

PROJECT:

VAL D'AGRI – POMPE MULTIFASE Monte Enoc 2-9-NW1

Pump Data Sheet

EX-CO	01	28/01/14	Issued for Approval	S. Klawitter	M. Wagner	S. Rinne	
EX-CO	00	09/10/13	Issued for Approval	S. Klawitter	M. Wagner	S. Rinne	
Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Approved by Company
Revision Index							
Company name and logo  eni S.p.A. div. exploration & production			Project Name: VAL D'AGRI POMPE MULTIFASE Monte Enoc 2-9-NW1 Project No: J20794		Company Document Number: 078206CMGA31061		
Contractor Name and Logo					Contractor Document Number: 81300062-A-DS-100 Contract n°: 2500010549		
Nome e logo Vendor/Subcontractor  Bornemann Pumps					Vendor/Sub Document Number: N.A. Order/Contract n°: N.A.		
Plant Name: Rete di raccolta		Site: Onshore - Basilicata - Val D'Agri			Scale: N.A.		Sheet 1 di 6
					Exceeds n°		
Pump Data Sheet					Exceeded by n°		
					Plant Area: 01		Plant Unit: N.A

 ITT Pumps and Systems www.bornemann.com		 Bornemann		Multiphase Pump MPC 268 - 45/1 / N				order no. / pos. NU 81300062 / 1,0 page: 1																																																																																																																																					
1.0 Project Data																																																																																																																																													
Item: revision	customer	: ENI S.p.A. Italien			6	quantity	: 2																																																																																																																																						
					7	delivery date																																																																																																																																							
		Via Emilia 1			8	customer-no.	: 300322																																																																																																																																						
		IT 20097 San Donato Milanese			9	expert	: Stefan Rinne																																																																																																																																						
					10	phone/fax	: 05724/390																																																																																																																																						
	1	order-no.	: 4310037152/4310037157_ENIRahme			11	application	: Multiphase Boosting																																																																																																																																					
2	order-date	: 02.01.2013			12	final destination	: Italy																																																																																																																																						
3	project-no.	: 81300062			13	application code	: API 676																																																																																																																																						
4	position	:			14	serial-no.	: 112122/112123																																																																																																																																						
5	project name	: ENI Monte Enoc 2-9-NW1			15	item-no.	: 1404																																																																																																																																						
2.0 Performance Data																																																																																																																																													
1/2	pumped liquid	: Multiphase Mixture with H2S / CO2,																																																																																																																																											
/3																																																																																																																																													
<table border="1"> <thead> <tr> <th colspan="2">operating points</th> <th>1.</th> <th>2.</th> <th>3.</th> <th>guarantee</th> <th colspan="2">operating points</th> <th>1.</th> <th>2.</th> <th>3.</th> <th>guarantee</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>1 temperature (C°)</td> <td>: 54,0</td> <td>: 72,0</td> <td>: 67,0</td> <td>: 67,0</td> <td>14</td> <td>capacity (m³/h)</td> <td>: 30,00</td> <td>: 122,00</td> <td>: 292,00</td> <td>: 292,00</td> </tr> <tr> <td>5</td> <td>viscosity (mm²/s)</td> <td>: 1,10</td> <td>: 1,60</td> <td>: 1,60</td> <td>: 1,60</td> <td>15</td> <td>suction pressure (barg)</td> <td>: 27,00</td> <td>: 13,00</td> <td>: 13,00</td> <td>: 13,00</td> </tr> <tr> <td>6</td> <td>1 gravity (kg/dm³)</td> <td>: 0,747</td> <td>: 0,767</td> <td>: 0,767</td> <td>: 0,767</td> <td>16</td> <td>discharge pressure (barg)</td> <td>: 55,20</td> <td>: 55,20</td> <td>: 52,70</td> <td>: 52,70</td> </tr> <tr> <td>7</td> <td>vapour pressure (bara)</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>17</td> <td>diff. pressure (bar)</td> <td>: 28,20</td> <td>: 42,20</td> <td>: 39,70</td> <td>: 39,70</td> </tr> <tr> <td>8</td> <td>gas content (%)</td> <td>: 83,0</td> <td>: 92,0</td> <td>: 92,0</td> <td>: 92,0</td> <td>18</td> <td>speed (1/min-)</td> <td>: 574</td> <td>: 925</td> <td>: 1743</td> <td>: 1743</td> </tr> <tr> <td>9</td> <td>solid content (%)</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>19</td> <td>shaft power (kW)</td> <td>: 110,00</td> <td>: 263,00</td> <td>: 477,00</td> <td>: 477,00</td> </tr> <tr> <td>10</td> <td>12 particle size (mm)</td> <td>: 1,000</td> <td>: 1,000</td> <td>: 1,000</td> <td>: 1,000</td> <td>20</td> <td>motor power (kW)</td> <td>: 630,00</td> <td>: 630,00</td> <td>: 630,00</td> <td>: 630,00</td> </tr> <tr> <td>11</td> <td>pH-value</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>21</td> <td>NPSH required (m)</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>12</td> <td>condition (liqu./gas.)</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> <td>22</td> <td>NPSH available (m)</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>13</td> <td>1 remarks</td> <td colspan="10">:</td> </tr> </tbody> </table>										operating points		1.	2.	3.	guarantee	operating points		1.	2.	3.	guarantee	4	1 temperature (C°)	: 54,0	: 72,0	: 67,0	: 67,0	14	capacity (m³/h)	: 30,00	: 122,00	: 292,00	: 292,00	5	viscosity (mm²/s)	: 1,10	: 1,60	: 1,60	: 1,60	15	suction pressure (barg)	: 27,00	: 13,00	: 13,00	: 13,00	6	1 gravity (kg/dm³)	: 0,747	: 0,767	: 0,767	: 0,767	16	discharge pressure (barg)	: 55,20	: 55,20	: 52,70	: 52,70	7	vapour pressure (bara)	:	:	:	:	17	diff. pressure (bar)	: 28,20	: 42,20	: 39,70	: 39,70	8	gas content (%)	: 83,0	: 92,0	: 92,0	: 92,0	18	speed (1/min-)	: 574	: 925	: 1743	: 1743	9	solid content (%)	:	:	:	:	19	shaft power (kW)	: 110,00	: 263,00	: 477,00	: 477,00	10	12 particle size (mm)	: 1,000	: 1,000	: 1,000	: 1,000	20	motor power (kW)	: 630,00	: 630,00	: 630,00	: 630,00	11	pH-value	:	:	:	:	21	NPSH required (m)	:	:	:	:	12	condition (liqu./gas.)	:	:	:	:	22	NPSH available (m)	:	:	:	:	13	1 remarks	:									
operating points		1.	2.	3.	guarantee	operating points		1.	2.	3.	guarantee																																																																																																																																		
4	1 temperature (C°)	: 54,0	: 72,0	: 67,0	: 67,0	14	capacity (m³/h)	: 30,00	: 122,00	: 292,00	: 292,00																																																																																																																																		
5	viscosity (mm²/s)	: 1,10	: 1,60	: 1,60	: 1,60	15	suction pressure (barg)	: 27,00	: 13,00	: 13,00	: 13,00																																																																																																																																		
6	1 gravity (kg/dm³)	: 0,747	: 0,767	: 0,767	: 0,767	16	discharge pressure (barg)	: 55,20	: 55,20	: 52,70	: 52,70																																																																																																																																		
7	vapour pressure (bara)	:	:	:	:	17	diff. pressure (bar)	: 28,20	: 42,20	: 39,70	: 39,70																																																																																																																																		
8	gas content (%)	: 83,0	: 92,0	: 92,0	: 92,0	18	speed (1/min-)	: 574	: 925	: 1743	: 1743																																																																																																																																		
9	solid content (%)	:	:	:	:	19	shaft power (kW)	: 110,00	: 263,00	: 477,00	: 477,00																																																																																																																																		
10	12 particle size (mm)	: 1,000	: 1,000	: 1,000	: 1,000	20	motor power (kW)	: 630,00	: 630,00	: 630,00	: 630,00																																																																																																																																		
11	pH-value	:	:	:	:	21	NPSH required (m)	:	:	:	:																																																																																																																																		
12	condition (liqu./gas.)	:	:	:	:	22	NPSH available (m)	:	:	:	:																																																																																																																																		
13	1 remarks	:																																																																																																																																											
3.0 Material Execution																																																																																																																																													
1	pump casing	: ASTM A 516 Gr.70			7	bearing housing	: P265GH (fabricated carbon steel)																																																																																																																																						
2	screws	: Alloy 625			8	sealing housing	: 1.4410 (s. dupl.) sim. to UNS 32750																																																																																																																																						
3	shafts	:			9	flat gaskets	: fiber composition, non asbestos																																																																																																																																						
4	liner	: EN-JS3011 s.t AISI D2 ASTM A439			10	1 o-rings medium wett.	:																																																																																																																																						
5	intermediate flange	: 1.4410 (s. dupl.) sim. to UNS 32750			11	non med. wetted seals	: FKM																																																																																																																																						
6	5 remarks	: to 3.3: Alloy 718 (API 6A 718); to 3.1: Lowest temp.: -20°C; to 3.10- FPM/PTFE																																																																																																																																											
4.0 Shaft Sealing																																																																																																																																													
1	construction / function	:			6	API-plan	: 53/54																																																																																																																																						
2	manufacturer	: EagleBurgmann			7	piping	: BORNEMANN																																																																																																																																						
3	1 type	: HRKS1-D-E4-L+R			8	piping execution	: stainl. steel pipes + screw connections																																																																																																																																						
4	material code	: Q2Q2K17/V10MG1-Q32Q2V10MG1			9	quench / barrier fluid	: oil, low viscous																																																																																																																																						
5	remarks	:																																																																																																																																											
5.0 Bypass / Heating / Design / Bearings																																																																																																																																													
1	bypass	: without bypass, with rupture disc			9	heating fluid data	:	barg	:	°C																																																																																																																																			
2	7 setting point	: 49,4 bar			10	12 bearing life time	: 50000	h	:																																																																																																																																				
3	max. suction pressure	: 100 barg			11	additional execut. 1	:																																																																																																																																						
4	casing design	: SS+DS:100bar@20°C			12	additional execut. 2	:																																																																																																																																						
5	design data heating	:			13	measuring points 1	:																																																																																																																																						
6	12 heating	:			14	measuring points 2	: 4x G1/2" for PT-100 at bearing casing																																																																																																																																						
7	heating fluid	:			15	-----	:																																																																																																																																						
8	remarks	:																																																																																																																																											
6.0 Flanges / Connections																																																																																																																																													
<table border="1"> <thead> <tr> <th></th> <th>rule</th> <th>size</th> <th>press. rate</th> <th>position</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>suction</td> <td>: ANSI B16,5</td> <td>: 12"</td> <td>: 600 lbs RTJ</td> <td>: top left</td> </tr> <tr> <td>2</td> <td>discharge</td> <td>: ANSI B16,5</td> <td>: 12"</td> <td>: 600 lbs RTJ</td> <td>: top right</td> </tr> <tr> <td>3</td> <td>heating</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>4</td> <td>drain</td> <td>: ANSI B16,5</td> <td>: 2"</td> <td>: 600 lbs RTJ</td> <td>: bottom</td> </tr> <tr> <td>5</td> <td>2 quench</td> <td>: DIN ISO 228-1</td> <td>: G 3/4"</td> <td>:</td> <td>:</td> </tr> <tr> <td>6</td> <td>cooling</td> <td>:</td> <td>:</td> <td>:</td> <td>:</td> </tr> <tr> <td>7</td> <td>flange options</td> <td colspan="4">:</td> </tr> <tr> <td>8</td> <td>2 remarks</td> <td colspan="4">:</td> </tr> </tbody> </table>											rule	size	press. rate	position	1	suction	: ANSI B16,5	: 12"	: 600 lbs RTJ	: top left	2	discharge	: ANSI B16,5	: 12"	: 600 lbs RTJ	: top right	3	heating	:	:	:	:	4	drain	: ANSI B16,5	: 2"	: 600 lbs RTJ	: bottom	5	2 quench	: DIN ISO 228-1	: G 3/4"	:	:	6	cooling	:	:	:	:	7	flange options	:				8	2 remarks	:																																																																																		
	rule	size	press. rate	position																																																																																																																																									
1	suction	: ANSI B16,5	: 12"	: 600 lbs RTJ	: top left																																																																																																																																								
2	discharge	: ANSI B16,5	: 12"	: 600 lbs RTJ	: top right																																																																																																																																								
3	heating	:	:	:	:																																																																																																																																								
4	drain	: ANSI B16,5	: 2"	: 600 lbs RTJ	: bottom																																																																																																																																								
5	2 quench	: DIN ISO 228-1	: G 3/4"	:	:																																																																																																																																								
6	cooling	:	:	:	:																																																																																																																																								
7	flange options	:																																																																																																																																											
8	2 remarks	:																																																																																																																																											

 ITT Pumps and Systems www.bornemann.com		 Bornemann		Multiphase Pump MPC 268 - 45/1 / N		order no. / pos. NU 81300062 / 1,0 page: 2	
7.0 Installation / Rotation / Name Plate							
1	installation	:	horizontal	5	rotation	:	cw
2	location	:	outdoor, inside container	6	pos. of drive shaft	:	left
3	2 area classification	:	ATEX category 2 (Zone 1) T3	7/8	name plate	:	English / Italian
4	remarks	:					
8.0 Accessories							
1	base plate	:	welded construction	9	13 maker coupling	:	Siemens
2	executioncode	:		10	13 coupling type	:	N-EUPEX HDS 340
3	option base plate 1	:	with earthing connection	11	coupling guard	:	aluminium
4	option base plate 2	:	lifting lugs	12	cover for drive	:	
5	drip pan	:	complete, integrated in base plate	13	instruments/options	:	
6	mounting option 1	:	holder for control unit	14	15 spare parts	:	DOC. 078206CMEA31006_EXCO
7	mounting option 2	:		15	electrical wiring	:	BORNEMANN
8	remarks	:					
9.0 Drive							
1	drive system	:	3-phase-motor	11	frequency (Hz)	:	50
2	13 type	:	DNSL-400LX-04	12	protection	:	IP 55
3	14 manufacturer	:	Siemens	13	explosion proof	:	EEx de IIB T3
4/5	size/ mounting form	:	/ B3	14	thermal class	:	F used acc. to B (155 / 130 °C)
6	start	:	inverter driven	15	13 certificate	:	ATEX certificate: EX II 2 G
7	15 power (kW)	:		16	supplied by	:	BORNEMANN
8	13 speed (1/min-)	:		17	assembly	:	BORNEMANN
9	voltage (V)	:	690 3 Phase	18	part no. drive	:	
10	remarks	:					
10.0 Painting / Conservation							
1	painting	:		5	intermediate coat	:	
2	surface preparation	:		6	final coat	:	
3	primer coat	:		7	preservation	:	acc. to QSA 09011 standard
4	15 remarks	:	According document 078206CMB31018_EXDE PAINTING, INSULATION AND COATING PROCEDURE				
11.0 Mill Certs / Testing							
1	casing	:	EN 10204-3.2 + NACE	11	liner	:	EN 10204-3.1
2	5 shafts	:	EN 10204-3.1	12	bearing housing	:	EN 10204-3.1
3	screws	:	EN 10204-3.1 + NACE	13	intermediate flange	:	EN 10204-3.2 + NACE
4	2 additional parts	:	Sealing Mechanical Seal: EN 10204-3.2 + NACE				
	Testing		<u>yes/no</u>	<u>according to</u>	<u>by</u>	<u>pressure</u>	<u>test medium</u>
5	9 hydrostat. press. test	:	yes	EN 10204-3.2	TÜV	150 barg	water
6	15 performance test	:	yes	API 676	customer		water
7	NPSH-test	:					
8	noise level test	:	yes	QSP 10 032	BORNEMANN		
9	vibration test	:	yes	QSP 10 031	BORNEMANN		
10	5 remarks	:	to. 11.2: Alloy 718 fabricated and tested according to API 6A718 (Nickel Base Alloy 718 (UNS N07718))				
12.0 Documentation							
1	language	:	English / Italian	6	operation manual	:	3-fold
2	hydrostat. press. test	:	3-fold	7	mill certs	:	3-fold
3	performance test	:	3-fold	8	dimensional drawing	:	3-fold
4	documents to	:					
5	remarks	:					
13.0 Weights / Packing							
1	15 pump	:	appr. 8500 kg	3	15 accessories	:	appr. 37000 kg
2	15 base plate	:	appr. 24700 kg	4	15 total net	:	appr. 37000 kg
				5	15 total gross	:	appr. 3800 kg
				6	packing	:	packing for truck transport
14.0 Remarks							
1	3	:					

**ITT**Pumps and Systems
www.bornemann.com

Multiphase Pump

MPC 268 - 45/1 / N

order no. / pos.

NU 81300062 / 1,0

page: 3

Additional comments to

1.0 Project Data

1.15. item. no 1404 refers to the MPC 268 -45/1 N pump and is needed for internal purpose.

Pump TAG Nos.:

- PA-101-C
- PA-101-D

2.0 Performance data

Design case 1 (Reduced Flow)

Design case 2 (Max Head)

Design case 3 (Max Flowrate/Power)

2.4 refers to discharge temperature

Suction temperature

Design case 1: 33,5 °C

Design case 2: 24 °C

Design case 3: 24°C

2.5 refers to oil viscosity

2.6 refers to oil gravity

3. Material Selection

For all wetted parts the material is in compliance with NACE MR0175/ISO 15156

3.1 pump casing: ASTM A 516 gr. 70 + 6 mm CA + HIC tested

3.2 screws: Ni-Alloy 625

3.3 shafts: Alloy 718 (API 6A 718)

3.4 liner: removable liner

5. Bypass/Heating/Design/Bearings

5.4 Operating pressure 89 barg @ 100°C

6. Flanges/Connections

The flange connection are only applicable for the pump.

The connection list refers to the complete system, please refer to document 078206CMDA31067_EXCO_00_2

7. Location/Rotation/Name Plate

7.2 outdoor, inside container

7.7 name plate: English/Italian

8. Accessories

- BSOS Electric heater, TAG No. E-201-C, E-201-D

- Rated Power: 2,5 KW

- Rated Voltage: 400 V 2/PE 50/60 Hz

**ITT**Pumps and Systems
www.bornemann.com

Multiphase Pump

MPC 268 - 45/1 / N

order no. / pos.

NU 81300062 / 1,0

page: 4

- Rated current: 6,3 A

- BSOS Pump, TAG No. P-202-C, P-202-D

- Feed rating: 35 l/min

- BSOS Pump, TAG No. P-201-C, P-201-D

- Feed rating: 7 l/min

BSOS Motor, TAG No. M-202-C, M-202-D

- Power: 3,4 KW

- Speed: 1500 rpm

- Voltage: 400 V

BSOS Motor, TAG No. M-201-C, M-201-D

- Power: 12,7 KW

- Speed: 1500 rpm

- Voltage: 400 V

BSOS Tank

- Oil: ISO VG 32

- Volume 300 liter

BSOS Oil Filter, TAG No. F-203-C, F-203-D, F-202-C, F-202-D

- Nominal size 300 l/min

- Nominal pressure 210 bar

BSOS Bladder accumulator, TAG No. BA-201-C, BA-201-D

- Volume 50 liter

- Set @ 110 - 130 bar

Inlet process strainer, TAG No. 112121-F-C, 112121-F-D

- PS min: 0 barg

- PS max: 93,2 barg

- TS min: -20 °C

- TS max: 100 °C

- Design: ASME B31.3 (incl. 6 mm Corosion allowance)

- Mesh opening: 6 mm

Pressure saftey valve, TAG No PSV-101-A, PSV-101-B

- Dimension: 4" x 6" / 600 x 150

- Orifice L

- Actual orifice diameter: 53,5 mm

- Actual orifice area: 2248 mm²

- Set pressure 89 bar

8.1 coupling guard: aluminum non sparking

9. Drive

9.7 Power: 564 - 690 KW

9.8 Speed: M=const=3610 NM: 400 - 1493 1/min

Speed: P=const=564 KW: 1493 - 1920 1/min

11. Mill Certs/ Testing

All tests must be refered to the project spec. 078206CM31005_EXCO_, Inspection test plan (all equipment)

NACE MR0175/ISO 15156 is confirmed

**ITT**Pumps and Systems
www.bornemann.com

Multiphase Pump

MPC 268 - 45/1 / N

order no. / pos.

NU 81300062 / 1,0

page: 5

11.6 performance test includes also the mechanical run test. The test has been performed according API 676 and according deviation requestes no. 8, no. 10 and no. 11

General:

Operation type: Continous

Type of working unit: 2x 100%

IRV System: The Bornemann multiphase pumps are all equipped with a patented liquid re-circulation valve (IRV) integrated in the pump casing. The IRV is designed to operate without any external system and re-circulates the liquid inside the pump. This feature extends the dry running time of the pump. The Bornemann Multiphase Pumps are all designed in such a way that the pump casing can store enough liquid in the casing during normal operation.

Maximum noise level: 85 db(A) @ 1 m from the skid with container

All equipment will be installed on one common base plate.

For the data of the lubricat system please refer to document 078206CMGA31063_EXCO
Data Sheet for Seal Oil System incl. GLRD Data Sheet

The warranty period is 24 month from delivery date.