



KKR BOSE DESIGN SERVICES PVT. LTD.

CONTENT

- **ABOUT KKR BDS**
- **WHAT IS STEAM TRACING**
- **STEAM TRACING SYSTEM**
- **ENGINEERING FOR STEAM TRACING**
- **DELIVERABLES**
- **CALCULATIONS**
- **3 D VIEW**
- **ISOMETRIC VIEW**
- **MTO**
- **CONSIDERED FITTINGS**



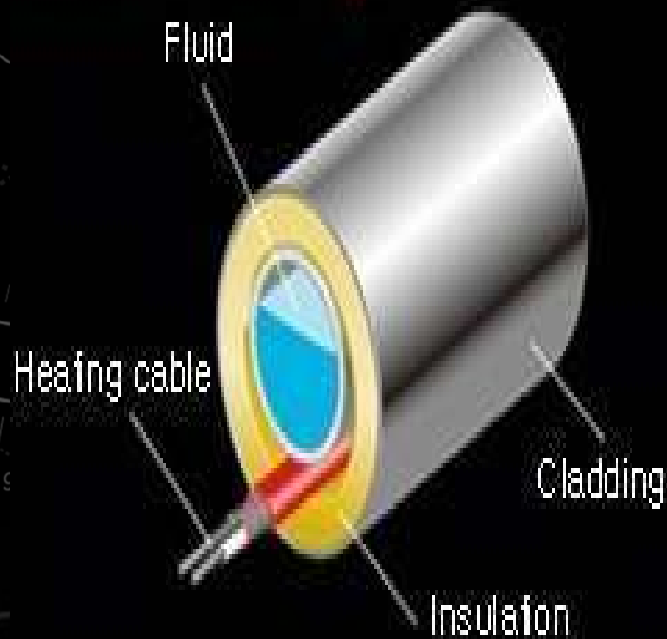
ABOUT KKR BDS

- ESTABLISHED IN THE YEAR 2010
- PVT LTD IN THE YEAR 2016
- WORKING AS AN INDEPENDENT ENGINEERING DESIGN SOLUTION AND SERVICE ORIENTED COMPANY
- OFFERING A VARIETY OF SERVICES FOR DESIGN SUPPORT, CAD DESIGNING & ENGINEERING SECTORS.
- MECHANICAL DESIGN & DRAFTING SERVICES.
- COMPUTER AIDED ENGINEERING DESIGN ANALYSIS, SIMULATIONS & SERVICES.
- PRODUCT DESIGN DEVELOPMENT & REVERSE ENGINEERING SERVICES.
- CIVIL ENGINEERING DESIGN CONCEPTS, PLANNING & DRAFTING DESIGN SERVICES.
- 2D & 3D MODELING RENDERING & DESIGN SERVICES FOR ARCHITECTS & INTERIOR DESIGNERS.



WHAT IS STEAM TRACING

Steam-Traced Pipe



- Steam tracing is heat tracing performed by circulating steam around process pipes to heat them.
- A typical piping system of steam tracing consists of :
 - Traced Lines : the process pipeline carrying process fluid that require steam tracing.
 - Steam supply line that connects the steam supply header with the steam tracing manifold or condensate recovery line that connects the condensate header with the condensate recovery manifold.
 - Steam or condensate manifold.
 - Tracer line : the pipe carrying steam along the traced line.
 - Steam traps : for removal of the condensate in used steam, steam traps are installed at regular intervals. It should be located at the lowest point of the tracer.

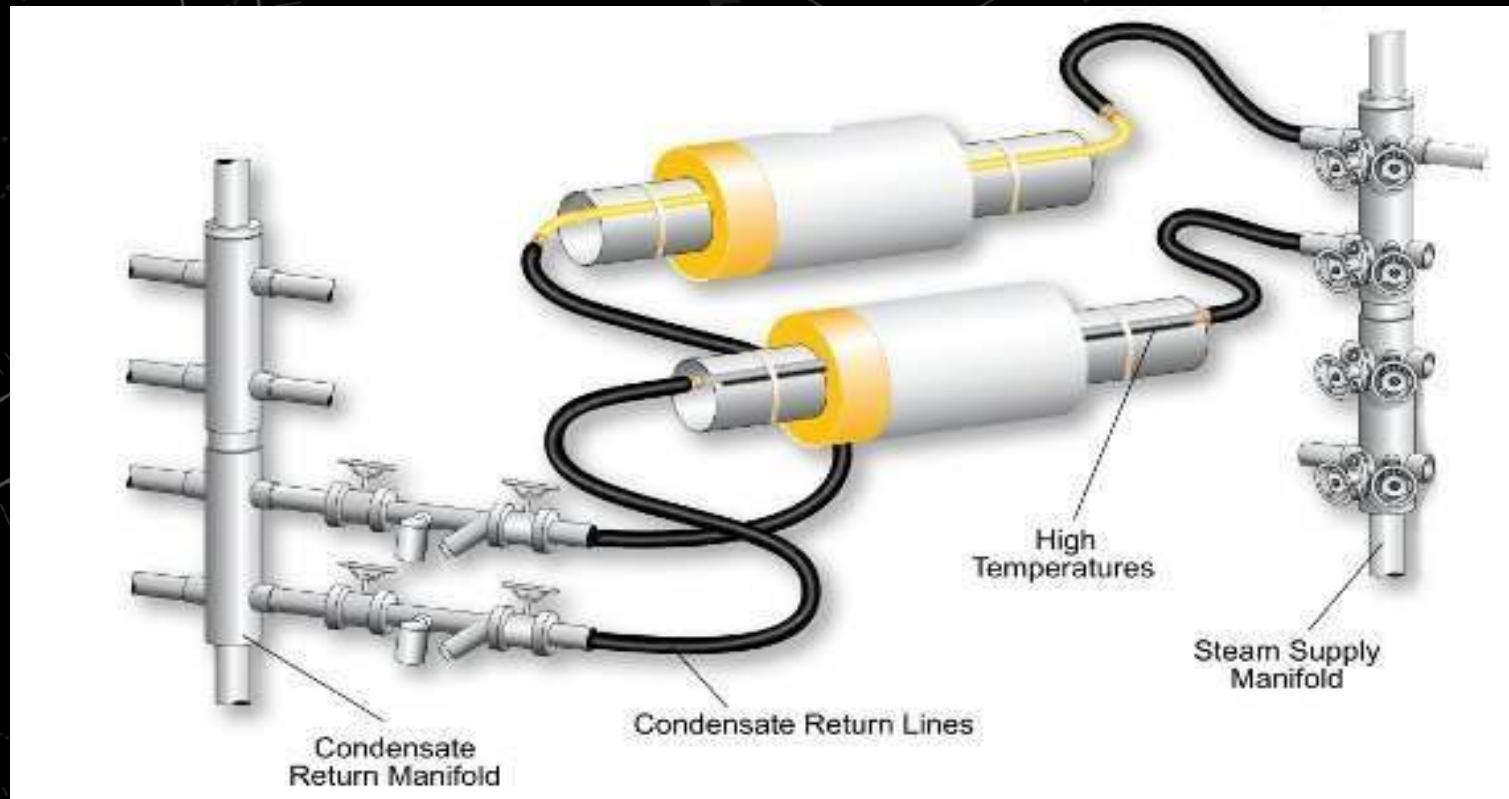


DETAILED STEPS FOR ENGINEERING OF STEAM PACKAGE

- **Basic study and calculations** : Study and calculations for no. of tracers, size of tracers, insulation material, HTC line or bare tracer line, Tracer length, lead and tail line length, pressure drop calculation, etc.
- **Detailed study** : Main process line study, routing of tracer on process lines, routing near valves, routing near instruments, tracing near vessels, decide type and no. of ports to manifolds. Decision regarding bare or HTC tracer requirements.
- **3D Modelling** : Modelling on software like SP3D / PDMS. Modelling of lead line, tail line and main tracer line & supports.
- **Isometrics** : Direct extraction or manually preparation of isometrics from model into AutoCAD and do necessary cleanup.
- **Checking** : Checking of all isometric drawings.
- **Isometric MTO** : Preparing MTO for each isometric drawing.
- **Bulk MTO** : Preparation of bulk MTO from each isometric MTO in required client's format.
- **Manifold location plan** : Preparation of final manifold location plan w.r.t. changes in modelling.
- **Tracer circuit schedule** : Preparation of tracer circuit schedule, which contains information of each port of manifold and location and area of manifold.
- **Cable Tray GA Drawings** : Preparation of cable tray GA from model and do necessary cleanup.



STEAM TRACING SYSTEM



ENGINEERING FOR STEAM TRACING

Feasibility
Analysis

Manifold
Location
Analysis

Relevant
Calculations

3 D
Modeling

Isometric
Extraction



DELIVERABLES

Manifold
Location
Plan

Drafting of
Isometric
Drawings

Tracer
Circuit
Schedule

IFC
Drawing

No. of
Tracer &
AVTR
Calculation


3D
Modelling

Manifold
List

MTO &
Cable Tray
Layout &



PRESSURE DROP CALCULATION

							
Client							
Project	Design and Engineering of steam tracing package						
Project No.							
Doc. no.							
Sheet no.	: 1						
Description	Unit		Values:		Values:	Length (meter) with 12.7 OD Tube	Length (meter) with 19.05 OD Tube
			9.52mm OD Tube and 19.05mm OD				
Overall Pressure Drop: tracer line including Tail and Lead i.e. $\Delta P_1 + \Delta P_2 + \Delta P_3$	bar		0.1813				
Overall Pressure Drop: tracer line including Tail and Lead i.e. $\Delta P_1 + \Delta P_2 + \Delta P_3$	kg /cm ²		0.1848				
Pressure drop in Percentage	%		4.620652348				
Here							
ΔP_1 : Pressure Drop- From Steam Manifold to Lead line Termination	bar		0.0227				40
ΔP_2 : Pressure Drop - Includes Tracer line and Tail line Up to condensate manifold	bar		0.0545				80
ΔP_3 : Pressure Drop - 9.52mm Includes Tracer line (control tracing on control valve)	bar		0.1000				2
ΔP_4 : Pressure Drop due to Inverted Bucket Steam Trap in Tail Line before condensate manifold	bar		0.0040				
Rev.	: 0						
Date	: 08/08/2017						
Prep. by	: PMK						
Chk. by	: TSK						
App. by	: PUP						



STEAM TRACING CALCULATION

STEAM TRACING CALCULATION - 7412

Sht No.	LINE NO.	CMP	FLUID	DESIGN	OPERATING	LINE SIZE (DN)	WELDING	LINEAR LENGTH (M)	Thermal Conductivity (W/m K) Insulation	60 of the Base Pipe or Insulation as per IS 8081 (4)	Inner diameter of the pipe (mm)	Radius of base pipe (m)	Radius with insulation (m)	WELDING TEMP. (°C)	Steam pressure (Bar)	Tracer Tube OD mm	Inner Diameter of the tube mm	Number of number of	Number of actual tracer required by Calculation	INSULATION	
				TEMP. (°C)	TEMP. (°C)		TEMP. (°C)		K _i	mm	°C	kg	(dependent on the holding temperature)	MAT'L	THK (MM)						
7412	NPAG-0119	7412B000H	Process gas	90	80	600	70	22.42	0.061	600	604	305	343	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B000M	Process gas	90	80	600	70	8.8	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B000H	Process gas	90	80	600	70	9	0.061	600	604	305	343	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B002H	Process gas	90	80	600	70	22.44	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B003H	Process gas	90	80	600	70	22.19	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B004H	Process gas	90	80	600	70	34.24	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B005H	Process gas	90	80	600	70	44.35	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B006H	Process gas	90	80	600	70	26.54	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B007H	Process gas	90	80	600	70	33.85	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B008H	Process gas	90	80	600	70	33.13	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B009H	Process gas	90	80	600	70	28.22	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B010H	Process gas	90	80	600	70	41.64	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B011H	Process gas	90	80	600	70	54.18	0.061	600	604	305	343	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B012H	Process gas	90	80	600	70	44.85	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B013H	Process gas	90	80	600	70	9.24	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B014H	Process gas	90	80	600	70	1.15	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0119	7412B015H	Process gas	90	80	600	70	59.46	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0142	7412B016H	Process gas	90	43	600	70	4.84	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0177	7412B017H	Process gas	90	43	600	70	4.32	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27
7412	NPAG-0188	7412B018H	Process gas	90	43	600	70	4.49	0.061	600	604	305	342	70	4	20	0.015	3.000	4.000	H	27




Steam Tracing Sample Calculation for Line No. 74FA12-2330

Inputs	Values		Types of losses	Output	Formula Used from Heat Loss
line size with Insulation (m)	0.684	do	Heat Loss through Insulation (Watt / meter)	244.39	$(2.\pi.K1.L.(Tp- Ta)) / \ln (do / di)$
Inner diameter of insulation (m)	0.61	di			
Tracer Liner length (m)	1	L			
Hold up temperature (°C)	70	Tp			
Ambient temperature (°C)	-3	Ta			
Steam Saturation temperature (°C) at 4 barg	152	Ts	Heat Loss from Tracer tube (Watt / meter)	52.56	UA(Ts-Ta)
Radius with insulation (m)	0.342	k1			
Wind velocity (m/s)	18				
Thermal Conductivity of Insulation (W/m K)	0.061				
Tracer size (mm)	12				
Tracer size (m)	0.012	U			
Thermal Conductivity of Tube (W/m K) SS316	17				
Total heat loss (Watt/ meter)				244.39	
Heat Loss from Tracer tube				52.56	
Number of Tracers (Total heat loss/ Heat Loss from Tracer tube * 75)				6.20	



VALVE CALCULATION

												
Client												
Project : Design and Engineering of steam tracing package												
Project No.												
Doc. no.												
Sheet no. : 6												
Sr. No	Type of Valves	Rating	Valve Size	Face to face	Valve Body Height	Total no. of turns considering 150mm pitch	Tracer Length (For 1 tracer)	Total length (For 1 no. of tracer on full valve body)	Length considering Contingency 20%	Tracer OD	Insulating Spacer sets	Remark
			mm NB	F - mm	H - mm	nos.	mm	mm	mm	mm	nos.	
1	Butterfly	150 & 300	80	114	190	4	1164	1164	1397	9.525	2	
2	Butterfly	150 & 300	100	127	230	5	1461	1461	1753	12.7	3	
3	Butterfly	150 & 300	150	140	280	6	1840	1840	2208	12.7	4	
4	Butterfly	150 & 300	200	152	345	7	2333	2333	2800	12.7	5	
5	Butterfly	150 & 300	250	165	405	8	2836	2836	3403	12.7	6	
6	Butterfly	150 & 300	300	178	485	10	3508	3508	4210	12.7	7	
7	Butterfly	150 & 300	350	190	535	11	3998	3998	4797	12.7	8	
8	Butterfly	150 & 300	400	216	595	12	4775	4775	5730	12.7	10	
9	Butterfly	150 & 300	450	222	635	13	5167	5167	6200	12.7	10	
10	Butterfly	150 & 300	500	229	700	15	5783	5783	6939	12.7	12	
11	Butterfly	150 & 300	600	267	815	17	7381	7381	8858	12.7	15	
12	Butterfly	150 & 300	650	292	865	18	8295	8295	9955	12.7	17	
13	Butterfly	150 & 300	700	292	920	19	8804	8804	10565	12.7	18	
14	Butterfly	150 & 300	750	318	990	21	10017	10017	12020	12.7	20	
15	Butterfly	150 & 300	800	318	1055	22	10654	10654	12784	12.7	21	

3D VIEW

Process Pipe

Tracer Routing

Preinsulated
tubing

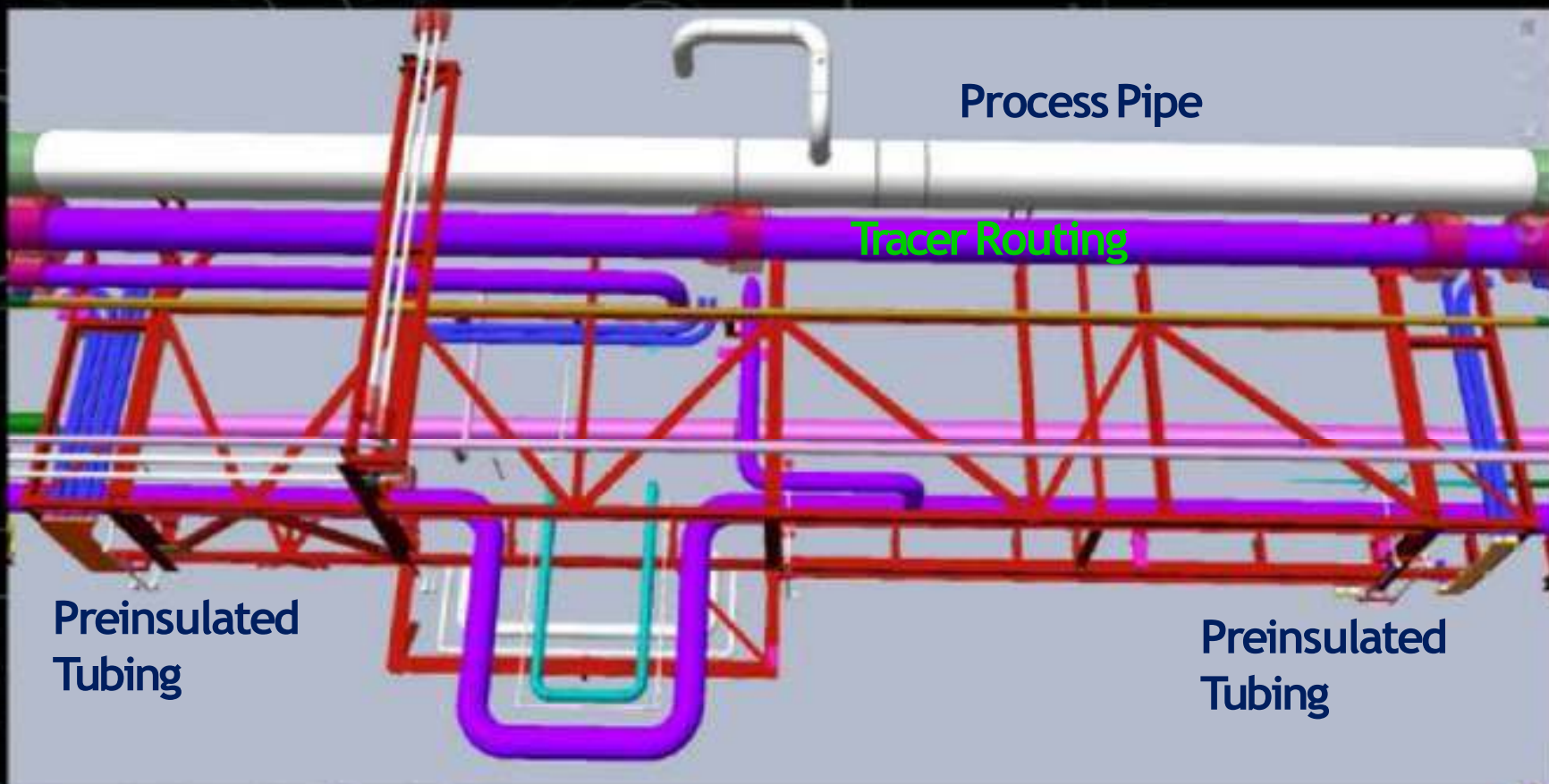
Supports

Preinsulated Tubing

Distribution
Manifold

Condensate Manifold

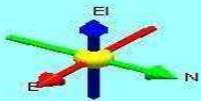
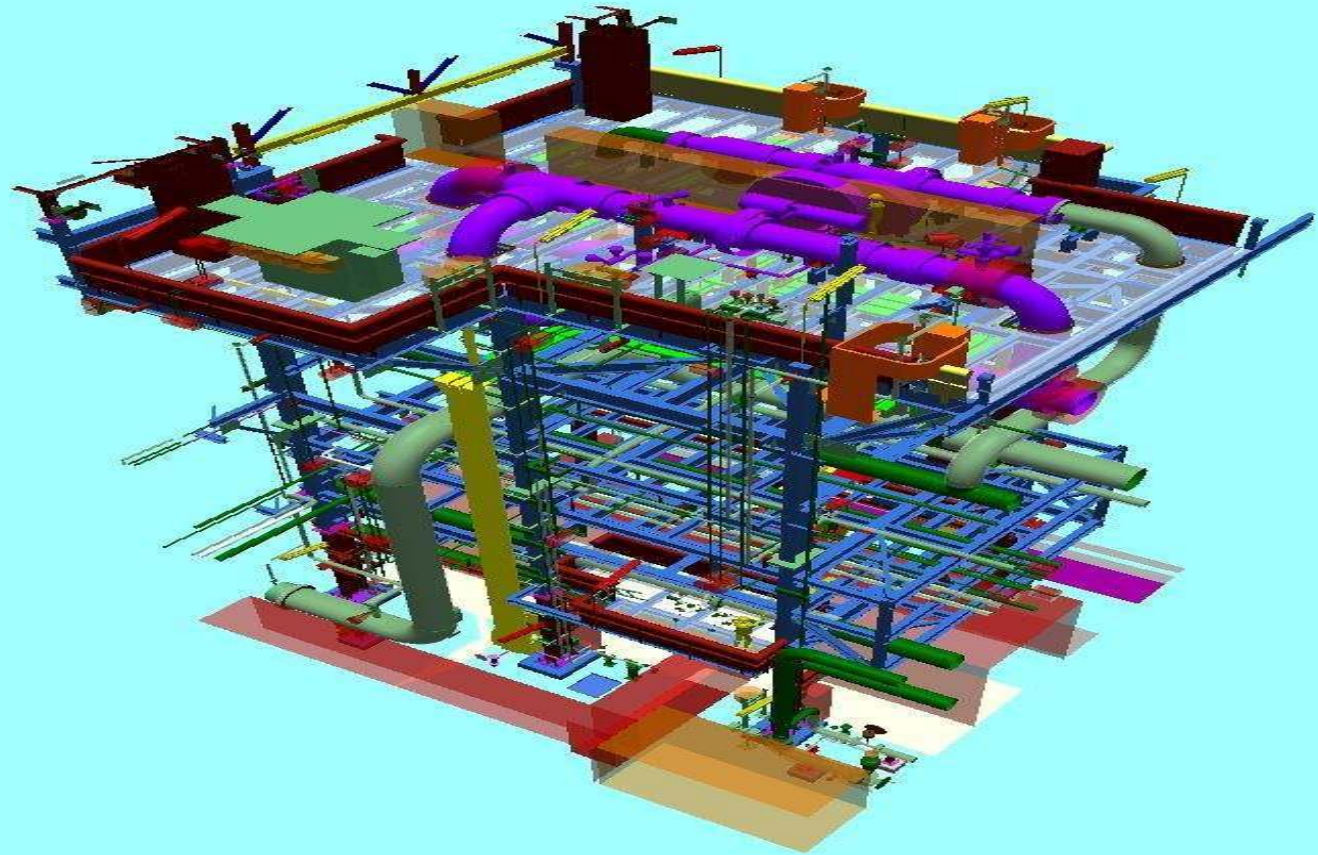




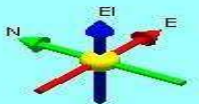
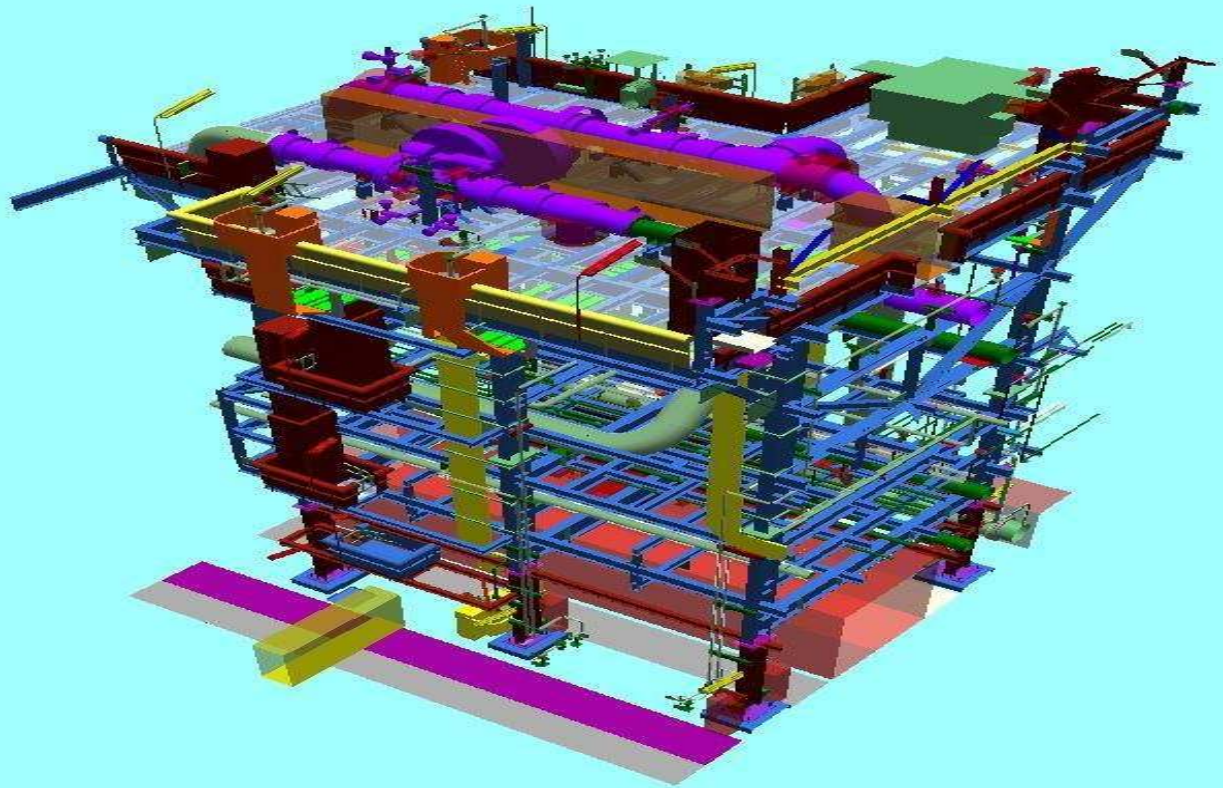
PLANT



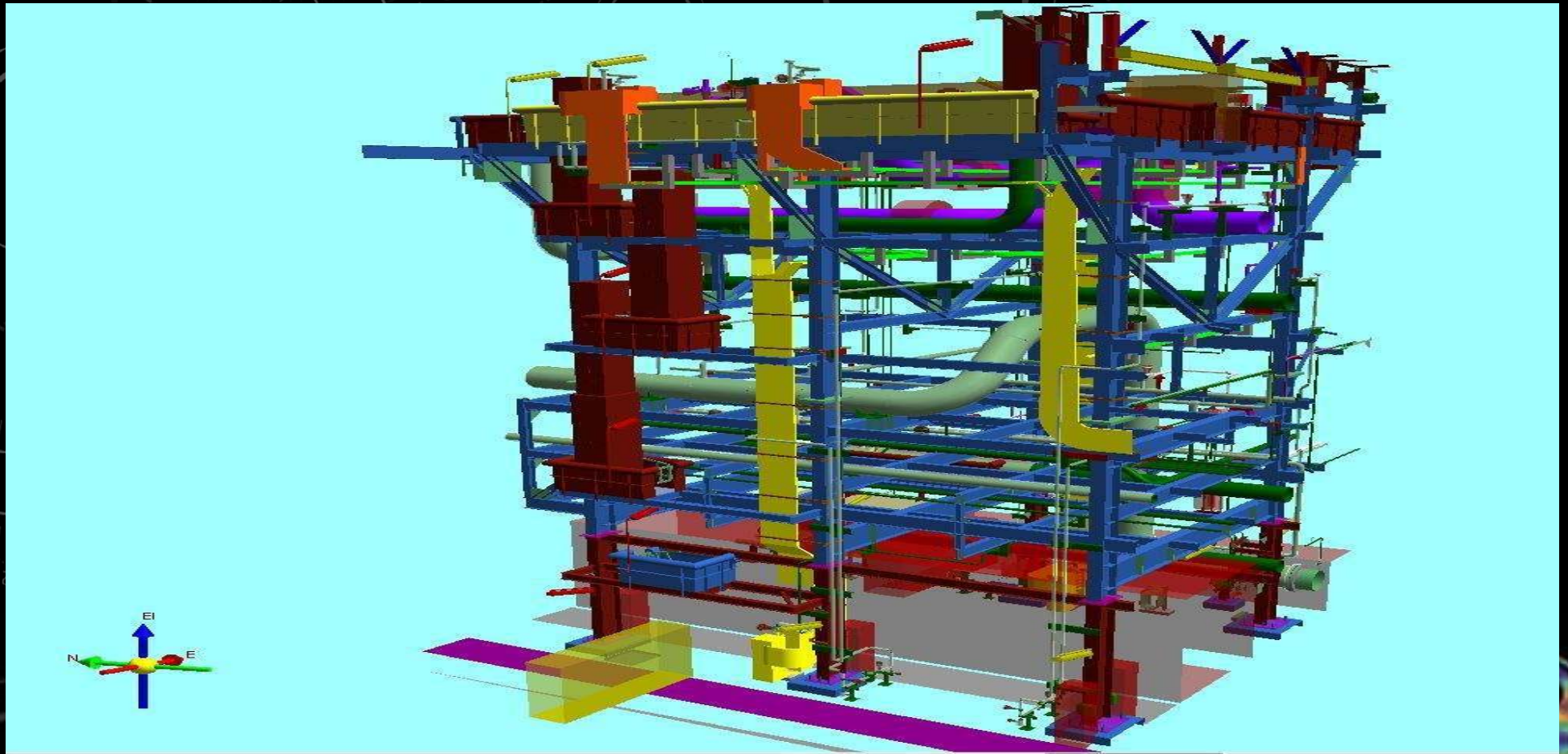
ONE UNIT (PART) OF A PLANT



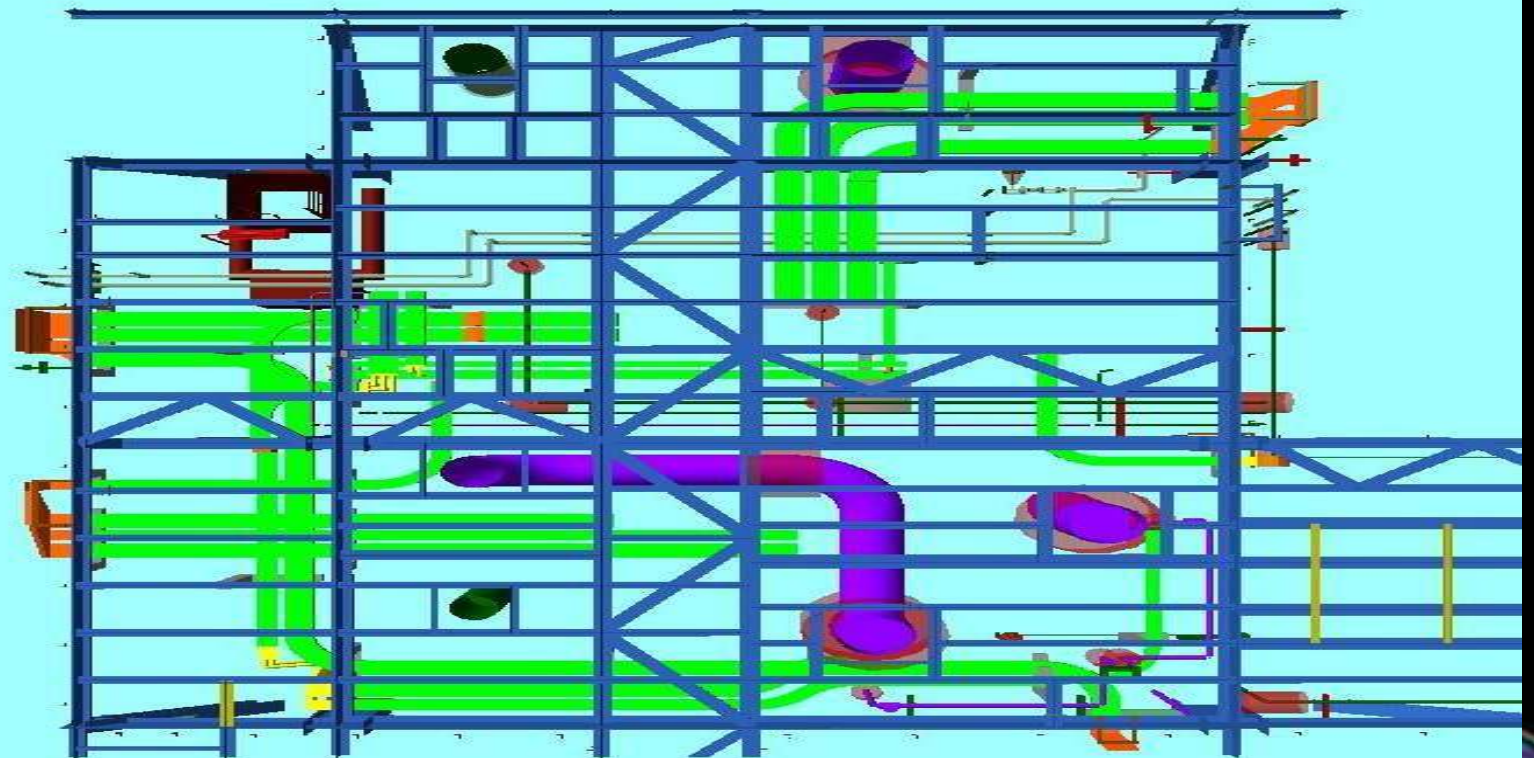
MANIFOLD LOCATION & LEAD LINE ROUTING



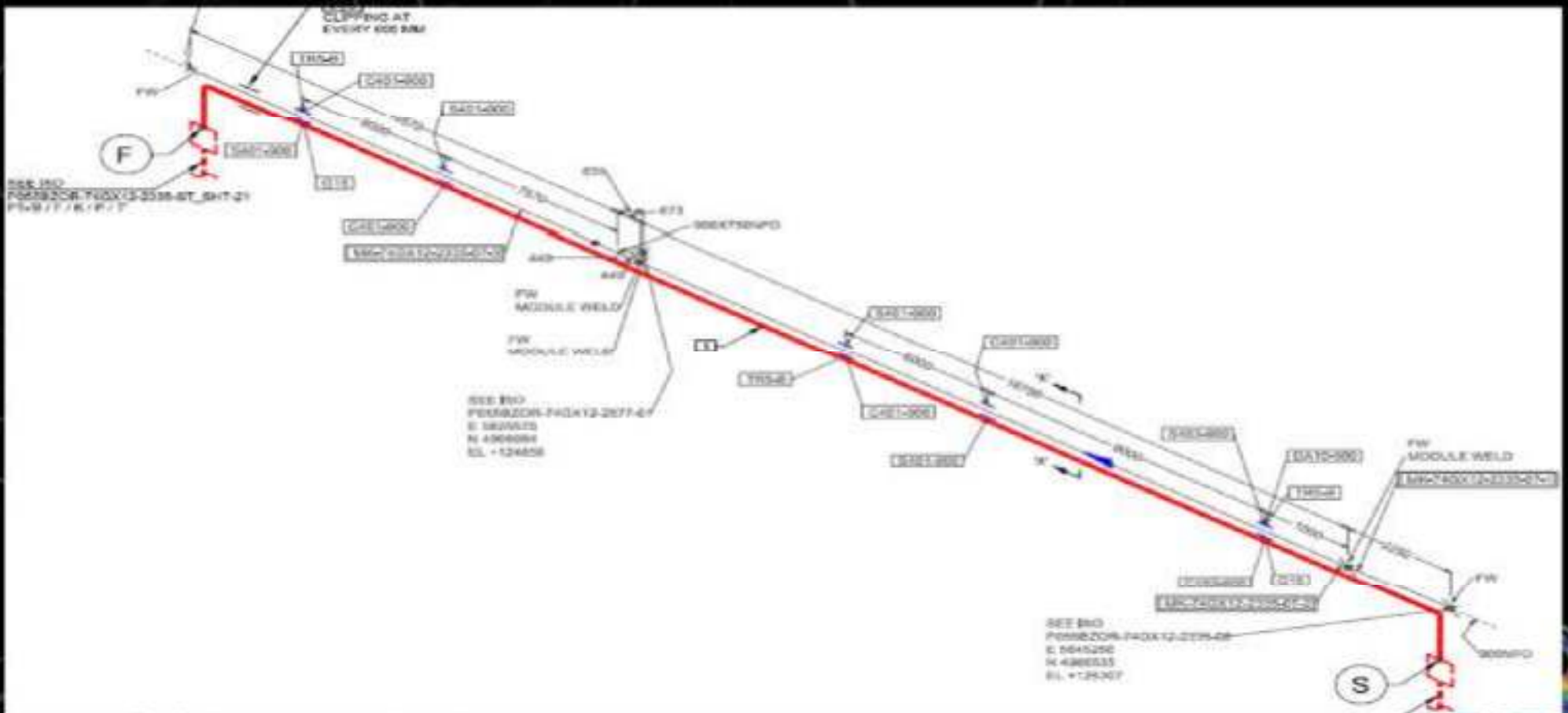
LEAD AND TAIL LINE ROUTING



PLAN VIEW OF CABLE TRAY



ISOMETRIC VIEW



MTO (MATERIAL TAKE OFF)

[illegible]

STEAM ENGINEERING RELATED ITEMS



Steam /
Condensate
Manifolds



Trap Assembly



Preinsulated
Tube



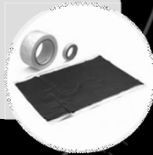
Connector



SPECIAL ITEMS FOR PACKAGE



Jacket Patch Kit



Heat Transfer Compound



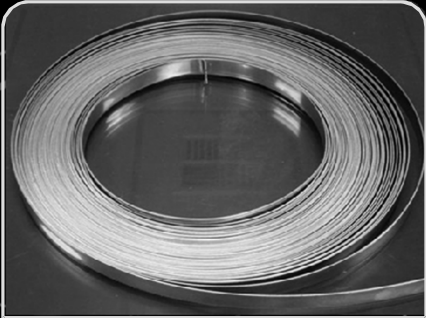
Equal /
Reducing Union



Fittings



SPECIAL ITEMS FOR PACKAGE



SSBanding



Fastening
Clamp



Connector



Termination
Kit



Thank You..!!

