to grade. They should end in a closed system.	O			Y				Y	Y	Y	Y	Y	Y		
31	LAYOUT	All	Check flare & drain lines slope are provided as per P&IDs & project specifications. If a low point is unavoidable in flare line ensure drain with adequate size is provided and joining to close drain system with auto drain valve in accordance with process engineer.	O			(Y)				Y	Y	Y	Y	Y	Y		
32	LAYOUT	All	Check branch joining orientation & location for flare & drain lines (for flare lines branch to join on header from top with 30deg or 45 deg angle).	O							Y	Y	Y	Y	Y	Y		
33	LAYOUT	All	Check if flare headers requires manual inspection / cleaning at end blind flange.	O			Y				Y	Y	Y	Y	Y	Y		
34	LAYOUT	All	Check the branch tapping orientation & location are taken from top of header for vapor lines & vent lines as per project philosophy / good engineering practice.	O			Y				Y	Y	Y	Y	Y	Y		
35	LAYOUT	All	Check the Branch tapping orientation & location from header as per philosophy / good engineering practice.for utility in & out (steam, cooling water, heating medium, instrument air, utility air, water), sampling point & injection point.	O								Y		Y		Y		
36	LAYOUT	All	Check break flanges are provided in drain network if required for removal of spool to clear blockages & replacement in case of corrosion..	O			Y				Y	Y	Y	Y	Y	Y		
37	LAYOUT	All	Check for rodding points are provided on drain lines & accesibility to them.	O							Y			Y	Y	Y		
38	LAYOUT	All	Check for access & space for operation to manual valves, isolation valves on nozzles of equipments, process vents & process drains. Manual valves should have permanant access. Check the vessel platform elevation as per this requirement.	O							Y	Y	Y	Y	Y	Y		
39	LAYOUT	All	Check for sufficient area provided for turning & installation of spectacle bilnds spade & spacers mounted on vessel nozzles. Check the vessel platform elevations & cut outs provide as per this requirement.	O														
40	LAYOUT	All	Check that drain is located at lowest point & vent at highest point in the line for maintenance start-up.	O			Y							Y		Y		
41	LAYOUT	All	Check for shortest routing of exotic MOC piping	O								Y		Y		Y		
42	LAYOUT	All	Check if unnecessary bends in piping can be eliminated	O								Y		Y		Y		
43	LAYOUT	All	Check if any place hand-rail is clashing physically with valve handle then that place hand-rail can be cut in concern with cllient or can be replaced with chain arrangement.	O		Y					Y			Y	Y	Y		
44	LAYOUT	All	Check the feasibility of operating platform (local strengthning) if it will be used as maintenance place for heavy valves etc (if material movement to nearest laydown area impossible).	O	Y	Y								Y		Y		
45	LAYOUT	All	Check that piping nearby operating platform is arranged in such a way that headroom clearance is provided for personnel entering or standing on the platform.	O										Y		Y		
46	LAYOUT	All	Check that all plated skids have a drip tray arrangement.	O										Y		Y		
47	LAYOUT	All	Gearbox of valve hand wheel should be above the valve	O										Y		Y		
48	LAYOUT	All	Check that valves located at outer areas of modules are accesible for operatio & maintenance.	O		Y						Y		Y		Y		
49	LAYOUT	All	Check that Isolation valve after check valve (seperated by spool piece if required for bolt removal) should be located horizontally wherever possible.	O								Y		Y		Y		
50	LAYOUT	All	Check access is provided for valves & instruments in pipe rack (if any).	O							Y			Y	Y	Y		
51	LAYOUT	All	Check location of Utility stations & their hose racks relative to user points & area coverage of deck considering number of hose stations used. (Onshore Related - preferably near to colums so that column height can be covered)	O				Y			Y	Y	Y	Y	Y	Y		
52	LAYOUT	All	Check location of safety shower & eye wash wrt HSE philosophy, source of hazard (e.g.- near equipment handling caustic, ammonia, acid and aggressive chemicals) & easy access adjoining safety path.	O			(Y)	Y			Y	Y	Y	Y	Y	Y		
53	LAYOUT	All	Check philosophy of drainage from safety shower wether it should be recovered to sewer system through piping.	O			Y							Y		Y		
54	LAYOUT	All	Check sample connection location & isolation valves of sample connection for accesibility. Ensure that it is not affecting nearby operation or maintenance activities.	O			Y				Y			Y	Y	Y		
55	LAYOUT	All	Check that isolation valve for sample connection (where sampling drain is joined to open drain) is near to overflow collection point (Open drain cup). If height is not more (i.e., sample connection is at lower elevation) the overflow collecting point (open drain cup) should be brought close to sample point.	O										Y		Y		

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56	LAYOUT	All	Check return from sample station is joining to nearest flare (in case of gas sampling) or drain (in case of liquid sampling) as per process requirement & feasibility of routing.	O										Y		Y		
57	LAYOUT	All	Check that single collecting point (open drain cup) can be used to share overflow from closely located sample points using flexible hose pipe if approved by client.	O							Y			Y	Y	Y	Y	
58	LAYOUT	All	Check symmetrical piping for equipment connections, pumps piping where applicable.	O			Y					Y		Y		Y		
59	LAYOUT	All	Check for straight length proided in piping joining to nozzles (ex- inlet to HP / L P Seperatoror, Vert. stabilisation tank & Cyclone seperator, KOD) accesibilty to nozzles where such requirement is specified by vendor in vendor data	O		Y	Y				Y			Y	Y	Y	Y	
60	LAYOUT	All	Strainers - 1. Check permanant strainers are correctly located and sufficient clearance is provided for cleaning. 2. Check drain valve of strainer is at sufficient elevation (for operation) from platform level below it. 3. Check that removable spools & correct support location are provided for maintenance of temporary strainer. 4. Check for requirement of removal of filter element from strainers / filters baskets.	O			Y				Y	Y	Y	Y	Y	Y	Y	
61	LAYOUT	All	Check for upstream & down stream straight length requirement of Auto Recirculation valve, SAPCV as indicated by vendor.	O			(Y)					Y		Y		Y		
62	LAYOUT	All	Check if any additional support (other than span or flexibility engineered) is required on interface pipe for installation point of view only. Provide such support with clear note in isometric at support location as "Temporary support provided to take care of module lifting while installation & before interface joining".	O	(Y)						Y	Y	Y	Y	Y	Y	Y	
63	LAYOUT	All	Check for possibility of installation, weldability & testing of interface welds for Piping interface spools when both modules / lifts are in place location.	O							Y	Y	Y	Y	Y	Y	Y	
64	LAYOUT	All	For air cooled & water cooled condensers pockets in outlet piping must be avoided.	O								Y		Y		Y		
65	LAYOUT	All	Check anchoring for piping discharging to atmosphere	O										Y		Y		
66	LAYOUT	Onshore	Onshore related - Check the flange orientation of liquid fill LPG system.	Y			Y	Y			Y	Y	Y	Y	Y	Y	Y	
67	LAYOUT	All	Is the piping entering or leaving the plant / module / platform is logically grouped together at battery limit	O							Y	Y	Y	Y	Y	Y	Y	
68	LAYOUT	All	Are start-up & circulation pipes short? Have dead ends been avoided (especially in steam and water pipes and in pipes with high pour point material) ? Can the system been flushed and drained?	O			Y					Y		Y		Y		
69	LAYOUT	All	Check if lines are one above the other, the gap between them should be more than either max. allowable deflection for the project or as informed decision should be taken with the help of client specifications and situation at hand.	O										Y		Y		
70	LAYOUT	All	Stress critical Lines:- Check for the lines having expansion more than 1 inch (as identified in stress report for nodes mainly at elbow or support) is not obstructing or colliding with any item. Try to keep safe gap at such elbow or support location as per requirement .	O								Y		Y		Y		
71	LAYOUT	All	Non Critical Piping:- To take care of thermal expansion at turns try to keep 100mm distance (or as instructed by STRESS group) between pipe & nearest item to take care of thermal expansion.	O								Y		Y		Y		
72	LAYOUT	All	From a pure fabrication point of view a gap should be maintained between structure and piping so that if any welding is necessary near the pipe on structure the welder can insert the electrode and perform welding. Typically 50mm or more space can suffice this requirement.	O	Y									Y		Y		
73	LAYOUT	All	Check that the long length small diameter pipes are supported properly to prevent breakage due to vibration	O										Y		Y		
74	LAYOUT	All	Check that piping is not passing through table tops. Where this can not be avoided, ensure a protective kerb is provided around the open area to prevent any rain water or oil entering the area below. All rain water disposal pipes from the table top shall be extended to ground level below or ODD (Open Deck Drain) / Tundish / Drain cup.	O								Y		Y		Y		
75	LAYOUT	All	Tundish (drain cups) should be reviewed for optimising their quantity by providing common tundish for closely located drain lines.	O										Y		Y		
76	LAYOUT	All	Check orientation of eccentric reducer in horizontal lines wrt flat side of reducer.	O								Y		Y		Y		

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77	LAYOUT	All	Verify that two phase flow vertical piping has been checked for flow feasibility, also for the turn down case	O			Y				Y	Y	Y	Y	Y	Y	Y	
78	LAYOUT	All	Check presence of chain operated valves (only allowed in exceptional case). If such case exists, check wether it is communicated to MTO team as special case.	O								Y		Y		Y		
79	LAYOUT	All	Check that there are no valves installed with the stem pointing downwards	O								Y		Y		Y		
80	LAYOUT	All	Check for valves in vertical pipes which may accumulate liquid (e.g.- water or condensate) & its acceptance wrt to process requirement.	Y			Y					Y		Y		Y		
81	LAYOUT	All	Check that installation of valves outside the platform is avoided	O								Y		Y		Y		
82	LAYOUT	All	Roding points of drain lines should be checked for access as well as from operating & maintaining point of view.	Y								Y		Y		Y		
83	LAYOUT	All	For piping components located high up to bottom of next higher level on platform, access can be granted using access hatches on higher level grid. Access hatch to be kept free from any item in all aspects.	O	(Y)		(Y)			(Y)	(Y)	Y		Y		Y		
84	LAYOUT	All	Check that the nominal pipe size in pipe racks is not less than that provided in project specification or DN 50 whichever applicable.	O														
85	LAYOUT	All	If mentioned in project specification check whether pipe rack is designed by considering space for future piping.	O														
86	LAYOUT	All	Check if the pipe rack is designed considering location of process lines on the lower level, utility piping on the top level of the pipe rack.	O														
87	LAYOUT	All	Check all Electrical & instrument cable trays are located on the top level wrt utility piping or on a separate level above the utility piping.	O						Y	Y							
88	LAYOUT	All	Check whether all small bore piping are grouped together & are supported as per required span arrangement on pipe rack / bridge.	O														
89	LAYOUT	Onshore	On shore Relaled- Water lines over 30” shall not be routed over racks and shall be routed underground. Check if water lines on racks are restricted to a maximum of 30” size.	O														
90	LAYOUT	All	Check that hot lines are routed on extreme side in the rack so that it is easy to take expansion loops.	O														
91	LAYOUT	All	Ensure Top side flat reducer is provided in suction line of pump to avoid cavitation	O								Y		Y		Y		
92	LAYOUT	All	Ensure no pockets in pump suction lines (no gas locking).	O							Y	Y	Y	Y	Y	Y	Y	
93	LAYOUT	All	Check consistency of piping configuration at pumps throughout the plant (as good engineering practice not mandatory)	O								Y		Y		Y		
94	LAYOUT	All	Check if suction piping (especially double suction pump) & discharge piping straight length complies wrt project specifications or vendor data.	O								Y		Y		Y		
95	LAYOUT	All	Check suction line routing / configuration for pumps running with 2 x 50% capacity to ensure equal distribution of flow to both suctions.	O			O				Y	Y	Y	Y	Y	Y	Y	
96	LAYOUT	All	Check valves around pump are logically placed & operable.	O							Y	Y	Y	Y	Y	Y	Y	
97	LAYOUT	All	Check that the hook-up around pumps provided with seal oil pipes, steam pipes, flush oil, steam tracing etc. needs considerable plot space. These small size support pipes may not be indicated in the model. Ensure adequate pump accesibility considering this. Also, ensure start / stop poles are not obstructed.	Y		(Y)	(Y)							Y		Y		
98	LAYOUT	All	Check that that steam tracing around the suction and discharge pipes (if required) can be dismantled to allow pump removal.	O		Y								Y		Y		
99	LAYOUT	All	Check that the high points in pump suction lines are avoided	O			Y					Y		Y		Y		
100	LAYOUT	All	For pumps with vertical suction and an elevated strainer, check that opening of such a strainer does not result in spilling flammable liquid and possible ignition if spilled on nearby hot surfaces.	O			Y	O			Y	Y	Y	Y	Y	Y	Y	
101	LAYOUT	All	Check for adequacy of pump priming requirement (is the vent valve at the highest point at discharge and suction side)	O			Y				Y	Y	Y	Y	Y	Y	Y	
102	LAYOUT	All	Check if the last pipe elbow in the suction line to a pump is a standard long radius elbow (1.5D). Avoid short radius elbow (1D) nearer to the suction nozzle.	O														
103	LAYOUT	All	Check whether breakup flanges at suction piping are provided for the maintenance of pump impeller or rotor removal.	O														

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104	LAYOUT	All	Check that piping is not routed on motor side to maintain clearance for motor removal/maintenance.	O														
105	LAYOUT	All	Check the pump suction & discharge piping is supported in such a way that it minimizes the need for removal of piping during pump maintenance.	O														
106	LAYOUT	All	Check if all the auxiliary piping (Seal Piping) is routed neatly along the base plate and is not extending across the operating floor. The piping shall not obstruct operation, handling, etc.,	O														
107	LAYOUT	All	Check valve on discharge piping shall be placed based on the type used; If the check valve is a piston type, piping shall be arranged horizontally. If the check valve is swing type, piping shall be arranged vertically.	O														
108	LAYOUT	All	Check in the absence of any contractual requirements, pump shall have clear access all around min of 600mm for small pumps.	O														
109	LAYOUT	All	All small bore piping connected to pumps (viz) drain to ODD shall have break up flange for removal of pump.	O														
110	LAYOUT	All	Check if adjustable pipe supports are provided for reciprocating pump piping (as per STRESS) to minimize the pulsation effects .	O														
111	LAYOUT	All	Check layout for Auxilliary Skid, Lube Oil Cooler, Seal Oil, Cooling water, Instrument Panel is as per specified by vendor & pressure drop requirement in interconnecting piping is meeting vendor's requirement.	O		O	O				Y	Y	Y	Y	Y	Y	Y	
112	LAYOUT	All	Check for compressor suction pipe slopes towards the knock out drum. Each low point of the compressor suction should have low point drain	O		Y	Y				Y	Y	Y	Y	Y	Y	Y	
113	LAYOUT	All	Check lube oil & hydraulic oil piping as per vendor specifications	O		Y	Y				Y			Y	Y	Y	Y	
114	LAYOUT	All	Check if inlet piping of comprssor has a minimum straight run as per manufacturer's recommendation or 3D between the elbow and the inlet nozzle.	O														
115	LAYOUT	All	Check if break-up flanges are required for maintenance of the compressor or strainer removal.	O														
116	LAYOUT	All	Check whether all branch connections are located on the top of the piping to minimize any potential liquid carryover.	O														
117	LAYOUT	All	Check in case of tube bundle removal / cleaning that flangeless butterfly valves in tube side piping (on bonnet / cover side isolation) can isolate the line joining to HE.	O										Y		Y		
118	LAYOUT	All	Check piping arrangements on shell and tube heat exchangers for location of break flanges to facilitate bundle removal & channel cover removals.	O							Y			Y	Y	Y	Y	
119	LAYOUT	All	Check if drains of exchanger piping at lowest point and close to the block valves if so specified.	O			Y				Y			Y	Y	Y	Y	
120	LAYOUT	Onshore	On shore related - Check for exchanger in LPG service have been provided on water outlet side with a vent pipe to a safe location to allow gas to escape in case of tube leak	Y			O	Y			Y	Y	Y	Y	Y	Y	Y	
E	E&I		INSTRUMENTATION & ELECTRICAL															
1	E&I	All	Instrument Accesibility-Check location of instruments & associated items in consideration with philosophy, instrument hook-up, accessibility and maintainability with sufficient removal volumes modelled clash free.	(Y)						O	Y	Y	Y	Y	Y	Y	Y	
2	E&I	All	Instrumentation Skids - Metering skids to be checked based on location, size, access & maintenance.	Y	Y		Y			O	Y	Y	Y	Y	Y	Y	Y	
3	E&I	All	Flow Meter- Check actual straight length at upstream & down stream of flow meter against the minimum requirement specified by vendor. Also check orientation of tap valves in consideration of flow direction & fluid status. Check for sufficient space around the ultrasonic flow meter to allow proper installation of the flow meter sensor in the horizontal plane without touching adjacent pipes.	(Y)						O	Y	Y	Y	Y	Y	Y	Y	
4	E&I	All	Control Valve - Check control valve location. Control valve should preferably installed at grade or platform with the pneumatic actuator in vertical position. Check orientation & accessibility of actuator & positioner on control valve.	(Y)						O	Y			Y	Y	Y	Y	
5	E&I	All	Bypass if any for Level control valve should be located at high point.	Y			O			O				Y		Y		
6	E&I	All	Level Instruments - Check the orientation of level guages wrt access/platforms & ladders. If access ladder is provided, check that instruments are visible & operable from the ladder. Level guages glasses should be visible and additional space may be required if the level guages are fitted with illuminators.	(Y)						O	Y			Y	Y	Y	Y	
7	E&I	All	Check clearance above extrenal displacers and underneath magnetic level guages for removal of floats.	Y						O	Y	Y	Y	Y	Y	Y	Y	
8	E&I	All	Stand Pipe - Check for elevations of tappings on standpipe for Level Guage & Level Transmitters.	Y			Y			O	Y			Y	Y	Y	Y	
9	E&I	All	Temperature Guages - Check location of guages are visible. Check the space for thermowell removal.	(Y)						O	Y			Y	Y	Y	Y	

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10	E&I	All	Check that thermowell is located at down stream from mixed point with suitable distance (10D).	(Y)			Y			O	Y			Y	Y	Y	Y	
11	E&I	All	Check that the thermowell is located at down stream of butterfly valve with suitable distance (5D)	(Y)			Y			O	Y			Y	Y	Y	Y	
12	E&I	All	Pressure Guages- Check location of guage is accesible & visible.	(Y)						O	Y			Y	Y	Y	Y	
13	E&I	All	Local Panel & Junction Box- Check location in consideration with operational access & effect on maintenance of plant.	(Y)					O	O	Y			Y	Y	Y	Y	
14	E&I	All	Air Manifold - Check location & orientation of air manifold & their block valve position in consideration with tubing space.	(Y)						O	Y			Y	Y	Y	Y	
15	E&I	All	Tray Routing-Check tray routing in consideration with supports & space for cable installation is sufficient. Cable trays above platform to clear maintenance & operation requirement & movement. Cable trays above platforms shall be in safe working height.	(Y)	(Y)				O	O				Y		Y		
16	E&I	All	Check cable routing plan to motors, local control panels & instruments			Y			O	O				Y		Y		
17	E&I	All	Check that start/stop station locations around pumps do not interfere with maintenance requirements.						O		Y			Y	Y	Y	Y	
18	E&I	Onshore	Onshore Related - U/G cable trench locations.						Y	Y				Y		Y		
19	E&I	All	Instrument mounting on removable spool pieces are avoided to maximum extent	Y						O				Y		Y		
20	E&I	All	Check for upstream & down stream straight length requirement of Pressure Control Valve.	Y			Y			O		Y		Y		Y		
21	E&I	All	Check upstream / down stream tapping requirement from main pipe to Pressure control valve based on ite type (internal / external).	Y			Y			O		Y		Y		Y		
22	E&I	All	Check that access platforms are provided for certain items which requires major adjustments (ex-flow indicators).	Y						O	Y			Y	Y	Y	Y	
23	E&I	All	Check for accesability of transmitters.	Y						O				Y		Y		
24	E&I	All	Class rating and face type of the control valve mating flange to be checked with the valve end connection details, irrespective of the piping class.	O														
25	E&I	All	Check adequate clearace & maintenance access is provided for motors, fan belts and A/V (auto variable) pitch fan hub for air coolers.	Y		Y			O			Y		Y		Y		
G	HAND		MATERIAL HANDLING															
1	HAND	All	Check that deck crane provided for top sides is covering max area wrt its minimum & maximum radius & crane movement path to be blocked by volume based on material handling philosophy,	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
2	HAND	All	Check the location of crane boom rest wrt single boom rest or dual boom rest as applicable is taken care by volume blocking & crane movement is unaffected by height of modules/skids/building in covered area.	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
3	HAND	All	Does Material Handling volume blocking is as per requirement? Are Horizontal & Vertical clearances required for them are acceptable as per installation procedure, size of opening & route of transport? This shall abide with steps in material handling procedure.	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
4	HAND	All	Check details & space allocated for additional lifting equipment requirement (like monorail, davit, pulleys, cranes ect) for material handling (like monorail, davit, cranes ect) are shown by volume blocking? Hoisting devices to be provided or access for hoisting devices to be provided for material handling of heavy (above 30 kg) items.	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
5	HAND	All	Check the continuity of route of material handling volume blocked till required destination (work shop or drop out zone or place of item as per layout).	Y		Y					Y			Y	Y	Y	Y	
6	HAND	All	Block volume for drop-out zones, lifting areas & laydown areas.	Y	Y	O					Y			Y	Y	Y	Y	
7	HAND	All	Check for space sufficiency for identified areas where liquid or solid handling activities will be performed.	Y		O	Y				Y	Y	Y	Y	Y	Y	Y	
8	HAND	All	Have platforms been provided at places where work is expected during shutdowns? Consider also access to spading at those places where scaffolding would be a nuisance, expensive or unsafe. Platform large enough shall be sufficient strong to carry the additional weight if they are used to store spades. Check the adequacy of height of access platforms.	Y	(Y)	O	(Y)				Y	Y	Y	Y	Y	Y	Y	
9	HAND	All	Check for suitable access and space for 1. equipment's internal maintenance & installation 2. jacking facilities to remove man hole covers	O		Y					Y	Y	Y	Y	Y	Y	Y	
10	HAND	All	Check platform access is provided for installation, operation and maintenance of PSVs. And any requirement of hoisting equipments.	Y		Y						Y		Y		Y		
11	HAND	All	Check acccebility of Pump for installation & maintenance. Check any special lifting device requirement is satisfied wrt space required for pump & motor maintenance is provided.	O	(Y)	O					Y	Y	Y	Y	Y	Y	Y	
12	HAND	All	Check maintenance aspect of rotor removal, turbine removal, casing opening / removal & lifting method is matching with vendor requirement wrt space required & provided for the same.	Y	(Y)	O					Y	Y	Y	Y	Y	Y	Y	

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13	HAND	All	Check the space & provision for compressor maintenance and handling requirements and the heaviest part in the compressor package.	Y		O												
14	HAND	All	Check for material handling of WHRU tube bundles if any?	Y	(Y)	Y	Y				Y	Y	Y	Y	Y	Y	Y	
15	HAND	All	Check if adequate space is available for tube bundle removal with mobile devices on one side (in case of U-tube exchanger) or tube cleaning (equal to half the tube length on both side or equal to tube length on one side) & bonnet / cover opening is provided for identified exchangers where bundle pulling or cleaning is required.	Y		O					Y	Y	Y	Y	Y	Y	Y	
16	HAND	All	Check whether cranes, bundle pulling equipment, monorail and cars can enter for pulling & transportation of bundles.	Y		O					Y	Y	Y	Y	Y	Y	Y	
17	HAND	All	Check whether bundles can be pulled and lowered safely from platforms or lifted by crane from platforms. Special care for stacked exchanger arrangement	Y		O					Y	Y	Y	Y	Y	Y	Y	
18	HAND	All	Check the stacked heat exchangers for the possibility of oil spills on hot heat exchanger or other equipments beneath, especially during maintenance work. In this case consider a large oil collecting funnel underneath or check the possibility to take both out of service	Y		O					Y			Y	Y	Y	Y	
19	HAND	All	In case of Plate Heat Exchanger (PHE) check if plate cleaning place is provided immediately adjacent to PHE with adequate draining arrangement.	Y		O					Y	Y	Y	Y	Y	Y	Y	
20	HAND	All	Check whether heat exchangers can be cleaned in situ. Are the required provisions present (e.g.-valves, cleaning pipes etc)			O	O				Y	Y	Y	Y	Y	Y	Y	
21	HAND	All	Ensure the connecting piping is well supported in case of valve being removed for repair (especially heavy valves). Large bore lines having heavy inline items such as valves etc shall be routed in such a manner that they are closer to overhead beams with possibility of carrying items weight.	O		O								Y		Y		
22	HAND	All	Wherever pad-eyes / lifting hooks / chain pulley block supporting arrangement is placed or planned is in co-ordination with STRL discipline.		Y	O								Y		Y		
23	HAND	All	Check possibility of using trolley for items near to grating / deck plate	Y	Y	O								Y		Y		
24	HAND	All	Check trolley movement volume blockage with trolley turning radius.			O						Y		Y		Y		
25	HAND	All	Check that all pad-eyes / lifting hooks / chain pulley block supporting arrangement are modeled with proper tag, working load capacity & specific identifiable color in model.			O								Y		Y		
26	HAND	All	Check model against the report (certified by STRL discipline) for load carrying capacity of each structural member on which pad-eyes / lifting hooks / chain pulley block supporting arrangement is planned.		Y	O								Y		Y		
27	HAND	All	Above mention report to specify that pad-eyes / lifting hooks / chain pulley block supporting arrangement is suitable for horizontal & vertical loading requirement		Y	O								Y		Y		
28	HAND	All	Check for possibility of scaffolding arrangement or permanant frame structure at places where nearby beams can not be used for material handling.	(Y)	(Y)	O								Y		Y		
29	HAND	All	Check adequacy & requirement for horizontal tugging pad-eye.	(Y)	(Y)	O					(Y)			Y		Y		
30	HAND	All	Check type of manual hoist to be used is of lower headroom if space available for material handling is of low headroom.			O						Y		Y		Y		
31	HAND	All	Check that material handling is provided for removable pipe spools joining to nozzles (of heat exchangers, vessels & columns).	(Y)		O								Y		Y		
32	HAND	All	Check that material handling of actuated valve is comprising of handling the valve with actuator (as far as possible).	(Y)		O				(Y)				Y		Y		
33	HAND	All	Check possiblity of providing davits to man-ways (big size) in material handling study.	(Y)		O								Y		Y		
34	HAND	All	Check that monorail paths are well defined to take heavy equipments to laydown area.			O						Y		Y		Y		
35	HAND	All	Check possibility of series of pad-eyes where monorail / trolley is not feasible due to space constraints.		(Y)	O						Y		Y		Y		
36	HAND	All	Check that monorail used for handling are curved at ends so that the hoisting equipment is brought away from the escape way when not in use & to prevent the hoisting equipment from coming off the rails.	(Y)		O						Y		Y		Y		
37	HAND	All	Check for permanant or temporary stool for components that can be easily handled by hands but are at elevated location.	(Y)		O								Y		Y		
38	HAND	All	Check to ensure that minimum dissembly of pipng system is required to carry out material handling of inline component. In such cases breake flanges can be suggested (to avoid dissembly of full piping system).	(Y)		O								Y		Y		
39	HAND	All	Check that man-way opening in blocked in soft volume with at least 120 deg. opening of man-way door.	(Y)		O					Y			Y	Y	Y	Y	

CHECKLIST FOR 3D MODEL REVIEW																		
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Sr. No.	CATEGORY	PROJECT TYPE (Onshore / Offshore / All)	CHECK ITEMS & POINTS	POINTS TO BE CHECKED BY DISCIPLINE								MODLE REVIEW TYPE						Remarks
												30%		60%		90%		
				PIPG	STRL	MECH	PROC	HSE	ELEC	INST	CLIENT	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	INTERNAL	EXTERNAL	
40	HAND	All	Some equipments / piping components require spacing for their removal / installation / operational tools. This minimum required tool spacing should be confirmed from the supplier.	Y		O								Y		Y		
H	COLUMN		Columns															
1	COLUMN	All	Check for necessary dedicated drain piping (e.g.- where draining a vessel or column to grade can be done via existing piping such as drain of pumps) & proper access to it while operation & maintenance.	O										Y		Y		
2	COLUMN	All	Check that insulation for personnel protection been provided for pipes. Check especially hot vapors and product pipes which can be easily touched from platform	O			Y							Y		Y		
3	COLUMN	All	Check that the pipes follow the expansion of equipment when heating-up & cooling-down? Pay special attention to supports on both hot and cold structures.	O										Y		Y		
4	COLUMN	All	Check free movement of access platforms (in case of thermal expansion)	O	Y	Y								Y		Y		
5	COLUMN	All	Check that barometric seals of vacuum equipment are at the specified height. This also applies for relative elevation of vessels belonging to a vacuum system.	Y			Y				Y	Y	Y	Y	Y	Y	Y	
I	WHRU		Waste Heat Recovery Units (WHRU) -															
1	WHRU	All	Check for footings of WHRU & Sliencer support structure are matching in line with structural frame.	Y	O	Y						Y		Y		Y		
2	WHRU	All	Check that opening provided in structural for WHRU inlet is inline with inlet duct to WHRU	Y	Y	Y						Y		Y		Y		
J	COMP/GTG		Compressors / GTG -															
1	COMP/GTG	All	Check for erection & installtion inside module aspects. 1. Will all items reach at site in one or more pieces (early delivery items & late delivery items)?	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	
2	COMP/GTG	All	Check if temporary piping can be installed for flushing & start-up in case of Gas Turbine Generator.	Y		O	O				Y			Y	Y	Y	Y	
3	COMP/GTG	All	Check Local Panel Location as per vendor data or logical requirement.			Y			Y	Y				Y		Y		
4	COMP/GTG	All	Check that the compressor safely be handled for maintenance such as filter pulling? Pay special attention to spading off possibilities and draining of the casing and the strainer	O		O					Y	Y	Y	Y	Y	Y	Y	
5	COMP/GTG	All	Check that compressor seal oil tanks / chambers are provided with their vent to the atmosphere at safe location	Y		O	Y				Y			Y	Y	Y	Y	
6	COMP/GTG	All	Check that lube oil storage drums properly protected against ingress of rain water and is the	Y		O	Y							Y		Y		
7	COMP/GTG	All	Are compressor recycle pipes self draining on both sides of the recycle control valve.	Y			O							Y		Y		
8	COMP/GTG	All	Check that compressor with bottom inlet pipes at suction provided with liquid drain to close system	Y			O				Y	Y	Y	Y	Y	Y	Y	
K	BOILER & FURNACE		Furnaces and boilers															
1	BOILER & FURNACE	Onshore	Onshore related - Check that suction of air blowers is taken from non-hazardous area.	Y			Y				Y	Y	Y	Y	Y	Y	Y	
2	BOILER & FURNACE	Onshore	Onshore related - Check that piping does not obstruct observation windows, access doors, header box covers etc.	Y		Y					Y			Y	Y	Y	Y	
3	BOILER & FURNACE	Onshore	Onshore related - Check for space availability for withdrawal or cleaning of tubes. Check for space for cranes to enter and manoeuvre	Y		Y					Y	Y	Y	Y	Y	Y	Y	
4	BOILER & FURNACE	Onshore	Onshore related - Is piping at burners is such a way arranged that insertion and removal of ignitors and burner guns is not hampered	Y		Y					Y			Y	Y	Y	Y	
5	BOILER & FURNACE	Onshore	Onshore related - With regard to safety of fuel systems: - Are heavy fuel and LBF (low boiling fuel) sustems sufficiently segregated? - Are adequate provisions made to prevent liquid fuels from entering atomising steam and steam-out pipes. - Are low points in fuel gas pipes avoided between fuel gas knock-out vessel and the burners or has tracing been provided? - Are location of flame arrestors, straight pipe lengths, etc of low pressure and waste gas in accordance with specifications	Y		Y	(Y)				Y	Y	Y	Y	Y	Y	Y	
6	BOILER & FURNACE	Onshore	Onshore related - Make sure that dry emergency smothering steam is made available with; - Outlet branches posotioned on top of mains, - steam pipes without pockets, - sufficient steam traps and drain points provided	Y		Y	Y				Y			Y	Y	Y	Y	

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7	BOILER & FURNACE	Onshore	Onshore related - On manually start furnces check that fuel valves of fuel oil and fuel gas within reach when looking at the burners through the observation window	Y		Y	Y				Y			Y	Y	Y	Y	
8	BOILER & FURNACE	Onshore	Onshore related - Is emergency shutdown swith is at safe location			Y		Y	Y		Y			Y	Y	Y	Y	
9	BOILER & FURNACE	Onshore	Onshore related - For multiple furnaces check for a logical and clear layout of each furnace and its logic start-up panel	Y		Y			Y		Y	Y	Y	Y	Y	Y	Y	
10	BOILER & FURNACE	Onshore	Onshore related - can a furnace be spaded off at its flue gas duct for furnace entrance and repair? This is required when multiple furnaces are connected to a common flue gas duct and one of the furnnce is required to continue the operation	Y		Y					Y			Y	Y	Y	Y	
L	HVAC		Heating, Ventilating, and Air Conditioning -															
1	HVAC	All	Check routing plan for 1. Duct (No pocket requirement, connecting direction etc) 2. Pneumatic conveyor line	Y		Y	Y					Y		Y		Y		
M	PACK		Package Units -															
1	PACK	All	Check that Package Units are modeled as bolcks.	O		O					Y	Y	Y	Y	Y	Y	Y	
2	PACK	All	Check for adequcy of space available for installation, access and removal of components from the package units.	Y		O					Y							
3	PACK	All	Check all require PIPG & E & I tie-in points are modelled as required.	Y		Y				Y	Y							
N	SUPPORT ENGG		PIPING SUPPORTS.															
1	SUPPORT ENGG	All	Check the logical supporting of lines.	O										Y		Y		
2	SUPPORT ENGG	All	Check support type & tag no. assigned as per design & support standard.	O										Y		Y		
3	SUPPORT ENGG	All	Check if the support is out of support standard is named as special support.	O										Y		Y		
4	SUPPORT ENGG	All	No holes should be allowed in secondary suport members for passing pipe through it.	O										Y		Y		
5	SUPPORT ENGG	All	Check to avoid un-necessary supports.	O										Y		Y		
6	SUPPORT ENGG	All	A random check to be done to cross check dimensions in support standard & modeled support.	O										Y		Y		
7	SUPPORT ENGG	All	Check feasibility of welding of supports to structural members.	O										Y		Y		
8	SUPPORT ENGG	All	Check support is not located at pipe weld, if it unavoidable make arrangement to provide notch on support at pipe fitting welding location (if required increase shoe length as standard shoe length may not be feasible) & proper information transfer to fabrication yard.	O										Y		Y		
9	SUPPORT ENGG	All	Check that there are no gaps left between pipe & support or support & structural member while modeling.	O										Y		Y		
10	SUPPORT ENGG	All	Check in case of Guide type supports that the gap (as instructed by STRESS analysis) allows for sliding after considering the fillet weld size required for welding.	O										Y		Y		
11	SUPPORT ENGG	All	Check for thin walled piping such as CuNi, the supports should be selected / checked carefully from support standard. As improper support type could damage or rip off the pipe during the deck transportation process.	O										Y		Y		
12	SUPPORT ENGG	All	Support should be checked for welding feasibility in case of less space around the support.	O										Y		Y		
13	SUPPORT ENGG	All	Check for spring type support necessary space for maintenance & operation is provided.	O							Y			Y	Y	Y	Y	
14	SUPPORT ENGG	All	Check that Pad-eye (used for maintenance) if welded to support should be in concurence with STRL discipline or make it as Special support.	O	Y	O								Y		Y		
15	SUPPORT ENGG	All	Check all support type & its details as furnished by stress team for every support of stress critical line.	O										Y		Y		
16	SUPPORT ENGG	All	Check for adequate supporting for critical & non critical lines which are subjected to vibration (connected to compressor, pump & turbine or lines carrying two phase flow).	O										Y		Y		
17	SUPPORT ENGG	All	Check relief valve out let piping arrangement (for both critical & non-critical lines) so that supports are provided to cope up with reaction forces.	O										Y		Y		

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18	SUPPORT ENGG	All	Check that proper supporting is done for utility station, so that pulling load of flexible hoses will be taken care.	O										Y		Y		
19	SUPPORT ENGG	All	Check that the sample collection assembly should be properly supported / braced if it is extended far from the header.	O										Y		Y		
20	SUPPORT ENGG	All	Check support on piping or any inline items is not fouling with operational / maintenance area or coming under lift interface zone.	O						Y	Y			Y	Y	Y	Y	
21	SUPPORT ENGG	All	Check that stress critical / non-critical / heavy load bearing supports taken from vessel, vessel platform or vendor package are incorporated in mechanical design of that equipment or vendor package. Check that such support location with loads is properly conveyed to vendor. Any support taken from vessel, vessel platform or vendor package is not creating hinderance to operational or maintenance movement in that area.	O		Y								Y		Y		
22	SUPPORT ENGG	All	As far as possible avoid flange supports.	O														

- NOTES:-**
- 1

O

=

Denotes ownership of discipline to check respective review point.
- 2

Y

=

Denotes supporting discipline in checking respective review point to 'O=owner' discipline. If there is/are no discipline specifically mentioned as 'O=Owner' then ownership to check that points belongs to all 'Y' marked disciplines.
- 3

(Y)

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Denotes discipline may be required to check respective review point.