(주)OOOO	**FLARE DATA SHEET** Project	:

FLARE DATA SHEET

Job. No. :

Project Name :

Location :

Contractor :

P.O No. :

Vendor :

This approval does not relieve the vendor of his responsibility to meet purchase order conditions relating to duty, specifications, materials, design, construction and delivery requirements.	1. ☐ Approved 2. ☐ Approved With Comments 3. ☐ Not Approved 4. ☐ For Information Contrator's Approval does not release the Vendor from Vendor's responsibilities and/or obligation by the Contract. APPR'D / DATE

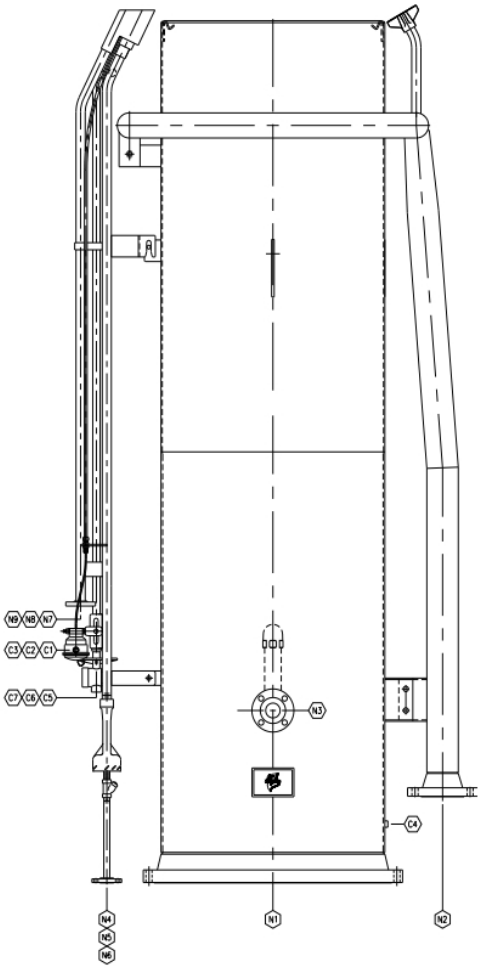
Rev.	Date	Description	Prepared by	Checked by	Approved by
C	25. Nov., 2019	Issue For Approval		D.W. Kim	
B	07. Aug., 2019	Issue For Approval		D.W. Kim	
A	20. May., 2019	Issue For Approval		D.W. Kim	

Flare Tip Specification Sheet

General Information:		
Tag No.:	F-1	
Model:		
Length:	3.05	m
Weight(Approx.):	564	kg
No. of Pilots:	3	

Design Case for Flare Tip:		
Governing Case:	FLARE GAS	
Molecular Weight:	42.48	
L. H. V. :	20,790	kcal/nm^3
Temperature:	40	Deg. C
Available Static Pressure:	0.306	barg
Design Flow Rate:	182,000	kg/hr
Governing Smokeless Case:	FLARE GAS	
Design Smokeless Rate:	54,600	kg/hr *Note 4)*
Upper Steam Consumption	26,463	kg/hr *Note 4)*
Center Steam Consumption	**8.700**	**kg/hr**
Approximate Exit Velocity:	101.5	m/s
Mach No.:	0.38	
Approx. Tip Press. Drop:	0.09	barg

Process Design Data for Pilot:		
Design Heat Release:	16,391	kcal/hr
Fuel Gas MW:	17.60	
Fuel Gas LHV:	9,282	kcal/nm^3
Fuel Gas Temperature:	5.0	Deg. C
Fuel Gas Inlet Pressure:	1.05	barg
Fuel Gas Flow rate:	2.14	Nm^3/hr(per Pilot)
Design Rainfall:	1270.00	mm/hr
Mounting Position:	Vertical	
Thermocouple Type:	K	Ungrounded
No. Thermocouples per Pilot:	1	(Duplex Type)



Construction for Flare Tip:	
Upper Section:	A240-310
Lower Section:	A240-310
Refractory:	N/A
Refractory Thk:	N/A
Windshield:	N/A
Flame Retention Rin	YES
Lifting Lugs:	YES

Construction for Pilot:	
Pilot Firing Tip:	310SS
Thermowell:	316SS
Thermocouple Sheath:	Inconel® 600
Thermocouple Head:	Aluminium Die Cast.
Fuel & FFG Ignition Line:	310SS

Surface Finish :

Surface Preparation N/A — Primer : N/A

Finish Paint : N/A — Final Color : N/A

Connections:	Qty.	Size	Type	Material
N1 - Flare Gas Inlet:	1	26"	150# WNRF "B"	A182-F310
N2 - Upper Steam Inlet:	1	6"	300# WNRF	A182-F304
N3 - Center Steam Inlet:	1	2"	300# WNRF	A182-F304
N4 ~ N6 - Pilot Gas :	3	1/2"	150# SWRF	A182-F310
N7 ~ N9 - Ignition Line:	3	1 "	150# SWRF	A182-F310
C1 ~ C4 - Thermocouple(Incl. Burn back):	4	PF 22C	PF Thread	CS(GALV.)
C5 ~ C7 - HEI Ignitior:	3	PF 16C	PF Thread	C[illegible])

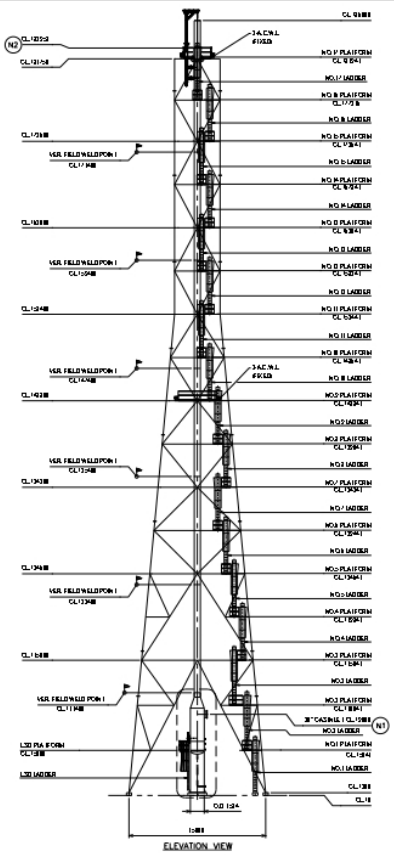
Miscellaneous Notes:

1. Includes Integral Purge Reducing Velocity Seal.
2. Required Fuel Gas(Mol. Wt. 17.60 / L.H.V. : 9282 kcal/nm^3) Purge Rate = 18.22Nm^3/hr (680 SCFH).
   - For more detail gas composition, please refer to Process Conditions on sheet 6 of 7.
3. Thermocouple (Duplex type) is included.
4. *30% application of total flare stack capacity (182,000 kg/hr) as per government regulation.*
5. *Butt weld joint at the flare tip shall be 100% radiographed. A minimum of 10% groove and other type weld joint shall be inspected using ultrasonic testing method.*

Derrick Supported Flare Stack Specification Sheet

General Information:

Tag No.:	ST0401	
Overall Height:	86.0	m
Number of Risers:	1	



Design Criteria:

Wind Design Code:	ASCE 7-05 / KBC2016	
Wind Speed (Structural):	51.0 / 34.0	m/s
Importance Factor (Wind):	1.15 / 1.00	
Exposure:	C	
Seismic Design Code:	UBC-97 / KBC2016	
Seismic Zone Factor:	0.15(ZONE 2A)	
Soil Profile Type:	S_D	
Importance Factor (Seismic):	1.25 / 1.2	
Design Temp.:	375.0	°C
Design Pressure:	3.5	barg
Riser Corrosion Allow:	3.0	mm
Derrick Corrosion Allow.:	0.0	mm

Construction:

Riser Material :	A516-70	Ladders & Step-offs :	per KOSHA
Liquid Seal Material:	A516-70	Platform at Tip :	360 Deg.
Derrick Material:	A36 or A53 Gr.B	Additional Platforms :	for ACWL

Surface Finish (Carbon Steel Surfaces):

■ **Derrick except top 2-band**

Surface Preparation : SSPC-SP10
Primer (P-1) : Inorganic Zinc Primer(75㎛)
Intermediate Paint (I-1) : High Build MIO Epoxy(150㎛)
Finish Paint (F-1) : Acrylic Polyurethane(75㎛)
Final Color : Red(RAL3000) / White(N9.5)

■ **Derrick top 2-band**

Surface Preparation : SSPC-SP10
Primer (P-1) : Inorganic Zinc Primer(75㎛)
Intermediate Paint *(F-3)* : Silicon Aluminum(20㎛)
Finish Paint *(F-3)* : Silicon Aluminum(20㎛)
Final Color : Red(RAL3000) / White(N9.5)

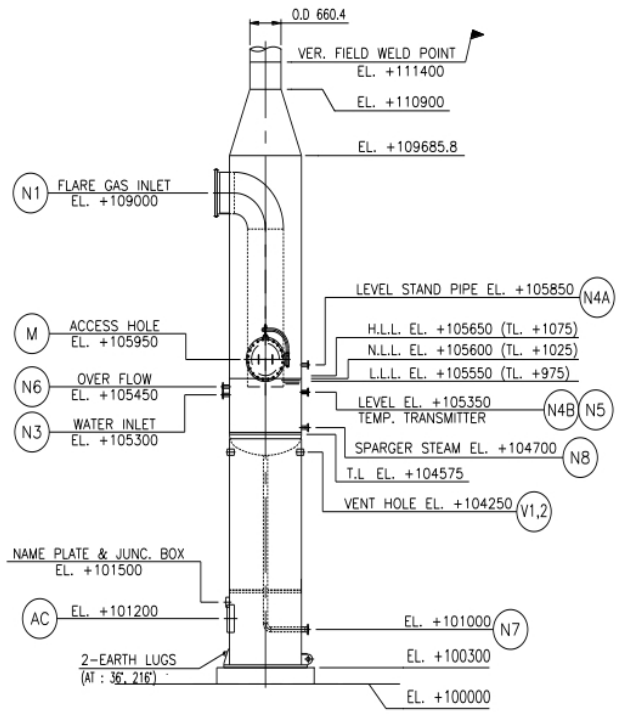
Miscellaneous Notes:

1. HDG is applied only for Platform grating.

Liquid Seal Specification Sheet

General Information:	
Tag No.:	LSD-1
Approx. Overall Height:	11.40 m
Approx. Outside Diameter:	1.52 m

Design Criteria:	
Governing Case:	FLARE GAS
Molecular Weight:	42.48
Design Flow Rate:	182,000 kg/hr
Design Pressure:	3.50 barg
Design Temperature:	375 Deg. C
Operating Pressure:	0.3 barg
Operating Temperature:	40.0 Deg. C
Corrosion Allowance:	3.0 mm
Structural Design Code:	ASME SEC.VIII DIV.1
ASME Code Stamp Req'd:	Yes ("U" Stamp)
Hydrostatic Test:	Yes
RT (Gamma Source):	Full(100%)



Construction:	
Shell Material:	A516-70
Nozzle Material:	A105
Skirt Material	A36 or SS400 Note 3)

Surface Finish (Carbon Steel Surfaces):	
Surface Preparation : SSPC-SP10	Primer (P-1) : Inorganic Zinc Primer(75㎛)
Intermediate Paint (I-1) : High Build MIO Epoxy(150㎛)	Finish Paint (F-1) : Acrylic Polyurethane(75㎛)
Final Color : Red(RAL3000)	

Liquid Level Alarm Set Points	
High Alarm Set Point : EL. +105700 (TL. + 1125)	Low Alarm Set Point : EL. +105500 (TL. +925)

Connections:	**Qty.**	**Size**	**Type**	**Material**
N1 - Flare Gas Inlet:	1	30"	150# WN.RF "Ser.B"	A105
N3 - Water Inlet:	1	2"	150# LWN.RF	A105
N4A/B - LG and LT	2	2"	300# LWN.RF	A105
N5 - Temp. Transmitter:	1	1-1/2"	*300#* LWN.RF	A105
N6 - Overflow (Skimmer):	1	2"	150# LWN.RF	A105
N7 - Liquid Seal Drain:	1	3"	150# WN.RF	A105
N8 - Sparger Steam:	1	2"	300# WN.RF	A105
M - Manhole:	1	24"	150# WN.RF	A105
AC - Access Hole:	1	20"	N/A	A36
V1/V2 - Vent Hole:	2	4"	N/A	A53 Gr.B

Miscellaneous Notes:

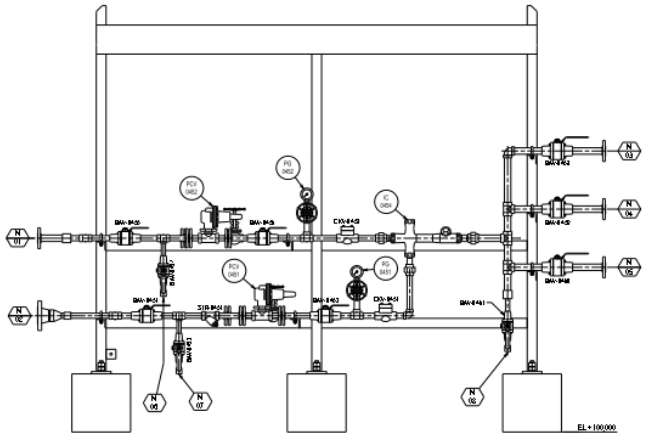
1. Any Instruments on LSD are not included.
2. Overflow Loop Seal pipe is not included.
3. For skirt of liquid seal Drum, same material shall be attached 900mm length from liquid seal drum.

Flame Front Generator Specification Sheet

General Information:	
Tag No.:	HEI/FFG-1
Model No.:	HEIC/LMM-3-DT/S
Operation:	FFG(Manual) / HEI(Manual & Auto)
No. of Pilots Ignited:	3
Area Classification:	Zone2, IIB+H2, T3
Approx. Weight:	1,000 kg

Fuel Gas Data:	
Molecular Weight:	17.60
L. H. V.:	9,282 kcal/Nm^3
Temperature:	5.0 deg. C
Pressure:	1.05 barg

Utility Consumption:	
Pilot Gas:	2.14 Nm^3/hr (per Pilot)
Pilot Gas:	6.42 Nm^3/hr (Total)
Ignition Gas:	3.09 Nm^3/hr (Intermittent)
Ignition Air:	29.6 Nm^3/hr (Intermittent)
UPS Power Available:	120 Volt, 1 Phase, 60 Hertz



Construction:			
Ignition Line Piping:	A312-TP304	Ignition Chamber:	Stainless Steel
Fuel Gas Piping:	By Other Scope	No. Thermocouples/Pilot	1(Duplex Type)
Mounting Rack:	A36 or SS400	Thermocouple Type:	"K"
Enclosure:	Ex "p" (Stainless Steel)	Propane Backup:	N/A
Shield for Radiant Heat & Rain:	Yes (A36 or SS400)	Ignition Air PRV:	Yes
Pilot Gas PRV:	N/A		

Surface Finish (Carbon Steel Surfaces):

Surface Preparation : SSPC-SP10 — Primer : Inorganic Zinc Primer(75㎛)

Intermediate Paint : High Build MIO Epoxy(150㎛) — Finish Paint : Acrylic Polyurethane(75㎛)

Final Color : Black(N1.5)

Connections:	Qty.	Size	Type	Material
N-01 - Instrument Air Inlet :	1	1"	150# SWRF	A182-F304
N-02 - Fuel Gas Inlet :	1	2"	150# SWRF	A182-F304
N-03 - 1st Ignition Gas Outlet :	1	1 "	150# SWRF	A182-F304
N-04 - 2nd Ignition Gas Outlet :	1	1 "	150# SWRF	A182-F304
N-05 - 3rd Ignition Gas Outlet :	1	1 "	150# SWRF	A182-F304
N-06 - Drain for Inst. Air :	1	1/2"	3000# THR'D	A182-F304
N-07 - Drain for Fuel Gas :	1	1/2"	3000# THR'D	A182-F304
N-08 - Drain for Ignition Gas :	1	1/2"	3000# THR'D	A182-F304

Miscellaneous Notes:

1. Piping/valves are stainless steel with SW construction.
2. Ignition system uses switch/relay logic.
3. Ex'd T/C J/B(040-PTJN-301) and HEI J/B(040-PAJN-301) are located at the bottom of flare stack.
4. Manifold of Pilot gas line at stack base is supplied by others.
5. Fuel Gas line for Pilot gas is by others.

Utility Piping Scope of Supply

Flare Tag No.	Description	Qty	Size	SCH.	Material	Origination Point	Termination Point	Termination Rating	Termination Type	Termination Material	Paint	Insulation
ST0401	Pilot Gas Line	3	1/2"	40	A312-TP304	Base of Stack	Flare Tip	150#	SWRF	A182-F304	N/A	N/A
ST0401	Ignition Gas Line	3	1"	40	A312-TP304	Base of Stack	Flare Tip	150#	SWRF	A182-F304	N/A	N/A
ST0401	Upper Steam	1	6"	40	A106-B	Base of Stack	Flare Tip	300#	WNRF	A105	See Paint Procedure	By Others
ST0401	Center Steam	1	2"	XS	A106-B	Base of Stack	Flare Tip	300#	WNRF	A105	See Paint Procedure	By Others
ST0401	HEI Conduit	1	PF 28C	-	Carbon Steel	Junction Box	Flare Tip	N/A	Coupling	CS(H.D.G.)	N/A	N/A
ST0401	Thermocouple Conduit	1	PF 42C	-	Carbon Steel	Junction Box	Flare Tip	N/A	Coupling	CS(H.D.G.)	N/A	N/A
ST0401	ACWL Conduit (Mid.)	1	PF 28C	-	Carbon Steel	Junction Box	Flare Tip	N/A	Coupling	CS(H.D.G.)	N/A	N/A
ST0401	ACWL Conduit (Top)	1	PF 54C	-	Carbon Steel	Junction Box	Flare Tip	N/A	Coupling	CS(H.D.G.)	N/A	N/A

Notes: 1. Base of Stack = Approximate Flare Stack Inlet Elevation.

2. All Utility Piping 2" and smaller and Conduit will be supplied in random lengths for field weld and installation at job site.