

CLIENT : GASSNOVA

PROJECT TITLE : CO2 KARSTO PROJECT

JOB NUMBER : 25474

M.R. NUMBER : _____

EQUIPMENT NUMBER : MV-101,MV-102-INTERNALS

EQUIPMENT TITLE : CO2 ABSORBER - INTERNALS

SERIAL NUMBER : _____

CRITICALITY RATING : _____

COMMENTS:

1. Packing is for the new CO2 absorbers
2. For drawing of column refer to 10112936-PB-P-DAS-0001
3. Vendor to rate packing design and advise suitability.
4. 2 sets of internals required for 2 identical columns.
5. Vendor to provide all internals including distributors and demisters.

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REV	DATE	DESCRIPTION	Orig.	Chkd	Lead	Review	Proj
1	12-Nov-08	Issued for Information Including Comments <i>Poo 37</i>	MJC	HS	DM	ADB	BR
0	7-Oct-08	Issued For Deliverable Milestone Schedule M2	HS	MJC	DM	ADB	BR

	PROCESS DATA SHEET TRAYS AND PACKING	JOB No	25474
		DATA SHEET No.	REV
		Bechtel:25474-000-M5D-CN-00012 Owner:10112936-PB-P-DAS-0002	
SHEET		1 OF 3	

REVISION

CLIENT & LOCATION : GASSNOVA, NORWAY	EQUIPMENT No : MV-101,MV-102
PROJECT : CO2 KARSTO	UNIT :
SERVICE OF UNIT : CO2 Absorber Internals	VESSEL REFERENCE DRAWING : 10112936-PB-P-DAS-0001
SUPPLIER :	INTERNAL DETAILS REFERENCE DRAWING :

PROCESS DESIGN DATA

PACKED BED LOCATION				
BED DESCRIPTION / LOCATION		Wash Water/Top	Amine/Middle	Amine/Bottom
THEORETICAL STAGES FROM TOP		1-3	4	5-8
CONDITIONS AT STAGE				
VAPOUR TO STAGE				
1 FLOW	kg/hr	*	*	*
1 MOLECULAR WEIGHT		*	*	*
1 TEMPERATURE	°C	*	*	*
1 PRESSURE	kPa(a)	*	*	*
1 DENSITY	kg/m ³	*	*	*
1 VOLUME FLOW	m ³ /hr	*	*	*
LIQUID FROM STAGE				
1 FLOW	kg/hr	*	*	*
1 MOLECULAR WEIGHT		*	*	*
1 TEMPERATURE	°C	*	*	*
1 DENSITY	kg/m ³	*	*	*
1 VOLUME FLOW (@ OPERATING TEMP & PRESS)	m ³ /hr	*	*	*
1 VISCOSITY	cP	*	*	*
1 SURFACE TENSION	Dynes/cm	*	*	*

PACKED BED DESIGN SPECIFICATION

DESIGN RATE, % OF INDICATED L & V RATES	By Vendor	By Vendor	By Vendor
MIN. OPER. RATE, % OF INDICATED L & V RATES (TURNDOWN)	50	50	50
TOTAL ALLOWABLE TOWER ΔP kPa	8-Note 2	8-Note 2	8-Note 2
ΔP /METRE PACKING, MAX ALLOWABLE cm.H2O/mmHg			
1 FOAMING TENDENCY (NONE/MODERATE/HIGH/SEVERE)	None - Note 1	Moderate-Note 1	Moderate-Note 1
1 FOULING CONSIDERATION (NONE / SEE REMARK No.)	Low - Note 3	Low - Note 3	Low - Note 3
1 REQUIRED NUMBER OF THEORETICAL STAGES	3	1	4
PACKING MATERIAL OF CONSTRUCTION	SS 304L	SS 304L	SS 304L
PACKED BED MATERIAL OF CONSTRUCTION			
MAX. EXPECTED DIFFERENTIAL PRESSURE kPa	By Vendor	By Vendor	By Vendor
MAX/MIN EXPECTED OPERATING TEMPERATURE °C			
SPECIAL REMARKS (ALSO SEE REMARKS SECTION BELOW)			

PACKED BED DETAILS (TO BE VERIFIED BY VENDOR)

COLUMN DIAMETER	mm	11810	11810	11810
PACKING TYPE		Structured	Structured	Structured
ESTIMATED BED HEIGHT (EXISTING)	mm			
DISTRIBUTOR TYPE		Gravity	Gravity	Gravity
BED SUPPORT TYPE	m	Lattice	Lattice	Lattice
BED HOLDDOWN TYPE				
OTHER INTERNAL TYPE				

PACKED BED DETAILS (BY VENDOR)

MAXIMUM % OF FLOOD ALLOWABLE		80%	80%	80%
% OF FLOOD @ DESIGN, CALCULATED				
ΔP /METRE, ACTUAL cm.H2O/mmHg				
PACKING EFFICIENCY - HETP m				
ACTUAL BED HEIGHT m				
PACKING STYLE IDENTIFIED				
DISTRIBUTOR STYLE IDENTIFIED				
BED SUPPORT STYLE IDENTIFIED				
BED HOLDDOWN STYLE IDENTIFIED				
OTHER INTERNAL STYLE IDENTIFIED				
PACKING BULK DENSITY kg/m ³				

NOTES

- * Refer to sheet 3 for Vapour/Liquid Profile and Properties
- 1) System Factor of 0.80, for amine service. System factor of 1.0 for wash water service.
- 2) To include inlet (1 kPa), outlet (1 kPa), demister, internal trays and packing.
- 3) Vendor to recommend measures taken to avoid fouling in amine service based on amine service experience.
- 4) Stages 1-3 are wash water, 4-8 are amine service.



**PROCESS DATA SHEET
PACKED BED**

JOB No	25474	REV	
DRAWING No	Bechtel:25474-000-M5D-CN-00012	1	
Owner:	10112936-PB-P-DAS-0002		
SHEET No.	2	OF	3

CLIENT & LOCATION : GASSNOVA, NORWAY	EQUIPMENT No : MV-101,MV-102
PROJECT : CO2 KARSTO	UNIT :
SERVICE OF UNIT : CO2 Absorber Internals	VESSEL REFERENCE DRAWING : 10112936-PB-P-DAS-0001
SUPPLIER :	INTERNAL DETAILS REFERENCE DRAWING :

PROCESS DESIGN DATA

Stage Report Vapor Phase

Vapor Phase Properties

Stage	Temperature °C	Pressure kPa	Molecular Weight kg/kmol	Mass Density kg/m ³	Mass Flow kg/h	Mass Cp kJ/(kg*°C)	Dynamic Viscosity cP	Thermal Conductivity W/(m*°C)
1	42.7835	101.273	27.8904	1.07581	1.20721E+06	1.06288	0.0186124	0.0265488
2	43.1526	102.307	27.8827	1.08524	1.20783E+06	1.06335	0.0186262	0.0265714
3	52.8663	103.342	27.3194	1.04224	1.25527E+06	1.09557	0.0188550	0.0270681

Stage Report Light Liquid Phase

Light Liquid Phase Properties

Stage	Temperature °C	Pressure kPa	Molecular Weight kg/kmol	Mass Density kg/m ³	Mass Flow kg/h	Mass Cp kJ/(kg*°C)	Dynamic Viscosity cP	Surface Tension dyne/cm
1	42.7835	101.273	18.2069	991.766	27927.3	4.17160	0.626548	69.0388
2	43.1526	102.307	18.2440	991.877	1.41425E+06	4.18772	0.625405	68.9202
3	52.8663	103.342	18.2520	987.712	1.43651E+06	4.21479	0.525078	67.0305

Stage Report Vapor Phase

Vapor Phase Properties

Stage	Temperature °C	Pressure kPa	Molecular Weight kg/kmol	Mass Density kg/m ³	Mass Flow kg/h	Mass Cp kJ/(kg*°C)	Dynamic Viscosity cP	Thermal Conductivity W/(m*°C)
4	58.9116	103.342	27.1045	1.01528	1.27753E+06	1.11091	0.0190176	0.0274034
5	58.9994	104.721	27.2006	1.03221	1.28814E+06	1.10798	0.0190108	0.0273703
6	57.2944	106.099	27.4886	1.06231	1.29433E+06	1.09631	0.0189649	0.0272260
7	55.0383	107.478	27.7978	1.09567	1.29738E+06	1.08367	0.0189022	0.0270555
8	53.3527	108.857	27.9971	1.12343	1.29692E+06	1.07530	0.0188558	0.0269388

Stage Report Light Liquid Phase

Light Liquid Phase Properties

Stage	Temperature °C	Pressure kPa	Molecular Weight kg/kmol	Mass Density kg/m ³	Mass Flow kg/h	Mass Cp kJ/(kg*°C)	Dynamic Viscosity cP	Surface Tension dyne/cm
4	58.9116	103.342	25.1682	1098.91	1.10992E+06	3.50298	1.63647	58.2523
5	58.9994	104.721	25.5710	1123.92	1.38966E+06	3.43884	1.87072	89.9563?
6	57.2944	106.099	25.8239	1139.05	1.39271E+06	3.39223	2.13649	92.9502
7	55.0383	107.478	25.9833	1147.71	1.39224E+06	3.35773	2.40133	94.6764
8	53.3527	108.857	26.0583	1151.91	1.39224E+06	3.33720	2.58556	95.5089

NOTES

- 4) Loads apply to one absorber only
- 5) Vapour flow and properties are for Vapour From Stage
- 6) Liquid flow and properties are for Liquid From Stage
- 7) Liquid is 35%wt MEA aqueous solution



**PROCESS DATA SHEET
PACKED BED**

JOB No 25474

DRAWING No

Bechtel:25474-000-MSD-CN-00012

Owner:10112936-PB-P-DAS-0002

SHEET No.

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OF

REV

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