SEDE LEGALE E AMM.VA:
VIA DI ROMA, 67
CAP 48121 RAVENNA
TEL. (0544) 34317
FAX (0544) 37169
CASELLA POSTALE N. 392
Sito Web: http://www.almapetroli.com
e-mail: info@almapetroli.com

ALMA PETROLI
S.p.A. CAPITALE SOCIALE € 10.000.000 INT. VERS.

STABILIMENTO:
VIA BAIONA, 195
CAP 48123 RAVENNA
TEL. (0544) 696411
FAX (0544) 696410

A: Spett.le

Ministero dell'Ambiente e della Tutela del Territorio e del Mare – Direzione Generale Valutazioni Ambientali
E.prot DVA – 2012 – 0005124 del 29/02/2012

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE
RICEVUTO IL
28 FEB. 2012
DIREZIONE GENERALE PER LE VALUTAZIONI AMBIENTALI

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE
Direzione Generale Valutazioni Ambientali
Divisione IV – Rischio rilevante e Autorizzazione Integrata Ambientale
Via Cristoforo Colombo, 44
00147 Roma

E P.C.

ISTITUTO SUPERIORE PER LA RICERCA AMBIENTALE
Commissario Straordinario
Via Vitaliano Brancati, 48
00148 Roma

Prot.n. L / 50 / 12
Ravenna, 21 febbraio 2012

OGGETTO: Trasmissione studio di processo per l'installazione di una torcia con sistema di blow-down presso la raffineria Alma Petroli in Ravenna

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Come prescritto dall'Autorizzazione Integrata Ambientale DVA_DEC-2011-0000302 del 07/06/2011 pubblicata su G.U. n°148 del 28/06/2011 (pag. 109 del Parere Istruttorio Conclusivo e pag. 21 del Piano di Monitoraggio e Controllo), e con riferimento alla ns. nota avente prot. L/402/11 del 20/12/2011 (trasmessa ad ISPRA), trasmettiamo lo studio di processo relativo alla costruzione di una torcia di raffineria con sistema di blow-down.

Comunichiamo altresì che a breve avranno inizio le attività relative all'ingegneria di dettaglio del medesimo progetto.

Distinti saluti

ALMA PETROLI SpA

ALMA PETROLI S.p.A.
Ing. Marino Bose

LIBRO DI PROCESSO

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione Di Processo	M. Tranfaglia	C. Bonventre	C.Bonventre / B. Binaco

CONTENUTO

ALLEGATI

1 - Proposta tecnico/commerciale della Thermoengineering Srl
2 - Planimetria preliminare
3 - Documentazione ISPRA – Pag. 11/18 e Allegato L
4 - Proposta tecnico/commerciale della Sick Spa

1 SCOPO DELLO STUDIO

Attualmente, nello stabilimento ALMA PETROLI di Ravenna, non è previsto un sistema centralizzato di raccolta degli scarichi delle valvole di sicurezza, con relativa torcia per la combustione dei gas scaricati; oggi gli scarichi delle PSV sono inviate all'atmosfera, mentre gli OFF GAS da impianto distillazione, in caso di blocco forni, sono inviati ad una candela.

Per allinearsi ad una prescrizione richiesta dal MATT, in occasione del rilascio dell'AIA dello stabilimento, ALMA PETROLI ha deciso dotarsi di un nuovo sistema di blowdown e torcia.

Per traguardare l'obiettivo prefissato, A.P. ha incaricato la Tecnimont KT di sviluppare il presente studio di processo, per produrre la progettazione di base del nuovo sistema torcia, contenente tutte le informazioni necessarie per poter poi procedere con la fase di ingegneria e costruzione.

Il nuovo sistema di blowdown e torcia sarà identificato come Unità 900.

2 BASI DELLO STUDIO

2.1 Definizione dell'area di ubicazione della torcia e dei limiti di irraggiamento da rispettare

L'area disponibile per l'installazione della torcia è identificata da un quadrato di lato massimo 8 m o un triangolo equilatero di lato massimo 10 m, ubicato nell'area compresa tra i Serbatoi di Bitume 30/31/32 a nord, i Serbatoi di Virgin Naphtha 21/22 a est, il locale Logistica D e il locale quadri Logistica LQ3 a sud. Per maggiori dettagli si allega la planimetria dell'area dello stabilimento interessata (allegato 2).

Data la presenza di serbatoi nell'area adiacente alla torcia, sarà garantito un irraggiamento massimo di 4730 W/m^2 (1500 $Btu/h\ ft^2$) a 15 m di altezza dal piano campagna ad una distanza di 15 m dalla base della torcia. L'altezza di 15 m tiene conto della possibile presenza di personale sul tetto dei serbatoi nei primi istanti di uno scarico di emergenza. Tale limite di irraggiamento consente al personale, adeguatamente vestito, di raggiungere un luogo sicuro in alcuni minuti senza alcun rischio.

Sarà inoltre garantito un irraggiamento massimo di 1580 W/m^2 (500 $Btu/h\ ft^2$) ad una distanza di 80/95 m dalla torcia al piano di campagna. Tale distanza tiene conto della lontananza dei confini dello stabilimento dalla torcia e il limte di irraggiamento tale da garantire che l'esposizione di persone per lunghi periodi non sia rischiosa per la salute.

2.2 Criteri di progettazione della Torcia e del Sistema Blowdown

2.2.1 Torcia

Il fattore vincolante per la determinazione dell'altezza della torcia è risultato l'ingombro della struttura di sostegno a causa del limitato spazio a disposizione per la nuova installazione. Si riportano di seguito i criteri concordati sulla base dei quali si sviluppa il calcolo dell'altezza della torcia:

- L'ingombro a terra del derrick di sostegno della torcia non deve essere superiore alla superficie di un triangolo equilatero di 10 m di lato.
- Per quanto riguarda il contributo dell'irraggiamento solare, nella sola emergenza di incendio (caso dimensionante), si è stabilito che esso può essere assunto pari a 500 W/m^2 (158 $Btu/h\ ft^2$). Tale assunzione è stata concordata per la sola emergenza incendio in quanto, data la bassissima probabilità che tale evento si possa verificare, si ritiene statisticamente non realizzabile la concomitanza dell'evento in coincidenza con la massima radiazione solare del ciclo annuale. Tale assunzione non deve essere applicata agli altri casi di emergenza che comportano l'apertura delle valvole di sicurezza.
- Il fornitore del sistema torcia selezionato è libero di adottare il metodo di calcolo più opportuno per determinare il massimo irraggiamento nei vari casi di emergenza. Allo stesso tempo il fornitore dovrà rispettare i limiti di irraggiamento richiesti, garantendo le prestazioni del sistema torcia per ogni emergenza specificata.
- Alma Petroli ha deciso che la nuova torcia debba essere predisposta per un sistema smokeless, nonostante non siano previsti scarichi continui nel sistema di blowdown. Il sistema smokeless dovrà essere dimensionato per sostenere una portata pari al 30% della massima portata di scarico, utilizzando preferibilmente vapore a bassa pressione. Qualora le condizioni del vapore non dovessero risultare adeguate allo scopo, si potranno utilizzare fluidi alternativi come acqua, aria, ecc . Tale sistema dovrà essere considerato di futura installazione per cui, al momento, si dovrà prevedere soltanto il minimo indispensabile per consentire il successivo funzionamento smokeless della torcia, senza la necessità di apportare in seguito modifiche strutturali. L'eventuale futuro funzionamento smokeless dovrà essere realizzato installando semplicemente le attrezzature e accessori mancanti (piping, tubing, strumenti, sistema di controllo, ecc.).

Inoltre, il sistema di torcia deve rispettare le indicazioni dell'ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale) di cui si riportano i principali vincoli:

- La torcia dovrà essere utilizzata solo in situazioni di emergenza, di avvio o arresto degli impianti.
- Il sistema di torcia dovrà essere dotato di un sistema di misura in grado di determinare, con la frequenza specificata in seguito, la portata del gas inviato alla torcia.
- Il sistema di torcia dovrà essere dotato di sistema automatico di campionamento del gas inviato alla torcia. In accordo con Alma Petroli si è deciso di considerare tale sistema di installazione futura, per cui, al momento, sono previste soltanto le connessioni per una successiva installazione.

La misura di portata deve essere continua e deve avere i seguenti requisiti minimi:

- Limite di rilevabilità 0.03 m/s.
- Intervallo di misura corrispondente a velocità tra 0.3 e 84 m/s nel punto in cui lo strumento è installato.
- Lo strumento deve essere certificato dal costruttore con un'accuratezza, nell'intervallo di misura di cui al punto precedente, di ±5%.
- Lo strumento deve essere installato in un punto tale da essere rappresentativo del gas bruciato in torcia.

Il campionamento automatico dei gas inviati alla torcia (installazione futura) deve attivarsi automaticamente al superamento di una soglia di portata, stabilita in 10 volte la portata minima misurabile. Il sistema di campionamento deve rispondere ai seguenti requisiti minimi:

- Il punto di campionamento deve essere rappresentativo del gas bruciato in torcia
- Quando la portata del gas è superiore alla soglia, un campione deve essere completamente acquisito entro 15 minuti, e successivamente ad intervalli di 1 ora, fino a quando la portata sia inferiore alla soglia.

In allegato 3 si riporta un estratto del documento dell'ISPRA contenente le indicazioni descritte.

2.2.2 Sub-collettori e collettori di scarico

Al fine di garantire in tutti gli scenari di scarico le condizioni di flusso critico attraverso le valvole di sicurezza, il dimensionamento del sistema di blowdown (sub-collettori e collettori) è stato effettuato con lo scopo di minimizzare le perdite di carico del sistema torcia, garantendo una contropressione a valle di ogni valvola di sicurezza, per ogni emergenza, minore o uguale a 1.0 barg. Nello specifico, sono state definite velocità nei vari collettori e sub-collettori tali che il flusso fosse sub-sonico (Mach <1). In particolare:

Mach <0.3 nelle tubazioni di uscita delle valvole di sicurezza

Mach <0.2 nei collettori e sub-collettori

2.2.3 KO Drum e Guardia Idraulica

Escludendo il caso fuoco, nel quale non è prevista la condensazione di vapori lungo i collettori del sistema di blowdown a causa dell'elevata temperatura, vi è la possibilità che parte dei vapori inviati alla torcia condensi o che ci siano errori di manovra che portino allo scarico di fasi liquide. Per tale motivo è previsto un KO Drum alla base della torcia, dimensionato per separare la fase liquida (acquosa o idrocarburica) dalla fase gassosa. La fase liquida accumulata viene inviata, tramite apposita pompa, al serbatoio di slop S69, mentre la fase gassosa viene inviata alla torcia.

Il volume di hold-up del KO Drum è stato definito sulla base del massimo scarico liquido dovuto ad errore manovra del sistema di lavaggio naphtha ed è pari a 1.5 m^3, corrispondenti ad un hold-up di circa 45 minuti.

Al fine di prevenire l'ingresso di aria nel collettore di torcia, è prevista una guadia idraulica tra il KO Drum e il camino. L'altezza della colonna di liquido (acqua di processo) impiegata per la guardia idraulica è di circa 200 mm, equivalenti a circa 0.02 bar. Al fine di minimizzare l'ingombro a terra, è previsto un sistema combinato KO Drum/Guardia idraulica, in cui i due recipienti sono posti in verticale uno sopra l'altro. La perdita di carico totale del sistema KO Drum/Guardia idraulica è circa 0.1 bar.

2.2.4 Definizione delle Aree di fuoco

Le portate di scarico dei singoli scenari di emergenza nel caso di incendio sono state determinate raggruppando le apparecchiature in tre distinti gruppi, in base alla loro posizione planimetrica e, quindi, in base alla possibilità che vengano interessate da un incendio nello stesso istante.

In particolare, sono state riconosciute 3 aree di fuoco: area Colonne (C-01, E-101, C-101, B-101, B-2, B-01), area Scambiatori (E-102/103/104/105/E108A-B-C-D/E123) e area Impianti Lavaggio (C-201, C-210, B-210, B-211, B-301, B-302, E-201, E-204, E-210).

Al fine di poter considerare le aree di fuoco singolarmente, queste devono rispettare i requisiti richiesti dalle regole di buona ingegneria universalmente riconosciute in materia di antincendio, tra cui a titolo non esaustivo:

- Presenza di pendenze e/o cordoli tali da impedire la diffusione del liquido infiammabile verso le aree adiacenti
- Presenza di sistemi antincendio dedicati per isolare la singola area e impedire la propagazione dell'incendio.
- Sistema fognario adeguato ad impedire la propagazione dell'incendio nelle condotte sotterranee.

Il sistema di pronto intervento antincendio di Alma Petroli dovrà essere in grado di confinare l'incendio all'interno delle aree di fuoco definite, dotandosi di tutti i mezzi necessari allo scopo (fissi e mobili).

2.3 Condizioni dei servizi

I servizi disponibili ai limiti di batteria dell'unità e le relative condizioni operative e di progetto sono elencate di seguito:

Servizio	T Operativa °C	P Operativa barg	T Progetto °C	P Progetto barg
Vapore bassa pressione	170	3.50	200	10/FV
Metano	AMB.	3.00	50	7.0
Aria strumenti	AMB.	7.00	50	10.0
Aria servizi	AMB.	7.00	50	10.0
Acqua processo	AMB.	8.00	50	10.0

Le condizioni descritte nella tabella precedente dovranno essere verficate e confermate da Alma Petroli durante la fase di ingegneria di dettaglio.

2.4 Emergenze selezionate

Si riportano di seguito i casi di emergenza considerati per il dimensionamento del sistema di blowdown e della torcia, con l'elenco delle PSV coinvolte e le relative condizioni di scarico. Maggiori dettagli sui casi dimensionanti sono contenuti negli allegati bilanci di materia e specifica di processo della torcia.

2.4.1 Emergenza fuoco in area colonne

Per il caso fuoco in area colonne sono stati considerati i seguenti scarichi simultanei:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-02	C-01, E-101	3.0	431	18344	1
PSV-03	C-101, B-101, B-101 (mammellone)	3.0	277	11250	2
PSV-05	B-2	3.0	108	3949	3
PSV-07	B-01	3.0	124	7013	4
TOTALE				**40556**	

Note:

1. Rif. Studio Processi Innovativi 5027-CN-1545-04.
2. Rif. Studi Conser A736 Testa C-101, Processi Innovativi 5015-SP-0510-01/02 .
3. Rif. Data Sheet Alma Petroli ID-PSV-05.
4. Rif. Data Sheet Alma Petroli ID-PSV-07.

2.4.2 Emergenza fuoco in area scambiatori

Per il caso fuoco in area scambiatori sono stati considerati i seguenti scarichi simultanei:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-02	E-108A-D(LT), E-123A-B(LT), E-103(LT), E-104(LT), E-102(LT)	3.0	413	20192	1
PSV-03	E-102(LM), E-103(LM), E-104(LM), E-105(LM)	3.0	371	18266	1
PSV-04	B-1	3.0	124	429	2
TOTALE				**38887**	

Note:

1. Rif. Studio KIOS K824
2. Rif. Data Sheet Alma Petroli ID-PSV-04.

2.4.3 Emergenza errore manovra su C-01

In caso di errore manovra sulla colonna C-01 si ottiene il seguente scarico massimo:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-02	C-01, E-101	3.0	160	13931	1
TOTALE				**13931**	

Note:

1. Rif. Studio Processi Innovativi 5027 marcia Patos Marinza senza riciclo da colonna vuoto; considerata la portata della testa colonna più il vapore di flash del grezzo di carica.

2.4.4 Emergenza fuoco in area impianti lavaggio

Per il caso fuoco in area impianti lavaggio sono stati considerati i seguenti scarichi simultanei:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-10	C-210,B-210, B-211, E-210	3.0	140	2324	1
PSV-251	C-201, E-204, E-201	3.5	150	724	2
PSV-301	B-301	17.0	289	4153	3
PSV-302	B-302	17.0	289	4153	4
TOTALE				**11354**	

Note:

1. Rif. D/S Alma Petroli ID-PSV-010 (rev. del 01/03/2011)
2. Rif. Studio Processi Innovativi 5027-200-CN-1545-101
3. Rif. Studio Processi Innovativi 5030-300-CN-1545-101
4. Rif. Studio Processi Innovativi 5030-300-CN-1545-101

2.4.5 Emergenza errore manovra su B-301

In caso di errore manovra su B-301 si ottiene il seguente scarico massimo:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-301	B-301	17.0	44	2630	1
TOTALE				**2630**	

Note:

1. Rif. Studio Processi Innovativi 5030-300-CN-1545-101; scarico in fase liquida.

2.4.6 Emergenza errore manovra su B-302

In caso di errore manovra su B-302 si ottiene il seguente scarico massimo:

	Apparecchiatura protetta	Pset (barg)	Temp. (°C)	Portata (kg/h)	Note
PSV-302	B-302	17.0	44	2064	1
TOTALE				**2064**	

Note:

1. Rif. Studio Processi Innovativi 5030-300-CN-1545-101; scarico in fase liquida.

2.4.7 Blocco forno

Nelle condizioni di “blocco forno” l’impianto distillazione invia al sistema torcia una portata di circa 100 kg/h di “off gas”.

3 SCHEMI DI PROCESSO – BILANCI DI MATERIA

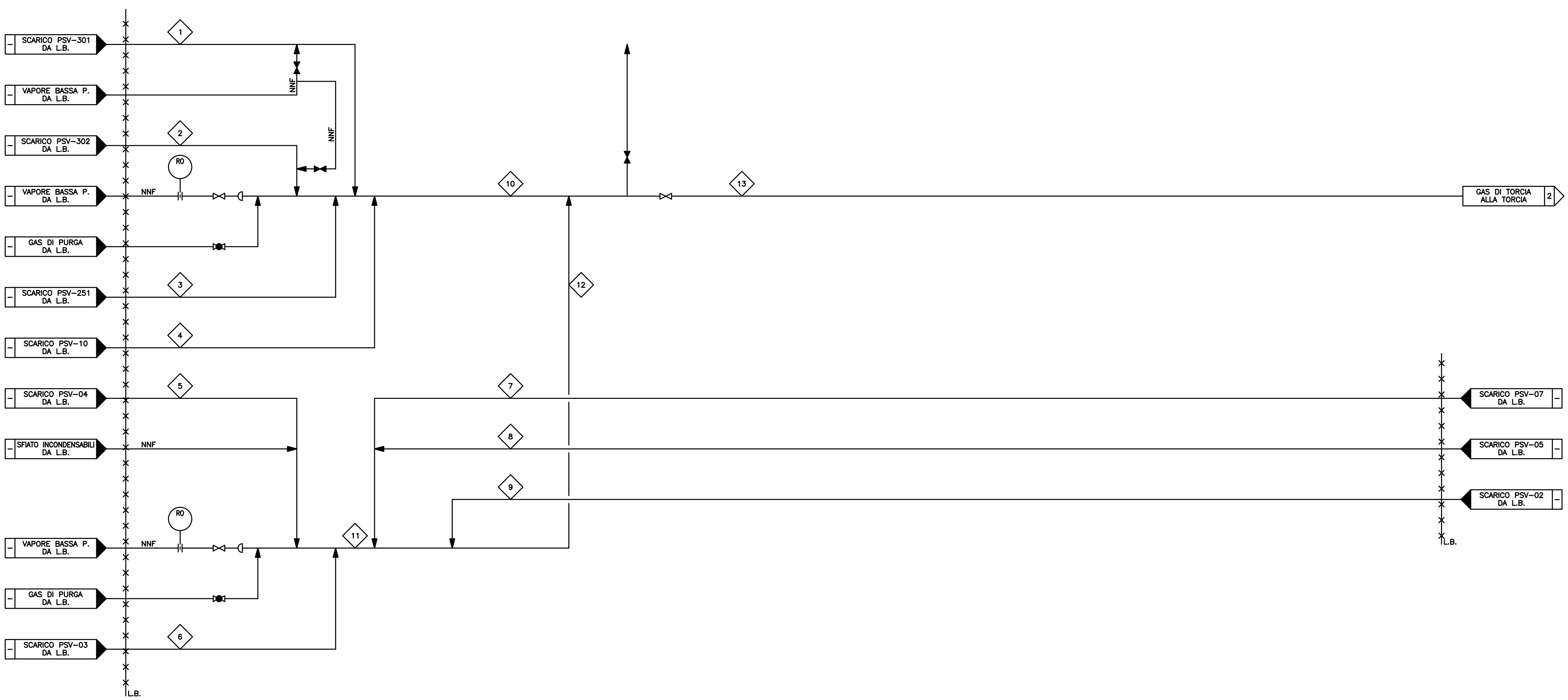
Nel presente capitolo si riportano gli schemi di processo con l'indicazione del numero di corrente per ciascun tratto del sistema blowdown/torcia:

- K027-900-PFD-0010-001 (par. 3.1)

Si riportano, inoltre, i bilanci di materia relativi ai seguenti casi:

- Emergenza Fuoco Area Colonne (par. 3.2)
- Emergenza Fuoco Area Scambiatori (par. 3.3)
- Emergenza Errore Manovra su C-01(par. 3.4)
- Emergenza Fuoco Area Impianti Lavaggio (par. 3.5)
- Emergenza Errore Manovra su B-301 (par. 3.6)
- Blocco Forni (par. 3.7)

3.1 Schemi di processo - K027-900-PFD-0010-001



REFERENCE DRAWINGS	HOLD LIST	NOTES	LEGEND
			STREAM IDENTIFICATION; TEMPERATURE; PRESSURE; FLOWRATE (weight); FLOWRATE (volume); DUTY; TKT / OTHERS

REV.	DATE	DESCRIPTION	PRP.	VRF.	APPR./AUTHOR.
A	Gen. 2012	EMISSIONE DI PROCESSO	FFS	MTR	GBR/BBN

Tecnimont KT — ALMA PETROLI

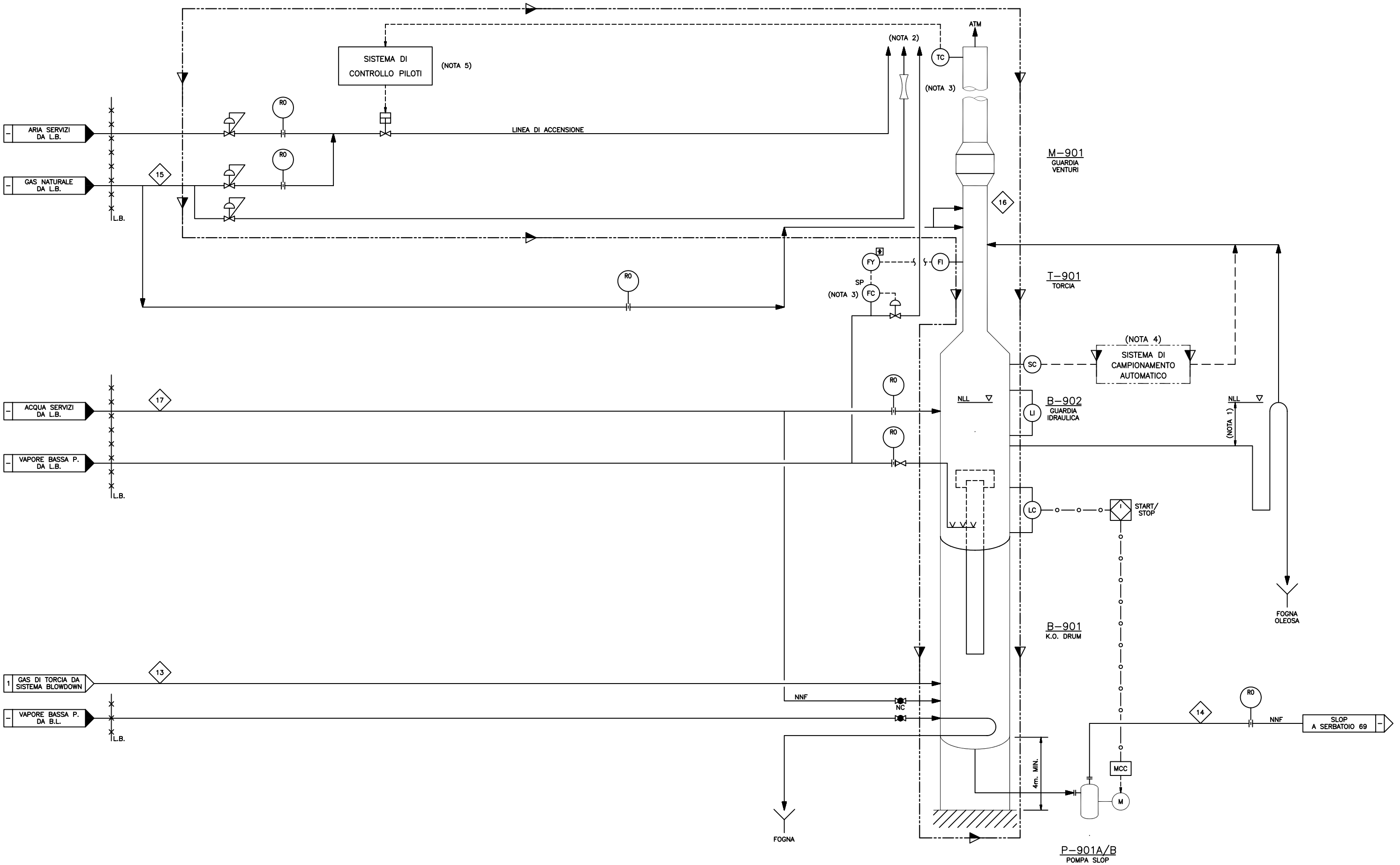
CAD CODE: PFD-0010-001
PROJ N.: K027

PROCESS FLOW DIAGRAM
SISTEMA BLOWDOWN

Scale	Project	Unit	Doc. Code & Serial No.	Page	Rev.
---	K027	900	PFD 0010 – 01	1 of 2	0

Tecnimont KT S.p.A. – 00148 ROMA – Viale Castello della Magliana, 75

MOD-CADA1/E- Rev.3



REFERENCE DRAWINGS	NOTES	LEGEND
	1) ALTEZZA DEL COLLO D'OCA DA DEFINIRE DURANTE L'INGEGNERIA DI DETTAGLIO DOPO LA DEFINIZIONE DEI LIVELLI. 2) NUMERO DEI BRUCIATORI PILOTA DA DEFINIRE/CONFERMARE DURANTE L'INGEGNERIA DI DETTAGLIO. 3) SISTEMA SMOKELESS D'INSTALLAZIONE FUTURA. PREVEDERE LA PREDISPOSIZIONE DI TUTTO QUANTO IL NECESSARIO PER IL CORRETTO FUNZIONAMENTO SENZA LA NECESSITA' DI APPORTARE MODIFICHE STRUTTURALI. LA CONFIGURAZIONE DEL SISTEMA SMOKELESS (INCLUSA LA STRUMENTAZIONE) SARA' DEFINITA DOPO LA SCELTA DEL FORNITORE DELLA TORCIA. 4) SISTEMA DI CAMPIONAMENTO DI FUTURA INSTALLAZIONE. 5) SISTEMA DI ACCENSIONE E CONTROLLO DEI PILOTI A CURA DEL FORNITORE DELLA TORCIA. LA CONFIGURAZIONE DEL SISTEMA SARA' DEFINITA DOPO LA SCELTA DEL FORNITORE DELLA TORCIA.	STREAM IDENTIFICATION TEMPERATURE PRESSURE FLOWRATE (weight) FLOWRATE (volume) DUTY TKT | OTHERS

REV.	DATE	DESCRIPTION	PRP.	VRF.	APPR./ AUTHOR.
A	Gen. 2012	EMISSIONE DI PROCESSO	GAR	MTR	GBR/BBN

Tecnimont KT — ALMA PETROLI

CAD CODE: PFD-0010-001
PROJ N.: K027

PROCESS FLOW DIAGRAM
TORCIA

Scale	Project	Unit	Doc. Code & Serial No.	Page	Rev.
---	K027	900	PFD 0010 – 01	2 of 2	0

Tecnimont KT S.p.A. – 00148 ROMA – Viale Castello della Magliana, 75

MOD-CADM/E- Rev.3

3.2 Bilancio di materia - Emergenza Fuoco Area Colonne

Si riporta di seguito il bilancio di materia relativo all' Emergenza Fuoco Area Colonne, doc. num. K027-900-CN-0001-01.

BILANCIO DI MATERIA
CASO FUOCO AREA COLONNE

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	-	-	-	-	-	11250	7013	3949	18344	-
Temperatura	°C	-	-	-	-	-	275	124	105	431	-
Pressure	bar a	-	-	-	-	-	1.86	2.03	1.95	1.88	-
Peso Molecolare	-	-	-	-	-	-	99.2	86.2	65.1	160.5	-
Velocità	m/s	-	-	-	-	-	23.3	41.9	32.0	40.9	-
Mach	-	-	-	-	-	-	0.11	0.22	0.14	0.22	-

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	10962	40556	40556	-	3 (3)	40556	15 (3)			
Temperatura	°C	373	311	311	-	AMB.	311	AMB.			
Pressure	bar a	1.84	1.78	1.76	-	3.00	1.56	1.20			
Peso Molecolare	-	77.2	109.7	109.7	-	16.04 (1)	109.7	-			
Velocità	m/s	20.7	31.4	31.8	-	-	(2)	-			
Mach	-	0.10	0.15	0.15	-	-	(2)	-			

XLSMOD - PRCb-Rev.2

Note:

1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.

3.3 Bilancio di materia - Emergenza Fuoco Area Scambiatori

Si riporta di seguito il bilancio di materia relativo all' Emergenza Fuoco Area Scambiatori, doc. num. K027-900-CN-0001-02.

BILANCIO DI MATERIA
CASO FUOCO AREA SCAMBIATORI

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	-	-	-	-	429	18266	-	-	20192	-
Temperatura	°C	-	-	-	-	121	369	-	-	413	-
Pressure	bar a	-	-	-	-	1.82	1.83	-	-	1.88	-
Peso Molecolare	-	-	-	-	-	86.2	136.1	-	-	172.7	-
Velocità	m/s	-	-	-	-	10.9	33.2	-	-	40.9	-
Mach	-	-	-	-	-	0.06	0.17	-	-	0.23	-

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	38887	38887	38887	-	3 (3)	38887	15 (3)			
Temperatura	°C	120	388	388	-	AMB.	388	AMB.			
Pressure	bar a	1.77	1.75	1.73	-	3.00	1.53	1.20			
Peso Molecolare	-	86.2	150.9	150.9	-	16.04 (1)	150.9	-			
Velocità	m/s	0.8	25.9	25.3	-	-	(2)	-			
Mach	-	0.05	0.13	0.13	-	-	(2)	-			

Note:

1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.

XLSMOD - PRCb-Rev.2

3.4 Bilancio di materia - Emergenza Errore Manovra su C-01

Si riporta di seguito il bilancio di materia relativo all' Emergenza Errore Manovra su C-01, doc. num. K027-900-CN-0001-03.

BILANCIO DI MATERIA
CASO ERRORE MANOVRA SU C-01

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	-	-	-	-	-	-	-	-	13931	-
Temperatura	°C	-	-	-	-	-	-	-	-	150	-
Pressure	bar a	-	-	-	-	-	-	-	-	1.73	-
Peso Molecolare	-	-	-	-	-	-	-	-	-	94.0	-
Velocità	m/s	-	-	-	-	-	-	-	-	33.2	-
Mach	-	-	-	-	-	-	-	-	-	0.18	-

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	-	13931	13931	-	3 (3)	13931	15 (3)			
Temperatura	°C	-	149	149	-	AMB.	149	AMB.			
Pressure	bar a	-	1.67	1.67	-	3.00	1.67	1.20			
Peso Molecolare	-	-	94.0	94.0	-	16.04 (1)	94.0	-			
Velocità	m/s	-	9.3	9.3	-	-	(2)	-			
Mach	-	-	0.05	0.05	-	-	(2)	-			

Note:

1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.

3.5 Bilancio di materia - Emergenza Fuoco Area Impianti Lavaggio

Si riporta di seguito il bilancio di materia relativo all' Emergenza Fuoco Area Impianti Lavaggio, doc. num. K027-900-CN-0001-04.

BILANCIO DI MATERIA
CASO FUOCO AREA IMPIANTI LAVAGGIO

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	4153	4153	724	2324	-	-	-	-	-	11354
Temperatura	°C	268	268	147	137	-	-	-	-	-	238
Pressure	bar a	1.87	1.88	2.04	1.92	-	-	-	-	-	1.68
Peso Molecolare	-	112.4	112.4	18.0	30.7	-	-	-	-	-	59.8
Velocità	m/s	29.0	28.9	87.2	77.4	-	-	-	-	-	41.0
Mach	-	0.15	0.15	0.18	0.22	-	-	-	-	-	0.15

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	-	-	11354	-	3 (3)	11354	15 (3)			
Temperatura	°C	-	-	238	-	AMB.	238	AMB.			
Pressure	bar a	-	-	1.68	-	3.00	1.68	1.20			
Peso Molecolare	-	-	-	59.8	-	16.04 (1)	59.8	-			
Velocità	m/s	-	-	15.2	-	-	(2)	-			
Mach	-	-	-	0.06	-	-	(2)	-			

Note:

1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.

3.6 Bilancio di materia - Emergenza Errore Manovra su B-301

Si riporta di seguito il bilancio di materia relativo all' Emergenza Errore Manovra su B-301, doc. num. K027-900-CN-0001-05.

BILANCIO DI MATERIA
CASO ERRORE MANOVRA SU B-301

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	2630	-	-	-	-	-	-	-	-	2630
Temperatura	°C	44	-	-	-	-	-	-	-	-	44
Pressure	bar a	1.66	-	-	-	-	-	-	-	-	1.66
Peso Molecolare	-	21.6	-	-	-	-	-	-	-	-	1315 (4)
Velocità	m/s	0.1	-	-	-	-	-	-	-	-	-
Mach	-	0.00	-	-	-	-	-	-	-	-	-

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	-	-	-	2630	3 (3)	-	15 (3)			
Temperatura	°C	-	-	-	44	AMB.	-	AMB.			
Pressure	bar a	-	-	-	1.66	3.00	-	1.20			
Peso Molecolare	-	-	-	-	1315 (4)	16.04 (1)	-	-			
Velocità	m/s	-	-	-	-	-	-	-			
Mach	-	-	-	-	-	-	-	-			

XLS-MOD - PRCb-Rev.2

Note:

1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.
4) Densità, kg/m^3.

3.7 Bilancio di materia – Blocco Forni

Si riporta di seguito il bilancio di materia relativo al caso Blocco Forni, doc. num. K027-900-CN-0001-06.

BILANCIO DI MATERIA
CASO BLOCCO FORNI

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

STREAM	ID	1	2	3	4	5	6	7	8	9	10
	Unità di misura	SCARICO PSV-301	SCARICO PSV-302	SCARICO PSV-251	SCARICO PSV-10	SCARICO PSV-04	SCARICO PSV-03	SCARICO PSV-07	SCARICO PSV-05	SCARICO PSV-02	COLLETTORE AREA LAVAGGI
Portata	kg/h	-	-	-	-	-	-	-	-	-	-
Temperatura	°C	-	-	-	-	-	-	-	-	-	-
Pressure	bar a	-	-	-	-	-	-	-	-	-	-
Peso Molecolare	-	-	-	-	-	-	-	-	-	-	-
Velocità	m/s	-	-	-	-	-	-	-	-	-	-
Mach	-	-	-	-	-	-	-	-	-	-	-

STREAM	ID	11	12	13	14	15	16	17			
	Unità di misura	COLLETTORE AREA COLONNE DN 8"	COLLETTORE AREA COLONNE DN 14"	COLLETTORE AL KO DRUM	LIQUIDO DA KO DRUM A L.B.	GAS NATURALE AI PILOTI	BLOWDOWN ALLA TORCIA	ACQUA SERVIZI ALLA GUARDIA IDRAULICA			
Portata	kg/h	100	100	100	-	3 (3)	100	15 (3)			
Temperatura	°C	40	40	40	-	AMB.	40	AMB.			
Pressure	bar a	1.10	1.10	1.10	-	3.00	1.10	1.20			
Peso Molecolare	-	42.4	42.4	42.4	-	16.04 (1)	42.4	-			
Velocità	m/s	TRASC.	TRASC.	TRASC.	-	-	TRASC.	-			
Mach	-	TRASC.	TRASC.	TRASC.	-	-	TRASC.	-			

Note:

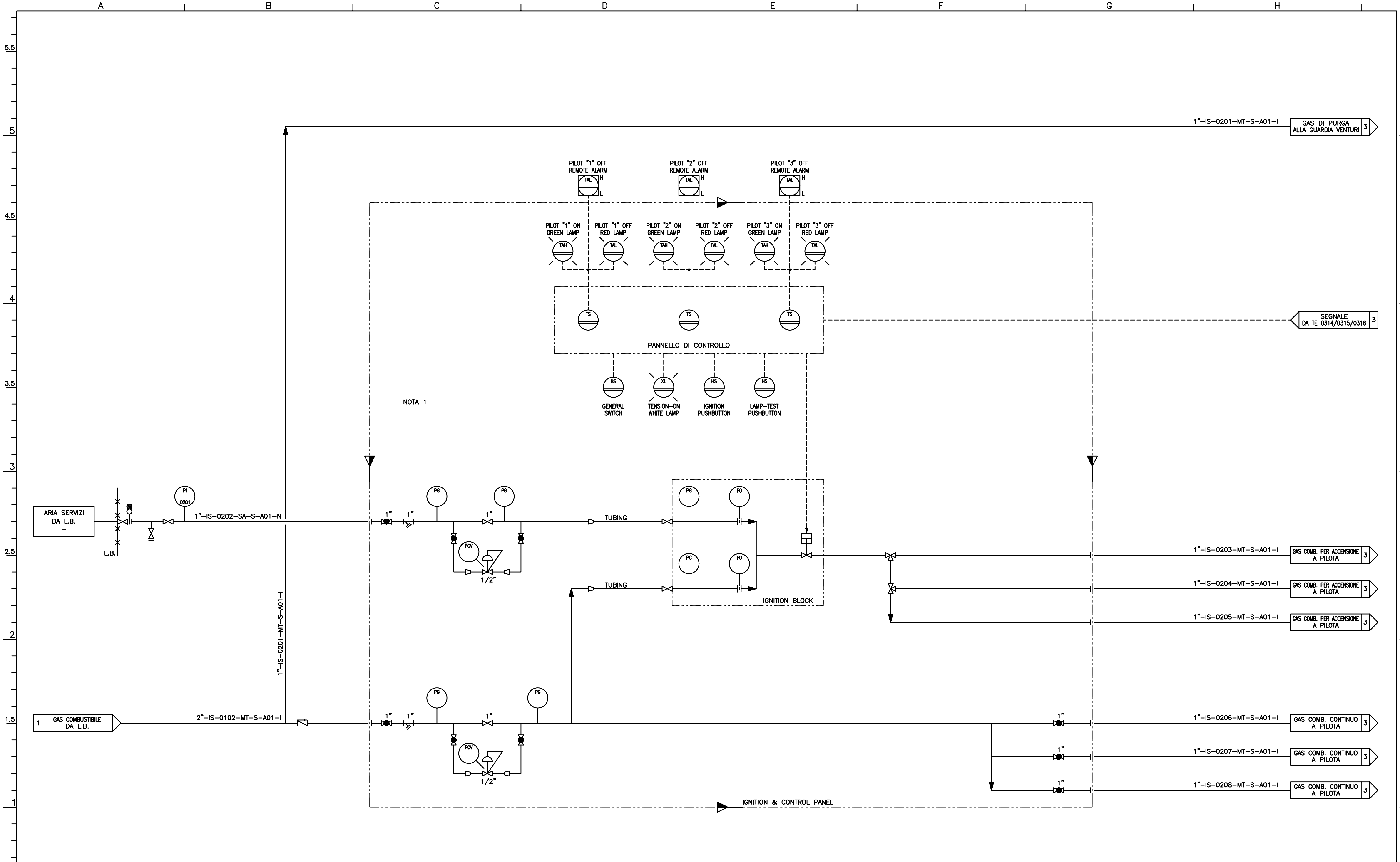
1) Gas naturale considerato come CH4.
2) Da parte del fornitore della torcia.
3) Da confermare da parte del fornitore della torcia.

XLS-MOD - PRCb-Rev.2

4 SCHEMI DI MARCIA

Nel presente capitolo si riportano i seguenti schemi di marcia:

- K027-900-PID-0031-001
- K027-900-PID-0031-002
- K027-900-PID-0031-003



NOTE

1. SISTEMA DI ACCENSIONE E CONTROLLO DEI PILOTI A CURA DEL FORNITORE DELLA TORCIA. LA CONFIGURAZIONE DEL SISTEMA SARA' DEFINITA DOPO LA SCELTA DEL FORNITORE DELLA TORCIA.

NOTE GENERALI

1. TUTTI GLI INNESTI SUL COLLETTORE PRINCIPALE DI TORCIA VANNO FATTI DALL'ALTO, ORIENTATI NEL VERSO DI FLUSSO E AUTODRENATI VERSO IL SEPARATORE DI TORCIA.
2. TUTTE LE TUBAZIONI DEL SISTEMA BLOWDOWN/TORCIA DEVONO ESSERE AUTODRENANTI VERSO IL SEPARATORE DI TORCIA.
3. TUTTE LE LINEE E LA STRUMENTAZIONE IN CONTATTO CON ACQUA/SOLUZIONI ACQUOSE DEVONO ESSERE WINTERIZZATE IN ACCORDO ALLO STANDARD DI STABILIMENTO DI ALMA PETROLI.

LEGENDA

CAMBIO CLASSE

REV.	DATE	DESCRIPTION	PRP.	VRF.	APPR./AUTHOR.
A	Gen. 2012	EMISSIONE DI PROCESSO	GAR	JDG/MTR	GSR/BBN

Tecnimont KT — ALMA PETROLI

CAD CODE: PID-0031-002
PROJ N.: K027

PIPING & INSTRUMENT DIAGRAM
SISTEMA CONTROLLO PILOTI

Scale	Project	Unit	Doc. Code & Serial No.	Page	Rev.
---	K027	900	PID 0031 – 02	1 of 1	0

MOD-CADA1/E- Rev.3

Tecnimont KT S.p.A. – 00148 ROMA – Viale Castello della Magliana, 75

SCARICO PSV DA PSV-10
3"-IS-0112-OG-P-A01-V
SCARICO PSV DA PSV-251
2"-IS-0111-OG-P-A01-V
SCARICO PSV DA PSV-301
4"-IS-0110-OG-P-A01-V
SCARICO PSV DA PSV-302
4"-IS-0109-OG-P-A01-V
L.B.
1 1/2"-IS-0108-LS-S-A01-I
1 1/2"-IS-0105-LS-S-A01-I
RO 0103
2"
3/4"
1½"
2"-IS-0107-LS-S-A01-I
MIN
NOTA 2
1½"
3/4"
PUNTO BASSO
3/4" NC
IN FOGNA
NOTA 2
1½"
3/4"
PUNTO BASSO
3/4" NC
IN FOGNA
VAPORE A BASSA PRESSIONE DA L.B.
PI 0101
L.B.
PUNTO BASSO
3/4"
6"-IS-0103-LS-S-A01-I
IN FOGNA
3/4" NC
2"-IS-0106-LS-S-A01-I
0.2%
6"-IS-0103-LS-S-A01-I
VAPORE A B. PRESS. AL KO-DRUM TORCIA 3
GAS DI PURGA DA L.B.
PI 0102
L.B.
2"x1½"
NOTA 4
1½"
RO 0104
3/4"
NOTA 5
NOTA 6
MIN
0.2%
6"-IS-0101-OG-P-A01-V
8"x6"
2"-IS-0104-MT-S-A01-I
2"x1½"
2"-IS-0102-MT-S-A01-I
GAS COMBUSTIBILE A CONTROLLO PILOTI 2
SCARICO PSV DA PSV-02
8"-IS-0118-OG-P-A01-V
SCARICO PSV DA PSV-04
2"-IS-0114-OG-P-A01-V
SCARICO PSV DA PSV-05
4"-IS-0117-OG-P-A01-V
SCARICO PSV DA PSV-03
8"-IS-0115-OG-P-A01-V
SCARICO PSV DA PSV-07
4"-IS-0116-OG-P-A01-V
SFIATO INCONDENSABILI DA B2/B01
1 1/2"-IS-0113-OG-P-A01-V
L.B.
NOTA 7
MIN
NOTA 3
6"
1 1/2"-IS-0104-MT-S-A01-I
RO 0105
3/4"
1½"
2"-IS-0106-LS-S-A01-I
MIN
6"-IS-0119-OG-P-A01-V
12"-IS-0120-OG-P-A01-V
8"-IS-0101-OG-P-A01-V
NOTA 4
1½"
RO 0106
3/4"
NOTA 5
NOTA 6
MIN
8"
0.2%
8"
14"
NOTA 3
6"
14"-IS-0101-OG-P-A01-V
NOTA 3
6"
0.2%
AREA SICURA
2" NC
3/4"
MIN
14"
NOTA 1
GAS A BASSA PRESSIONE ALLA TORCIA 3

NOTE

1. LA VALVOLA D'ISOLAMENTO DELLA TORCIA DEVE AVERE LO STELO SULLA PARTE INFERIORE AD UN ANGOLO DALLA POSIZIONE VERTICALE DI MAX. 45°.
2. L'INNESTO DI VAPORE VA FATTO A MINIMA DISTANZA DALLO SCARICO DELLA PSV.
3. BOCCHELLO LIBERO PER CONNESSIONE FUTURA.
4. BOCCHELLO LIBERO PER CONNESSIONE AZOTO FUTURA.
5. PRESSIONE DESIGN: 10 barg.
6. PRESSIONE DESIGN: 3.5 barg.
7. LA VALVOLA DI RITEGNO SULLA LINEA DEGLI INCONDENSABILI SARA' DEL TIPO A BASSO DELTA P. PREVEDERE UNA CONFIGURAZIONE CON DOPPIA VALVOLA DI BLOCCO E SFIATO MANUALE IN TORCIA SULLA LINE DI FUEL GAS AL FORNO.

NOTE GENERALI

1. TUTTI GLI INNESTI SUL COLLETTORE PRINCIPALE DI TORCIA VANNO FATTI DALL'ALTO, ORIENTATI NEL VERSO DI FLUSSO E AUTODRENATI VERSO IL SEPARATORE DI TORCIA.
2. TUTTE LE TUBAZIONI DEL SISTEMA BLOWDOWN/TORCIA DEVONO ESSERE AUTODRENANTI VERSO IL SEPARATORE DI TORCIA.
3. TUTTE LE LINEE E LA STRUMENTAZIONE IN CONTATTO CON ACQUA/SOLUZIONI ACQUOSE DEVONO ESSERE WINTERIZZATE IN ACCORDO ALLO STANDARD DI STABILIMENTO DI ALMA PETROLI.

LEGENDA

CAMBIO CLASSE

REV.	DATE	DESCRIPTION	PRP.	VRF.	APPR./ AUTHOR.
A	Gen. 2012	EMISSIONE DI PROCESSO	GAR	JDG/MTR	GBR/BBN

Tecnimont KT

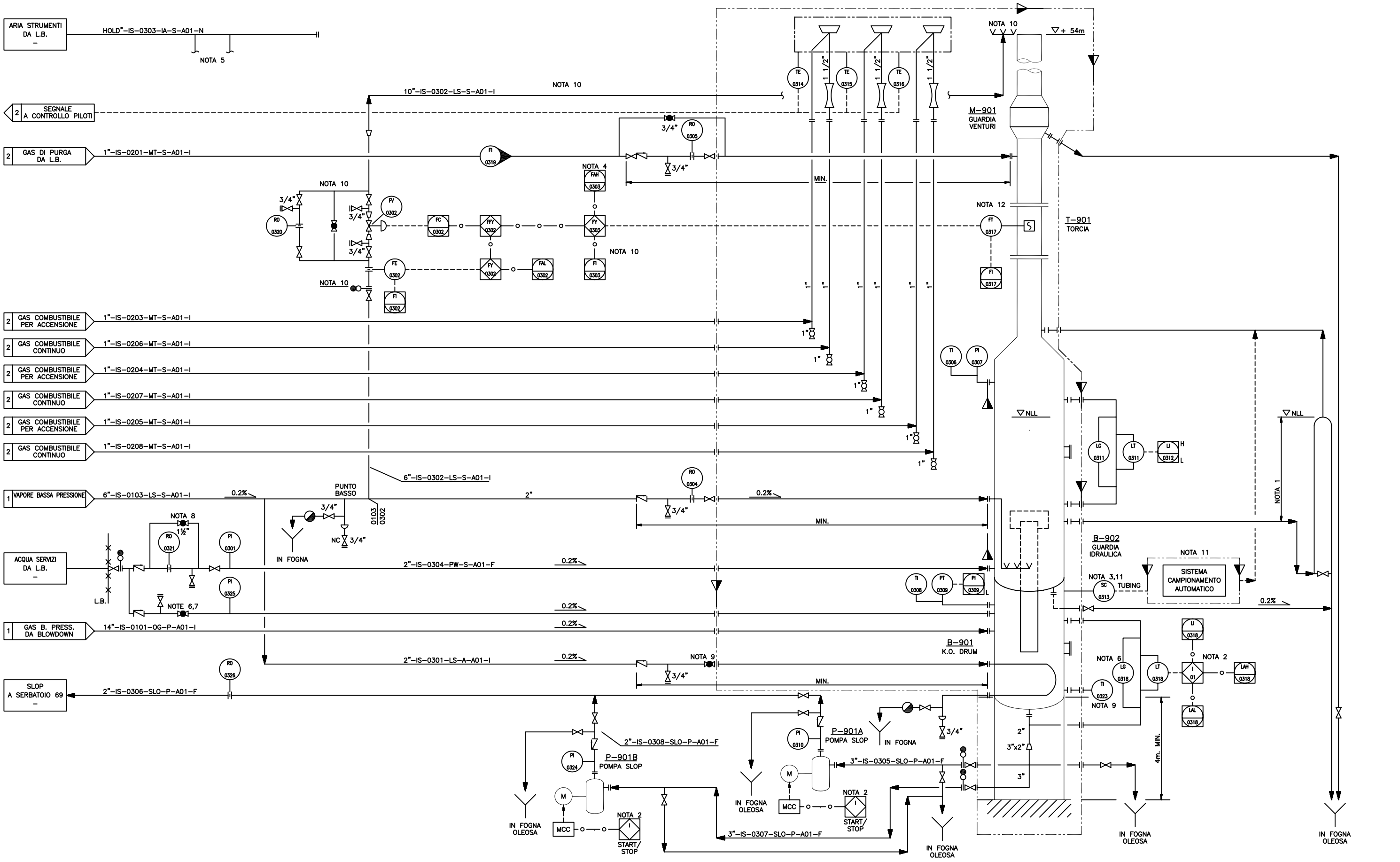
ALMA PETROLI

CAD CODE: PID-0021-001
PROJ N.: K027

PIPING & INSTRUMENT DIAGRAM
PLANIMETRICO SISTEMA BLOWDOWN

Scale	Project	Unit	Doc. Code & Serial No.	Page	Rev.
---	K027	900	PID 0031 – 01	1 of 1	0

MOD-CADM/E- Rev.3



NOTE

1. ALTEZZA DEL COLLO D'OCA DA DEFINIRE DURANTE L'INGEGNERIA DI DETTAGLIO DOPO LA DEFINIZIONE DEI LIVELLI.
2. QUANDO LAH E' ATTIVO I-01 AVVIA LA POMPA P-901A/B, QUANDO LAL E' ATTIVO I-01 FERMA LA POMPA P-901A/B.
3. LA PRESA CAMPIONE DEVE ESSERE FACILMENTE ACCESSIBILE.
4. LA REGOLAZIONE DELLA PORTATA DI VAPORE SI AVVIA QUANDO LA PORTATA DI GAS ALLA TORCIA E' 10 VOLTE LA MINIMA PORTATA RILEVABILE DALLO STRUMENTO (HOLD).
5. NUMERO DI CONNESSIONI PER STRUMENTI E DIMENSIONI DA DEFINIRE IN FASE DI DETTAGLIO.
6. LG-0318 VISIBILE DALLA VALVOLA ALIMENTAZIONE ACQUA SERVIZI.
7. LINEA ACQUA SERVIZI DA UTILIZZARE PER RIEMPIRE IL K.O. DRUM DELLA TORCIA PER IL TEST PERIODICO DELLE POMPE.
8. LG-0311 VISIBILE DALLA VALVOLA DI BY-PASS DI RO-0321.
9. TI-0323 VISIBILE DALLA VALVOLA IMMISIONE VAPORE NEL SERPENTINO DEL K.O. DRUM.
10. SISTEMA SMOKELESS D'INSTALLAZIONE FUTURA. PREVEDERE LA PREDISPOSIZIONE DI TUTTO QUANTO IL NECESSARIO PER IL CORRETTO FUNZIONAMENTO SENZA LA NECESSITA' DI APPORTARE MODIFICHE STRUTTURALI. LA CONFIGURAZIONE DEL SISTEMA SMOKELESS (INCLUSA LA STRUMENTAZIONE) SARA' DEFINITA DOPO LA SCELTA DEL FORNITORE DELLA TORCIA.
11. SISTEMA DI CAMPIONAMENTO DI FUTURA INSTALLAZIONE.
12 MISURATORE DI PORTATA DEL TIPO AD ULTRASUONI PROVVISTO DI TRONCHETTO CON CONNESIONI FLANGIATE.

NOTE GENERALI

1. TUTTI GLI INNESTI SUL COLLETTORE PRINCIPALE DI TORCIA VANNO FATTI DALL'ALTO, ORIENTATI NEL VERSO DI FLUSSO E AUTODRENATI VERSO IL SEPARATORE DI TORCIA.
2. TUTTE LE TUBAZIONI DEL SISTEMA BLOWDOWN/TORCIA DEVONO ESSERE AUTODRENANTI VERSO IL SEPARATORE DI TORCIA.
3. TUTTE LE LINEE E LA STRUMENTAZIONE IN CONTATTO CON ACQUA/SOLUZIONI ACQUOSE DEVONO ESSERE WINTERIZZATE IN ACCORDO ALLO STANDARD DI STABILIMENTO DI ALMA PETROLI.

LEGENDA

CAMBIO CLASSE

REV.	DATE	DESCRIPTION	PRP.	VRF.	APPR./ AUTHOR.
A	Gen. 2012	EMISSIONE DI PROCESSO	GAR	JDS/MTR	GBR/BEN

Tecnimont KT

ALMA PETROLI

CAD CODE: PID-0031-003

PROJ N.: K027

PIPING & INSTRUMENT DIAGRAM TORCIA

Scale	Project	Unit	Doc. Code & Serial No.	Page	Rev.
---	K027	900	PID 0031 – 03	1 of 1	0

Tecnimont KT S.p.A. – 00148 ROMA – Viale Castello della Magliana, 75

MOD-CADAM/E- Rev.3

5 LISTA APPARECCHIATURE

Si riporta di seguito la lista apparecchiature costituenti l'unità 900 ed il relativo numero di documento della specifica di processo:

APPARECCHIATURA	DESCRIZIONE	Num. Doc. Specifica di Processo	Note
T-901	Torcia	K027-900-SP-0180-01	Incluso nella fornitura della Torcia
B-901	KO Drum	K027-900-SP-0180-01	Incluso nella fornitura della Torcia
B-902	Guardia Idraulica	K027-900-SP-0180-01	Incluso nella fornitura della Torcia
M-901	Guardia Venturi	K027-900-SP-0180-01	Incluso nella fornitura della Torcia
P-901 A/B	Pompe Slop	K027-900-SP-0910-01	
PK-901	Sistema Campionamento Automatico	K027-900-SP-2162-01	Installazione futura; escluso dalla fornitura della Torcia.

6 SPECIFICHE DI PROCESSO

Si riportano di seguito le specifiche di processo delle apparecchiature:

- Sistema Torcia (T-901/M-901/B-901/B-902) (par. 6.1)
- Pompe slop P-901A/B (par. 6.2)
- Sistema di campionamento automatico PK-901 (par. 6.3)

Maggiori dettagli tecnici/costruttivi relativi al Sistema Torcia sono contenuti nell'offerta tecnica della Thermoengineering allegata (allegato 1).

6.1 Sistema Torcia T-901/M-901/B-901/B-902

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-0180-01 (12 fogli).

PURCHASER SUPPLIED - GENERAL INFORMATION

		Note		Rev.
1	Purchaser			
2	Reference Number			
3	Plant Owner/Operator		Alma Petroli Spa - Stabilimento di Ravenna	
4	Reference Number			
5	Vendor			
6	Reference Number			
7				
8	Jobsite Location		Ravenna - Italia	
9	Jobsite Climate			
10	Unit Tag	(1)	900	
11	Equipment Number	(1)		
12	Service		Emergency Blowdown / Furnaces shutdown	
13	Quality Required			
14	Is Smokeless Required? (Y/N)	(2)	Yes	
15	Preferred Smokeless Method		Steam	
16	Local Codes		97/23/CE (PED) / ISPRA guideline	
17	Is P&ID Attached? (Y/N)		Yes	
18				
19	Ambient conditions (Design/Normal)			
20	Minimum Temperature, °C		-12	
21	Maximum Temperature, °C		36	
22	Relative Humidity, %		100 / 25	
23	Maximum Wind Speed, m/s	(3)		
24	Predominant Wind, (Y/N) / Direction			
25	Peak Solar Radiation, W/m²	(4)	500/1000	
26	Include Solar w/ Flare Radiation (Y/N)	(4)	Yes	
27	Jobsite Elevation, meters above sea level		2	
28	Seismic Zone	(24)	See attached seismic data.	
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47	Notes:			
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PURCHASER SUPPLIED - GENERAL INFORMATION

		Note		Rev.
1	Minimum Flare Height, meter	(5)		
2	Anticipated Flare Header Diameter, mm		As per P&IDS n° K027-900-PID-0031-001/2/3	
3	Approx. Flare Header Length, m			
4	Flare Header Network Volume, m³			
5	Plot Space Available, Length/Width, m	(6)	8x8 squared area or 10x10x10 triangular area	
6	Aircraft Warning Lights Required? (Y/N)		As per Enac code.	
7				
8	Welding Code			
9	Peak Radiation at Grade, W/m²	(7)	1580 @ 80/95 m (X axis) from flare	
10	Surface Prep. & Paint Requirements			
11	Special Erection Requirements		To be defined by vendor according to site charateristics.	
12				
13	Nozzle Loads on Flare Inlet			
14	Fx, Fy, Fz (kg)			
15	Mx, My, Mz (meter-kg)			
16	Special Piping Treatment			
17	Fireproofing			
18	Insulation			
19	Supports			
20	Covering			
21	Heat Tracing (Elec., Steam)			
22				
23	Utilities Available (Design/Normal)			
24	Steam Pressure, bar (ga)		8.0/3.5	
25	Steam Temperature, °C		170	
26	Location of Steam Conditions		to be defined during detailed engineering	
27	Blower Power, Volts/Phase/Freq.			
28	Instr. Power, Volts/Phase/Freq.			
29	Electrical Classification, Cl / Gp / Div			
30	Instrument Air, bar (ga)		10.0/7.0	
31	Plant Air, bar (ga)		10.0/7.0	
32	Nitrogen, bar (ga)	(8)		
33	Fuel Gas, bar (ga) / Case #		5.0/3.0 (methane)	
34	Purge Gas, bar (ga) / Case #	(8)		
35	Utility Costs			
36				
37	Nearby Structures (Distance, Height), meter			
38	Other Active Flares	(9)	None	
39	Direction from Current Flare			
40	Heat Release, W			
41	Radiant Fraction			
42	Other Inactive Flares	(9)	None	
43	Cooling Towers	(9)	None	
44	Electrical Substations	(9)		
45	Property Line		80/95	
46	Virgin Naphtha tank	(7)(9)	15 , 7.5	
47	Bitumen tank	(7)(9)	15 , 12.5	
48	Notes:			
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PROCESS DESIGN CONDITIONS - PURCHASER

		Note	Case 1	Rev.	Case 2	Rev.	Case 3	Rev.
1	Design Flare Capacity, kg/hr	(10)	40556		38887		13931	
2	Smokeless Capacity, kg/hr / opacity	(2)	30% / Ringlemann chart 1					
3	Gas Temperature, deg C		311		388		146	
4	Static Pressure at Flare Inlet, bar (ga)	(11)	0.4		0.4		0.4	
5	Flare Inlet Diameter, mm	(23)	14 in.					
6	Veq. SCFH air equivalent							
7	Heat Release, MW		by vendor					
8	Duration @ Max. Rate, min.							
9	Peak Radiation at Grade, W/m²	(7)	1580 @ 80/95 m					
10	Controlling Case for							
11	**GAS COMPOSITION** (Mole% / Mass%)							
12	Methane							
13	Ethane							
14	Propane							
15	Isobutane		8.20					
16	n-Butane							
17	Isopentane							
18	n-Pentane		8.20					
19	Hexane		22.01		1.93			
20	Heptane							
21	Octane		25.89		11.45		26.91	
22	C-9						45.44	
23	C-10				40.62			
24	C-11		21.64					
25	C-12		9.28		46.00			
26	Ethylene							
27	Propylene							
28	Butylene							
29	Acetylene							
30	Butadiene							
31	Benzene							
32	Toluene							
33	Xylene							
34	Hydrogen							
35	Carbon Monoxide							
36	Hydrogen Sulfide							
37	Ammonia							
38	Water Vapor		4.78				27.65	
39	Nitrogen							
40	Carbon Dioxide							
41								
42	**TOTAL** (should be 100%)		100.00		100.00		100.00	
43	Molecular Weight		109.71		150.89		94.00	
44	Lower Heating Value, kcal/kg		11000		11000		10000	
45	Ratio of Specific Heats, Cp/Cv		1.03		1.02		1.05	
46	Viscosity, cP		0.011		0.016		0.008	
47	UEL, % in air							
48	LEL, % in air		0.98		0.81		1.20	
49	Notes:							
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PROCESS DESIGN CONDITIONS - PURCHASER

		Note	Case 4	Rev.	Case 5	Rev.	Case 6	Rev.
1	Design Flare Capacity, kg/hr	(14)	11354		2630 (12)		2064 (12)	
2	Smokeless Capacity, kg/hr / opacity	(2)						
3	Gas Temperature, deg C		238		44 (12)		44 (12)	
4	Static Pressure at Flare Inlet, bar (ga)	(11)	0.4		0.4		0.4	
5	Flare Inlet Diameter, mm							
6	Veq. SCFH air equivalent							
7	Heat Release, MW							
8	Duration @ Max. Rate, min.							
9	Peak Radiation at Grade, W/m²							
10	Controlling Case for							
11	**GAS COMPOSITION** (Mole% / Mass%)							
12	Methane							
13	Ethane							
14	Propane							
15	Isobutane							
16	n-Butane							
17	Isopentane							
18	n-Pentane		9.33					
19	Hexane							
20	Heptane		5.06					
21	Octane		33.86					
22	C-9							
23	C-10							
24	C-11							
25	C-12							
26	Ethylene							
27	Propylene							
28	Butylene							
29	Acetylene							
30	Butadiene							
31	Benzene							
32	Toluene							
33	Xylene							
34	Hydrogen							
35	Carbon Monoxide							
36	Hydrogen Sulfide							
37	Ammonia							
38	Water Vapor		51.75		100.00		100.00	
39	Nitrogen							
40	Carbon Dioxide							
41								
42	**TOTAL** (should be 100%)		100.00		100.00		100.00	
43	Molecular Weight		59.80		1315 (13)		1032 (13)	
44	Lower Heating Value, kcal/kg		9000		-		-	
45	Ratio of Specific Heats, Cp/Cv		1.06		-		-	
46	Viscosity, cP		0.012					
47	UEL, % in air				-		-	
48	LEL, % in air		1.83		-		-	
49	Notes:							
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		Note	Case 7	Rev.		Rev.		Rev.
1	Design Flare Capacity, kg/hr	(15)	100					
2	Smokeless Capacity, kg/hr / opacity	(2)						
3	Gas Temperature, deg C		40					
4	Static Pressure at Flare Inlet, bar (ga)	(11)	0.4					
5	Flare Inlet Diameter, mm							
6	Veq. SCFH air equivalent							
7	Heat Release, MW							
8	Duration @ Max. Rate, min.	(16)						
9	Peak Radiation at Grade, W/m²							
10	Controlling Case for							
11	**GAS COMPOSITION** (Mole% / Mass%)							
12	Methane		21.73					
13	Ethane		6.42					
14	Propane		13.83					
15	Isobutane		6.72					
16	n-Butane		11.85					
17	Isopentane		5.83					
18	n-Pentane		4.84					
19	Hexane		7.51					
20	Heptane							
21	Octane							
22	C-9							
23	C-10							
24	C-11							
25	C-12							
26	Ethylene							
27	Propylene		0.30					
28	Butylene		0.67					
29	Acetylene		0.21					
30	Butadiene							
31	Benzene							
32	Toluene							
33	Xylene							
34	Hydrogen		0.79					
35	Carbon Monoxide		0.37					
36	Hydrogen Sulfide							
37	Ammonia							
38	Water Vapor		2.00					
39	Nitrogen		16.02					
40	Carbon Dioxide		0.02					
41	Oxygen		0.89					
42	**TOTAL** (should be 100%)		100.00					
43	Molecular Weight		42.41					
44	Lower Heating Value, kcal/kg		9650					
45	Ratio of Specific Heats, Cp/Cv		1.06					
46	Viscosity, cP		0.012					
47	UEL, % in air							
48	LEL, % in air		1.80					
49	Notes:							
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MECHANICAL DESIGN DATA (PILOTS/IGNITION SYSTEM)

		Note	Purchaser - Specified	Rev.	Vendor - Proposed/Actual	Rev.
1	**PILOTS**		by Vendor			
2	Quantity					
3	Rating - Each, kW					
4	Gas Pressure					
5	Inspirator Type					
6	Inspirator Material					
7	Gas Orifice Size, mm					
8	Strainer (Y/N)					
9	Peak Radiation at Grade, W/m²					
10	Flame Monitor Type					
11	Pilot Fuel Connection Type / Size, mm					
12	Fuel Gas Manifold (Y/N)					
13	Manifold Connection Type / Size, mm					
14	Ignition Connection Type / Size, mm					
15	Retractable Pilots (Y/N)					
16	Retractable Thermocouples (Y/N)					
17						
18						
19						
20						
21	**IGNITION SYSTEM**		by Vendor			
22	Type (FFG/Electronic/Other)					
23	Distance from Stack, meter					
24	Automatic/Manual Ignition					
25	Elec. Class., Cl / Gp / Div					
26	Remote Alarm Contacts - Quantity					
27	Remote Ignition Contact (Y/N)					
28	Pressure Regulators - Quantity					
29	Pressure Gauges - Quantity					
30	Pilot Selector Valves - Type/Quantity					
31	Pilot Indicator Lights (Y/N)					
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MECHANICAL DESIGN DATA (LIQUID SEAL)

		Note	Purchaser - Specified	Rev.	Vendor - Proposed/Actual	Rev.
1	**LIQUID SEAL**					
2	Vessel Diameter, meter		by Vendor			
3	Height/Length (T/T), meter		by Vendor			
4	Material/Thickness, mm		KCS / by Vendor			
5	Integral/Separate from Stack		Integral			
6	Design Code		97/23/CE (PED)			
7	Code Stamp (Y/N)		Yes			
8	Design Pressure, bar (ga)	(17)	3.5			
9	Peak Radiation at Grade, W/m²					
10	Corrosion Allowance, mm		3			
11	Seal Depth, mm		by Vendor			
12	Max. Vacuum w/o adding liquid, mm WC		Half vacuum @ 100°C			
13	Freeze Protection Type		Required, by Vendor			
14	Connection Type / Size, mm / #					
15	Instrument/Valve Requirements		by Vendor			
16	Special Requirements		by Vendor			
17	Vessel Connections		As per P&IDS n° K027-900-PID-0031-001/2/3			
18	Flare Gas Inlet Type / Size, mm / #					
19	Flare Gas Outlet Type / Size, mm					
20	Fill Nozzle Type / Size, mm / #					
21	Drain Type / Size, mm / #					
22	Level Gauge Type / Size, mm / #					
23	Level Switch Type / Size, mm / #					
24	Temperature Type / Size, mm / #					
25	Pressure Type / Size, mm / #					
26	Skimmer/Overflow Type / Size, mm / #					
27	Manway Type / Size, mm / #					
28	Skirt Access (Y/N) / Type / Size, mm / #					
29	Skirt Vents (Y/N) / Type / Size, mm / #					
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MECHANICAL DESIGN DATA (KNOCKOUT DRUM)

		Note	Purchaser - Specified	Rev.	Vendor - Proposed/Actual	Rev.
1	**KNOCKOUT DRUM**		by Vendor			
2	Type (Horiz./Vert./Cyclone, ref. RP-521)		Vertical			
3	Vessel Diameter, meter		by Vendor			
4	Height/Length (T/T), meter	(18)	by Vendor			
5	Material/Thickness, mm		KCS / by Vendor			
6	Integral/Separate from stack		Integral			
7	Design Code		97/23/CE (PED)			
8	Code Stamp (Y/N)		Yes			
9	Peak Radiation at Grade, W/m²					
10	Design Temperature, °C	(17)	250			
11	Corrosion Allowance, mm		3			
12	Max. Liquid Level, m		by Vendor			
13	Liquid Holdup Volume, m^3		1.5			
14	Freeze Protection Type		Required, by Vendor			
15	Connection Type / Size, mm / #					
16	Instrument/Valve Requirements		by Vendor			
17	Special Requirements		by Vendor			
18	Vessel Connections		As per P&IDS n° K027-900-PID-0031-001/2/3			
19	Flare Gas Inlet Type / Size, mm / #					
20	Flare Gas Outlet Type / Size, mm					
21	Fill Nozzle Type / Size, mm / #					
22	Drain Type / Size, mm / #					
23	Level Gauge Type / Size, mm / #					
24	Level Switch Type / Size, mm / #					
25	Temperature Type / Size, mm / #					
26	Pressure Type / Size, mm / #					
27	Skimmer/Overflow Type / Size, mm / #					
28	Manway Type / Size, mm / #					
29	Skirt Access (Y/N) / Type / Size, mm / #					
30	Skirt Vents (Y/N) / Type / Size, mm / #					
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GENERAL NOTES

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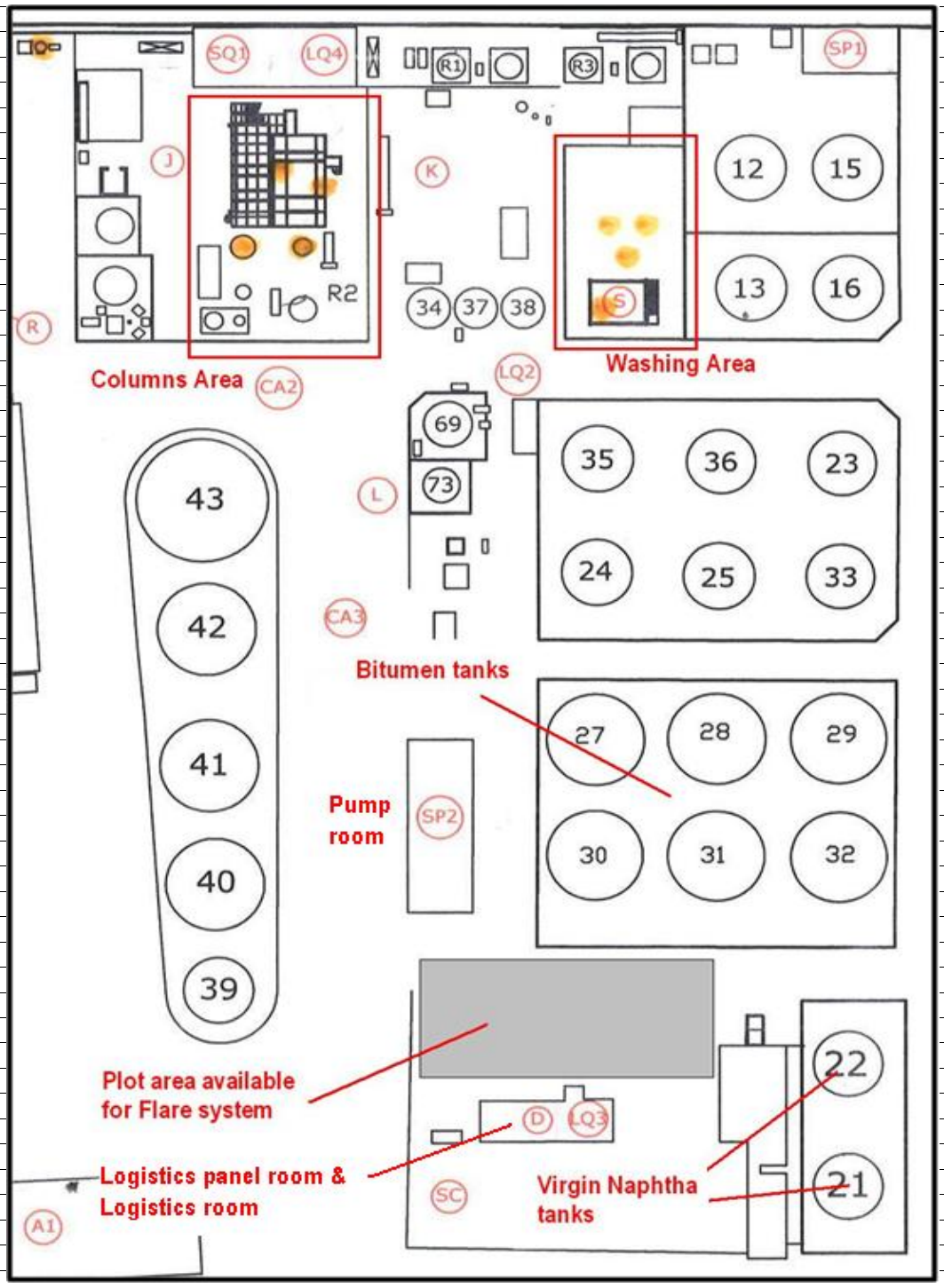
Plot area



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GENERAL NOTES

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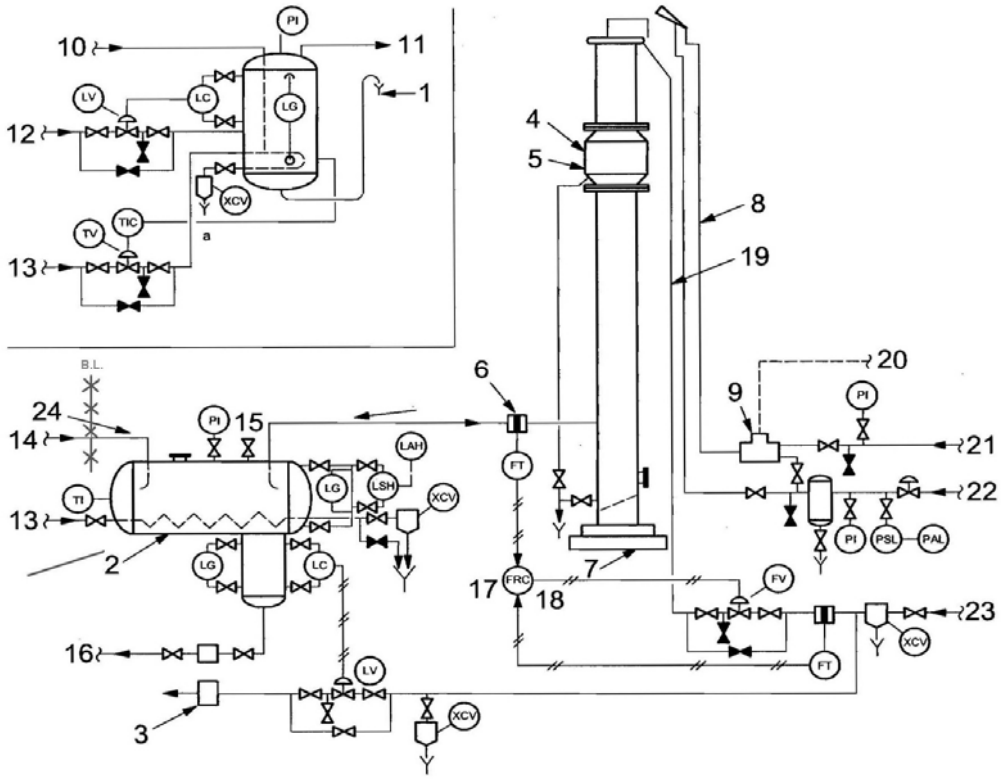
Typical flare installation

API Standard 521 / ISO 23251



Key

1 oily water sewer (to sour water system if large quantities of H_2S are flared continuously)
2 knockout drum
3 steam-driven pump and electrically-driven spare
4 molecular seal
5 purge gas
6 flow-measuring element
7 flare stack
8 igniter line
9 flame-front generator
10 from knockout drum
11 to flame stack
12 water
13 steam
14 from relief or vent header system
15 vent
16 to oil recovery facilities or slop
17 panel-mounted
18 ratio
19 steam to nozzle manifold for smokeless burning
20 power supply for spark ignition
21 air supply
22 fuel gas to pilots and ignition
23 steam for smokeless burning
24 slope towards drum

[a] Insert shows alternative sealing method (water seal).

Figure D.3 — Typical flare installation

Figure D.3 represents an operable system arrangement and its components. The arrangement of the system varies with the performance required. Correspondingly, the selection of types and quantities of components, as well as their applications, should match the needs of the particular plant and its specifications.

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NOTES

	Notes:	Rev. No.
1	(1) Unit 900 includes: Flare stack T-901, Venturi Seal M-901, KO Drum B-901, Hydraulic Seal B-902.	
2	(2) Flare T-901 shall be intended to work with a smokeless system sized for 30% of maximum dicharge flowrate. Flare Vendor shall supply all material necessary to	
3	its future connection to steam network in order to avoid any further structural modification.	
4	(3) Design wind velocity for fire scenario: 10 m/s; maximum continuous wind velocity: 22.2 m/s;	
5	maximum gust of wind recorded over the last 10 years : 36.1 m/s.	
6	(4) Maximum peak solar radiation during fire emergency 500 W/m^2; Maximum peak solar radiation during any other case 1000 W/m^2.	
7	(5) Flare height shall accounts for the presence of two Virgin Naphtha tanks beside the available plot space. For further information see notes 4, 7.	
8	(6) See attached plot plan.	
9	(7) Flare height shall also ensure a 4730 W/m^2 maximum radiaton on the roof of two tanks 15 m (Y axis) high at 15 m (X axis) from flare.	
10	(8) No inert gas (e.g. Nitrogen) is currently available.	
11	(9) To be confirmed during detailed engineering.	
12	(10) Case 1: Fire in Columns Area; Case 2: Fire in Heat Exchangers Area; Case 3: Misoperation on C-01.	
13	(11) Static pressure at blowdown system B.L. (see attached API sketch, 2 of 2); maximum static pressure at KO Drum inlet 0.6 barg.	
14	(12) Liquid discharge.	
15	(13) Actual density, kg/m^3.	
16	(14) Case 4: Fire in Washing Area; Case 5: Misoperation on B-301; Case 6: Misoperation on B-302.	
17	(15) Case 7: Furnace shutdown	
18	(16) Deleted.	
19	(17) 250°C design temperature for thickness, 400°C for stress analysis (short time condition); MDMT: -12°C.	
20	(18) KO Drum B-901 minimum height above grade: 4 m.	
21	(19) The Scope of Supply includes all the machinery, equipment, materials and necessary activities in order to supply and install the flare system in	
22	compliance with norms and laws in force. In particular, the Scope of Supply shall include:	
23	a) Flare K.O. drum	
24	b) Hydraulic Seal	
25	c) Flare stack	
26	d) Burner/pilots	
27	e) Piping, fittings and instrumentation.	
28	f) Sample connection for Automatic Sampling System on KO Drum B-901.	
29		
30	(20) The typical arrangment and the minimum instrumentation of the flare system shall be in compliance with API Standard 521 (see sketch 2 of 2	
31	(21) Minimum instrumentation shall be strictly in compliance with ISPRA Guidelines as per "Allegato L", June 2011. In particular, the instrumenta	
32	shall meet the following specification:	
33	a) Flowrate measurement shall be able to be performed automatically and continuously.	
34	b) Flowmeter detectivity limit shall be 0.03 m/s (to be confirmed).	
35	c) Detection range shall be 0.3 - 84.0 m/s at the detection point (to be confirmed).	
36	d) Flowmeter shall have a +/- 5% accuracy on the range specified above.	
37	e) The flowmeter shall be installed so that the measurement is representative of the gas burned in the flare.	
38		
39	(22) Flare system design shall be in compliance with the latest issue of the national code (ISPRA Guidelines).	
40	(23) To be confirmed by flare vendor.	
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NOTES

	Notes:	Rev. No.
1	(24) Seismic data relevant to site provided by Alma Petroli Spa:	
2		
3	Via Baiona, 48123 Ravenna RA, Italia Longitudine 12.2596 Latitudine 44.4798	
4	Tipo di Terreno D	
5	Coefficiente di amplificazione topografica (S_T) 1.0000	
6	Vita nominale della costruzione (V_N) 50.0 anni	
7	Classe d'uso IIIº coefficiente C_U 1.5	
8	Classe di duttilità impostata Bassa	
9	Fattore di struttura massimo q_o per sisma orizzontale 1.00	
10	Fattore di duttilita K_R per sisma orizzontale 1.00	
11	Fattore riduttivo regolarità in altezza K_R 1.00	
12	Fattore riduttivo per la presenza di setti K_W 1.00	
13	Fattore di struttura q per sisma orizzontale 1.00	
14	Fattore di struttura q per sisma verticale 1.50	
15	Smorzamento Viscoso (0.05 = 5%) 0.03	
16	TU 2008 SLV H	
17	Probabilità di superamento (P_{VR}) 10.0 e periodo di ritorno (T_R) 712 (anni)	
18	S_s 1.8	
19	T_B 0.22 [sec]	
20	T_C 0.66 [sec]	
21	T_D 2.27 [sec]	
22	a_g/g 0.1672	
23	F_o 2.5617	
24	T_C^* 0.2810	
25		
26	TU 2008 SLD H	
27	Probabilità di superamento (P_{VR}) 63.0 e periodo di ritorno (T_R) 75 (anni)	
28	S_s 1.8	
29	T_B 0.22 [sec]	
30	T_C 0.67 [sec]	
31	T_D 1.85 [sec]	
32	a_g/g 0.0622	
33	F_o 2.5095	
34	T_C^* 0.2900	
35		
36	TU 2008 SLO H	
37	Probabilità di superamento (P_{VR}) 81.0 e periodo di ritorno (T_R) 45 (anni)	
38	S_s 1.8	
39	T_B 0.22 [sec]	
40	T_C 0.65 [sec]	
41	T_D 1.80 [sec]	
42	a_g/g 0.0502	
43	F_o 2.4965	
44	T_C^* 0.2744	
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PA	January 2012	PROCESS ISSUE	MTR	CBO	CBO	BB							

6.2 Pompe slop P-901A/B

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-0910-01 (5 fogli).

Tecnimont KT | ALMA PETROLI

NUOVO SISTEMA DI TORCIA E BLOWDOWN
ALMA PETROLI S.P.A.
STABILIMENTO DI RAVENNA

DATA SHEET FOR CENTRIFUGAL PUMP
PROCESS DATA SHEET SI UNITS (API 610 10th. Ed.)

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SERVICE: POMPA SLOP
IDROCARBURI / SOLUZIONE NaOH 30%

ITEM: P-901A/B
MR:

NO. REQUIRED: 2 (5) | PUMP SIZE: | TYPE: ORIZZONTALE | NO. STAGES:
MANUFACTURER: | MODEL: | SERIAL NO.:
APPLICABLE TO: ○ PROPOSALS ○ PURCHASE ◎ AS BUILT

NOTES: INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER ☐ BY MANUFACTURER ◎ BY MANUFACTURER OR PURCHASER

○ DATA SHEETS

	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED
PUMP		○		○		○
MOTOR		○		○		○
GEAR		○		○		○
TURBINE		○		○		○

APPLICABLE OVERLAY STANDARD(S):

NOTES / REMARKS

○ OPERATING CONDITIONS (5.1.3)

FLOW, NORMAL 9 (m^3/h) RATED 10 (4) (m^3/h)
OTHER
SUCTION PRESSURE MAX./RATED 3.82 (1,2) / 0.21 (1)(2) (barg)
DISCHARGE PRESSURE 2.28 (1)(2) (barg)
DIFFERENTIAL PRESSURE 2.07 (1)(2) (bar)
DIFF. HEAD 34.5 (1)(2) (m) NPSHA 3.3 (1)(2)(7) (m)
PROCESS VARIATIONS (5.1.4)
STARTING CONDITIONS (5.1.4)
SERVICE: ○ CONT. ● INTERMITTENT (STARTS/DAY) (6)
○ PARALLEL OPERATION REQ'D (5.1.13)

○ SITE DATA (5.1.3) (note 11)

LOCATION: (5.1.30) (8)
○ INDOOR ○ HEATED ● OUTDOOR ○ UNHEATED
○ ELECTRICAL AREA CLASSIFICATION (5.1.24 / 6.1.4)
CL GR ZONE
● WINTERIZATION REQ'D ○ TROPICALIZATION REQ'D.

SITE DATA (5.1.30)
○ ALTITUDE 5 (m) BAROMETER 1.013 (bara)
○ RANGE OF AMBIENT TEMPS: MIN/MAX. -12 / 36 (°C)
○ RELATIVE HUMIDITY: MIN / MAX 25 / 100 (%)
UNUSUAL CONDITIONS: (5.1.30) ○ DUST ○ FUMES
○ OTHER

○ DRIVER TYPE

○ INDUCTION MOTOR ○ STEAM TURBINE ○ GEAR
○ OTHER

○ MOTOR DRIVER (6.1.1 / 6.1.4)

◎ MANUFACTURER
☐ (kW) ☐ RPM
☐ FRAME ◎ ENCLOSURE
◎ HORIZONTAL ◎ VERTICAL ◎ SERVICE FACTOR
◎ VOLTS/PHASE/HERTZ 380 / 3 / 50
○ TYPE
○ MINIMUM STARTING VOLTAGE (6.1.5)
◎ INSULATION ○ TEMP. RISE
◎ FULL LOAD AMPS
◎ LOCKED ROTOR AMPS
◎ STARTING METHOD
◎ LUBE

BEARINGS (TYPE/NUMBER):
☐ RADIAL /
☐ THRUST /
☐ VERTICAL THRUST CAPACITY
UP (N) DOWN (N)

○ LIQUID (5.1.3)

LIQUID TYPE OR NAME: IDROCARBURI / SOLUZIONE NaOH 30%
○ HAZARDOUS ● FLAMMABLE ○ (5.1.5)

	MIN. (1)	NORMAL	MAX. (2)
PUMPING TEMP (°C)	99		44
VAPOUR PRESS. (bar)	1.03		0.04
RELATIVE DENSITY (SG):	0.610		1.345
VISCOSITY (mPa.s)	0.197		5.1

SPECIFIC HEAT, Cp 0.603 (1) / 0.859 (2) (kJ/kg.K)
○ CHLORIDE CONCENTRATION (6.5.2.4) (mg/kg)
○ H_2S CONCENTRATION (mol fraction) WET (5.12.1.12c)
CORROSIVE / EROSIVE AGENT NaOH / SOLFURI (5.12.1.9)

MATERIALS (5.12.1.1)

○ ANNEX H CLASS (5.12.1.1)
○ MIN DESIGN METAL TEMP (5.12.4.1) -12 (°C)
○ REDUCED HARDNESS MATERIALS REQ'D. (5.12.1.12)
☐ BARREL/CASE KCS (10) IMPELLER CAST IRON (10)
☐ CASE/IMPELLER WEAR RINGS
☐ SHAFT
☐ DIFFUSERS

◎ PERFORMANCE:

PROPOSAL CURVE NO. ☐ RPM
☐ IMPELLER DIA. RATED MAX. MIN. (mm)
☐ IMPELLER TYPE APERTA
☐ RATED POWER 1.5 (12) (kW) EFFICIENCY 47 (12) (%)
☐ MINIMUM CONTINUOUS FLOW:
THERMAL (m^3/h) STABLE (m^3/h)
☐ PREFERRED OPER. REGION TO (m^3/h)
☐ ALLOWABLE OPER. REGION TO (m^3/h)
☐ MAX HEAD @ RATED IMPELLER (m)
☐ MAX POWER @ RATED IMPELLER (kW)
☐ NPSHR AT RATED FLOW (m) (5.1.10)
◎ MAX. SUCTION SPECIFIC SPEED: (5.1.11)
◎ MAX. SOUND PRESS. LEVEL REQ'D (dBA) (5.1.16)
◎ EST MAX SOUND PRESS. LEVEL (dBA) (5.1.16)
◎ EST MAX SOUND POWER LEVEL (dBA) (5.1.16)

○ UTILITY CONDITIONS (5.1.3)

ELECTRICITY	VOLTAGE	PHASE	HERTZ
DRIVERS	380	3	50
HEATING			

SYSTEM VOLTAGE DIP ○ 80% OTHER (6.1.5)

STEAM	MAX. PRESS.	MAX. TEMP.	MIN. PRESS.	MIN. TEMP.
DRIVERS				
HEATING				

COOLING WATER: (5.1.19) SOURCE
SUPPLY TEMP. (°C) MAX. RETURN TEMP. (°C)
NORM. PRESS. (barg) DESIGN PRESS. (barg)
MIN. RET. PRESS. (barg) MAX. ALLOW. D.P. (barg)
CHLORIDE CONCENTRATION: (mg/kg)

Rev	Date	Description	Wrt	Verif	App	Auth
PA	gen-12	EMISSIONE PER LIBRO DI PROCESSO	MTR	CBO	CBO	BB

PROCESS DEPARTMENT | ENGINEERING DEPARTMENT

Tecnimont KT

NUOVO SISTEMA DI TORCIA E BLOWDOWN
ALMA PETROLI S.P.A.
STABILIMENTO DI RAVENNA

DATA SHEET FOR CENTRIFUGAL PUMP
PROCESS DATA SHEET SI UNITS (API 610 10th. Ed.)

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MECHANICAL SEAL (5)

SEAL DATA:

- ○ SEE ATTACHED ISO 21049/API 682 DATA SHEET
- ○ NON-API 682 SEAL
- ○ APPENDIX H SEAL CODE
- ◎ SEAL MANUFACTURER
- ◎ SIZE AND TYPE /
- ◎ MANUFACTURER CODE

ARRANGEMENT:

◎ SINGLE ◎ DUAL UNPRESSURIZED ◎ DUAL PRESSURIZED

SEAL CHAMBER DATA:

- ◎◎ TEMPERATURE (°C)
- ◎◎ PRESSURE (Barg)
- ◎ FLOW (m³/h)

SEAL FLUSH PIPING:

- ○ SEAL FLUSH PIPING PLAN
- ◎ TUBING ◎ CARBON STEEL
- ◎ PIPE ◎ STAINLESS STEEL
- ○ SEAL FLUSH FLUID TYPE
- ○ AUXILIARY FLUSH PLAN
- ◎ TUBING ◎ CARBON STEEL
- ◎ PIPE ◎ STAINLESS STEEL
- ○ AUXILIARY FLUSH FLUID TYPE

MECHANICAL SEAL (CONT.)

○ PIPING ASSEMBLY:

◎ THREADED ◎ UNIONS ◎ SOCKET WELDED
◎ FLANGED ◎ TUBE TYPE FITTINGS

REMARKS

PACKING

PACKING DATA:

MANUFACTURER
TYPE
SIZE NO. OF RINGS

☐ PACKING INJECTION REQUIRED
☐ FLOW (m³/h) @ (°C)
☐ LANTERN RING

STEAM AND COOLING WATER PIPING

◎ COOLING WATER PIPING PLAN (3.5.4.1)
☐ COOLING WATER REQUIREMENTS
SEAL JACKET/BRG HSG (m³/h) @ (Barg)
SEAL HEAT EXCHANGER (m³/h) @ (Barg)
QUENCH (m³/h) @ (Barg)
TOTAL COOLING WATER (m³/h)
○ STEAM PIPING: ○ TUBING ○ PIPE

NOTES

1) Idrocarburo saturo (peso molecolare 100).
2) In caso di Soluzione NaOH 30% in peso; pressione aspirazione max/min: 4.20 / 0.45 barg; pressione mandata: 2.83 barg; pressione differenziale: 2.38 bar; NPSH disponibile: > 7 m (vedi nota 7).
3) Pressione di design: 7.06 barg da confermare da parte del fornitore.
4) La portata rated comprende un overdesign del 10%.
5) Una in operazione, una in stand-by.
6) L'avviamento della pompa è automatico in caso di emergenza. Data l'alta probabilità di periodi di inattività, il funzionamento della pompa sarà testato periodicamente avviando la pompa in modalità manuale utilizzando acqua di servizio.
7) L'NPSH è stato calcolato considerando la linea di tangenza del fondo del separatore di torcia ad una quota di 4 m.
8) temperatura di design: 150°C
9) La potenza del motore sarà calcolcata considerando il liquido come per la nota 2.
10) I materiali devono essere in accordo alla normativa NACE 0103.
11) Winterizzazione in accordo allo standard di Alma Petroli.
12) Valori da confermare da parte del fornitore della pompa.

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ALMA PETROLI

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DATA SHEET FOR CENTRIFUGAL PUMP SINGLE STAGE OVERHUNG (TYPE OH) SI UNITS (API 610 10th. Ed.)

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CONSTRUCTION

ROTATION: (VIEWED FROM COUPLING END) ☐ CW ☐ CCW

PUMP TYPE: (4.1)

◯ OH2 ◯ OH3 ◯ OH6 ◯ OTHER _____

CASING MOUNTING:

◯ CENTERLINE ◯ IN-LINE ☐ OTHER _____

CASING TYPE:

☐ SINGLE VOLUTE ☐ MULTIPLE VOLUTE ☐ DIFFUSER

CASE PRESSURE RATING:

◯ OH6 PUMP SUCTION REGION DESIGNED FOR MAWP (5.3.6)

☐ MAX ALLOWABLE WORKING PRESSURE **7.06 (3)** (barg)

@ _____ (°C) **(REFER TO PAGE 2)**

☐ HYDROTEST PRESSURE _____ (barg)

☐ **NOZZLE CONNECTIONS: (5.4.2)**

	SIZE	FLANGE RATING	FAC'G	POSITION
SUCTION		150	RF	
DISCHARGE		150	RF	

PRESSURE CASING AUX. CONNECTIONS: (5.4.3)

	NO.	SIZE (DN)	TYPE
◯ DRAIN			
◯ VENT			
◯ WARM-UP			

◯ MACHINED AND STUDDED CONNECTIONS (5.4.3.8)

◯ CYLINDRICAL THREADS REQUIRED (5.4.3.3)

ROTOR:

◯ COMPONENT BALANCE TO ISO 1940 G1.0 (5.9.4.4)

COUPLINGS:(6.2.2)

◯ MANUFACTURER _____ ◯ MODEL _____

☐ RATING (kW per 100 r/min) _____

◯ SPACER LENGTH _____ (mm) ◯ SERVICE FACT. _____

◯ COUPLING BALANCED TO ISO 1940-1 G6.3 (6.2.3)

◯ COUPLING WITH PROPRIETARY CLAMPING DEVICE (6.2.11)

◯ COUPLING PER ISO 14691 (6.2.4)

◯ COUPLING PER ISO 10441 (6.2.4)

◯ COUPLING PER API 671 (6.2.4) ◯ ASME B15.1

◯ NON SPARK COUPLING GUARD (6.2.14c)

◯ COUPLING GUARD STANDARD PER _____ (6.2.14a)

BASEPLATES:

☐ API BASEPLATE NUMBER _____ (ANNEX D)

◯ NON-GROUT CONSTRUCTION (6.3.13)

◯ OTHER _____

MECHANICAL SEAL:(5.8.1)

◯ SEE ATTACHED ISO 21049/API 682 DATA SHEET

SURFACE PREPARATION AND PAINT

◯ MANUFACTURER'S STANDARD ◯ OTHER (SEE BELOW)

◯ SPECIFICATION NO. _____

PUMP: _____

◯ PRIMER _____

◯ FINISH COAT _____

BASEPLATE: (6.3.17)

◯ PRIMER _____

◯ FINISH COAT _____

◯ DETAILS OF LIFTING DEVICES(6.3.20) _____

SHIPMENT: (7.4.1)

◯ DOMESTIC ◯ EXPORT ◯ EXPORT BOXING REQUIRED

◯ OUTDOOR STORAGE MORE THAN 6 MONTHS

SPARE ROTOR ASSEMBLY PACKAGED FOR:

◯ HORIZONTAL STORAGE ◯ VERTICAL STORAGE

◯ TYPE OF SHIPPING PREPARATION _____

HEATING AND COOLING

◯ HEATING JACKET REQ'D. (5.8.9)

◯ COOLING REQ'D.

◯ COOLING WATER PIPING PLAN (6.5.3.1) _____

C.W. PIPING:

◯ PIPE ◯ TUBING; FITTINGS _____

C.W. PIPING MATERIALS:

◯ S. STEEL ◯ C. STEEL ◯ GALVANIZED

COOLING WATER REQUIREMENTS:

☐ BEARING HOUSING _____ (m^3/h)

HEAT EXCHANGER _____ (m^3/h)

TOTAL COOLING WATER _____ (m^3/h)

HEAT MEDIUM: ◯ STEAM ◯ OTHER

HEATING PIPING: ◯ TUBING ◯ PIPE

BEARINGS AND LUBRICATION

BEARING (TYPE/NUMBER) (5.10.1):

☐ RADIAL _____ /

☐ THRUST _____ /

LUBRICATION (5.11.3, 5.11.4):

◯ GREASE ◯ OIL

◯ PURGE OIL MIST ◯ PURE OIL MIST

◯ CONSTANT LEVEL OILER PREFERENCE (5.10.2.2): _____

◯ OIL VISC. ISO GRADE

INSTRUMENTATION

◯ ACCELEROMETER (6.4.2.1) _____

◯ PROVISION FOR MOUNTING ONLY (5.10.2.11)

◯ FLAT SURFACE REQ'D (5.10.2.12)

◯ TEMP. GAUGES (WITH THERMOWELLS) (8.1.3.6) _____

◯ PRESSURE GAUGE TYPE _____

REMARKS: _____

☐ MASSES

MASS OF PUMP (kg) _____

MASS OF BASEPLATE (kg) _____

MASS OF DRIVER (kg) _____

TOTAL MASS (kg)

Tecnimont KT ALMA PETROLI

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DATA SHEET FOR CENTRIFUGAL PUMP SINGLE STAGE OVERHUNG (TYPE OH) SI UNITS (API 610 10th. Ed.)

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SPARE PARTS (TABLE 18)

- ○ START-UP ○ NORMAL MAINTENANCE
- ○ AND COMMISSIONING

OTHER PURCHASER REQUIREMENTS

- ○ COORDINATION MEETING REQUIRED (9.1.3)
- ○ MAXIMUM DISCHARGE PRESSURE TO INCLUDE (5.3.2)
  - ○ MAX RELATIVE DENSITY
  - ○ MAX DIA. IMPELLERS AND/OR NO OF STAGES
  - ○ OPERATION TO TRIP SPEED
- ○ OH3 BEARING HS6 LIFTER (8.1.2.6)
- ○ CONNECTION DESIGN APPROVAL (5.12.3.4)
- ◎ TORSIONAL ANALYSIS REQUIRED (5.9.2.1)
- ○ TORSIONAL ANALYSIS REPORT (5.9.2.6)
- ○ PROGRESS REPORTS (9.3.3)
- ○ OUTLINE OF PROCEDURES FOR OPTIONAL TESTS (9.2.5)
- ○ ADDITIONAL DATA REQUIRING 20 YEARS RETENTION (7.2.1.1f)

PIPING AND APPURTENANCES

MANIFOLD PIPING TO SINGLE CONNECTION (6.5.1.6)
◎ VENT ◎ DRAIN ◎ COOLING WATER

- ◎ MOUNT SEAL RESERVOIR OFF BASEPLATE (6.5.1.4)
- ◎ FLANGES REQ'D IN PLACE OF SOCKET WELD UNIONS (6.5.2.8)
- ◎ INSTALLATION LIST IN PROPOSAL (9.2.3L)

CONNECTION BOLTING

- ○ PTFE COATING ○ ASTM A153 GALVANIZED
- ○ PAINTED ○ SS

QA INSPECTION AND TESTING

- ○ SHOP INSPECTION (7.1.4)
- ○ PERFORMANCE CURVE APPROVAL
- ◎ TEST WITH SUBSTITUTE SEAL (7.3.3.2b)
- ○ MATERIAL CERTIFICATION REQUIRED (5.12.1.8)
  - ○ CASING ○ IMPELLER ○ SHAFT
  - ○ OTHER _____
- ○ CASTING REPAIR PROCEDURE APPROVAL REQ'D (5.12.2.5)
- ◎ INSPECTION REQUIRED FOR CONNECTION WELDS (5.12.3.4e)
  - ◎ MAG PARTICLE ◎ LIQUID PENETRANT
  - ◎ RADIOGRAPHIC ◎ ULTRASONIC
- ◎ INSPECTION REQUIRED FOR CASTINGS (7.2.1.3 / 5.12.1.5)
  - ◎ MAG PARTICLE ◎ LIQUID PENETRANT
  - ◎ RADIOGRAPHIC ◎ ULTRASONIC
- ○ HARDNESS TEST REQUIRED: _____ (7.2.2.3)
- ○ ADDITIONAL SUBSURFACE EXAMINATION FOR 7.2.1.3
  FOR _____
  METHOD _____

QA INSPECTION AND TESTING (CONT.)

TEST	NON-WIT	WIT	OBSERVE
○ HYDROSTATIC (7.3.2)	○	○	○
○ PERFORMANCE (7.3.3)	○	○	○
○ RETEST ON SEAL LEAKAGE (7.3.3.2d)	○	○	○
○ NPSH (7.3.4.2) (7)	○	○	○
○ TRUE PEAK VELOCITY DATA (7.3.3.4d)	○	○	○
○ COMPLETE UNIT TEST (7.3.4.3)	○	○	○
○ SOUND LEVEL TEST (7.3.4.4)	○	○	○
○ CLEANLINESS PRIOR TO FINAL ASSEMBLY (7.2.2.2)	○	○	○
○ NOZZLE LOAD TEST (6.3.6)	○	○	○
○ CHECK FOR CO-PLANAR MOUNTING PAD SURFACES (6.3.3)	○	○	○
○ MECHANICAL RUN UNTIL OIL TEMP. STABLE (7.3.4.7.1)	○	○	○
○ 4 HR. MECHANICAL RUN AFTER OIL TEMP. STABLE (7.3.4.7.3)	○	○	○
○ 4 HR. MECH. RUN TEST(7.3.4.7.2)	○	○	○
○ BRG HSG RESONANCE TEST (7.3.4.6)	○	○	○
○ AUXILIARY EQUIPMENT TEST (7.3.4.5)	○	○	○
◎ IMPACT TESTING (5.12.4.3) ○ PER EN 13445 ○ PER ASME VIII	○	○	○
○ _____	○	○	○

- ○ VENDOR KEEP REPAIR AND HT RECORDS (7.2.1.1c)
- ○ VENDOR SUBMIT TEST PROCEDURES (7.3.1.2 / 9.2.5)
- ○ VENDOR SUBMIT TEST DATA WITHIN 24 HOURS (7.3.3.3e)
- ○ INCLUDE PLOTTED VIBRATION SPECTRA (5.9.3.3)
- ○ SUBMIT INSPECTION CHECK LIST (7.1.6)

REMARKS

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☐ **PRESSURE DESIGN CODES**
○ **WELDING REQUIREMENTS**
◉ **PURCHASER DEFINED MATERIAL INSPECTIONS**

APPLICABLE TO: ○ PROPOSALS ○ PURCHASE ◉ AS BUILT

FOR _____ UNIT _____

SITE _____ SERVICE _____

NOTES INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER ☐ BY MANUFACTURER ◉ BY MANUFACTURER OR PURCHASER

PRESSURE VESSEL DESIGN CODE REFERENCES.

☐ THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER

CASTING FACTORS USED IN DESIGN (5.3.4) (TABLE 3) ☐

SOURCE OF MATERIAL PROPERTIES ☐

WELDING AND REPAIRS (5.12.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER. (DEFAULT TO TABLE 10 IF NO PURCHASER PREFERENCE IS STATED)

○ ALTERNATIVE WELDING CODES AND STANDARDS (5.12.3.1)

Welding Requirement (Applicable Code or Standard)	Purchaser defined	Default per Table 10
Welder/operator qualification	○	○
Welding procedure qualification	○	○
Non-pressure retaining structural welding such as baseplates or supports	○	○
Magnetic particle or liquid penetrant examination of the plate edges	○	○
Postweld heat treatment	○	○
Postweld heat treatment of casing fabrication welds	○	○

MATERIAL INSPECTION (7.2.2.1) (7.2.1.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER (DEFAULT TO TABLE 13 IF NO PURCHASER PREFERENCE IS STATED)

○ ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 13)

Type of inspection	Methods	For fabrications	Castings
Radiography	○	○	○
Ultrasonic inspection	○	○	○
Magnetic particle inspection	○	○	○
Liquid penetrant inspection	○	○	○

REMARKS

6.3 Sistema di campionamento automatico PK-901 (installazione futura)

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-2162-01 (1 foglio).

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DATA SHEET PER SISTEMA DI CAMPIONAMENTO AUTOMATICO

Service **GAS DI TORCIA**		Item **PK-901**
Type	N° Req. **1**	MR

Secondo quanto stabilito dall'ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale) la torcia dovrà essere dotata di un sistema di misurazione della portata scaricata e un sistema di campionamento discontinuo che si attivi al superamento di una soglia limite di portata.

Tale sistema è da considerarsi di installazione futura; pertanto, al momento, si provvederà a installare la sola connessione di campionamento sul KO Drum a base torcia.

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7 LISTA FLUIDI ED ELENCO LINEE

7.1 Lista fluidi

Si riporta di seguito la lista fluidi num. doc. K027-900-NM-0002-01 (3 fogli).

LISTA FLUIDI

A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco
Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized

DESCRIPTION	FLUID TAG	CLASS	MATERIAL	CA (mm)	RATING (lbs)	OPERATING CONDITIONS		DESIGN CONDITIONS		INSULATION	PWHT (process)	PED GROUP/PHASE	REMARKS
						Temperature (°C)	Pressure (bar g)	Temperature (°C)	Pressure (bar g)				
SCARICO PSV-04	OG	P-A01	KCS (14)	3,0	150	82	0,49	250 (6)	3.5/HV	V	-	1/G	(1)(10)
SFIATO INCONDENSABILI DA B2/B01	OG	P-A01	KCS (14)	3,0	150	40	0,50	250 (6)	3.5/HV	V	-	1/G	(2)(10)
SCARICO PSV-03	OG	P-A01	KCS (14)	3,0	150	371 (1)	0,53	250 (6)	3.5/HV	V	-	1/G	(1)(10)
SCARICO PSV-07	OG	P-A01	KCS (14)	3,0	150	105	0,69	250 (6)	3.5/HV	V	-	1/G	(3)(10)
SCARICO PSV-05	OG	P-A01	KCS (14)	3,0	150	121	0,79	250 (6)	3.5/HV	V	-	1/G	(3)(10)
SCARICO PSV-02	OG	P-A01	KCS (14)	3,0	150	431 (3)	0,66	250 (6)	3.5/HV	V	-	1/G	(3)(10)
SCARICO PSV-10	OG	P-A01	KCS (14)	3,0	150	137	0,66	250 (6)	3.5/HV	V	-	1/G	(4)(10)
SCARICO PSV-251	OG	P-A01	KCS (14)	3,0	150	147	0,80	250 (6)	3.5/HV	V	-	1/G	(4)(10)
SCARICO PSV-301	OG	P-A01	KCS (14)	3,0	150	289 (4)	0,63	250 (6)	3.5/HV	V	-	1/G	(4)(10)
SCARICO PSV-302	OG	P-A01	KCS (14)	3,0	150	289 (4)	0,62	250 (6)	3.5/HV	V	-	1/G	(4)(10)
COLLETTORE AREA SCAMBIATORI/COLONNE	OG	P-A01	KCS (14)	3,0	150	390 (1)(3)(11)	0,44	250 (6)	3.5/HV	V	-	1/G	(1)(3)(10)(11)
COLLETTORE AREA LAVAGGI	OG	P-A01	KCS (14)	3,0	150	240	0,43	250 (6)	3.5/HV	V	-	1/G	(4)(10)
COLLETTORE KO DRUM TORCIA	OG	P-A01	KCS (14)	3,0	150	388 (1)(3)	0,43	250 (6)	3.5/HV	V	-	1/G	(1)(3)(10)
SLOP DA KO DRUM TORCIA A P-901A/B	SLO	P-A01	KCS (14)	3,0	150	40/99	0,50	150 (6)	3.5/HV	F (8)	-	1/G	(9)(10)
SLOP DA A P-901A/B A L.B.+	SLO	P-A01	KCS (14)	3,0	150	40/99	2,90	150 (6)	7.1 (12)	F (8)	-	1/G	(9)(10)
VAPORE BASSA P AL COLLETTORE AREA SCAMBIATORI/COLONNE	LS	S-A01	CS	1,5	150	170 (7)	3.50 (7)	200 (6)(7)	10.0/FV (7)	I	-	2/G	(5)
VAPORE BASSA P AL COLLETTORE AREA IMPIANTI LAVAGGIO	LS	S-A01	CS	1,5	150	170 (7)	3.50 (7)	200 (6)(7)	10.0/FV (7)	I	-	2/G	(5)
VAPORE BASSA P A SCARICO PSV-301	LS	S-A01	CS	1,5	150	170 (7)	3.50 (7)	200 (6)(7)	10.0/FV (7)	I	-	2/G	(5)
VAPORE BASSA P A SCARICO PSV-302	LS	S-A01	CS	1,5	150	170 (7)	3.50 (7)	200 (6)(7)	10.0/FV (7)	I	-	2/G	(5)
CONDENSE BASSA P	LC	S-A01	CS	1,5	150	134 (7)	3,00	150 (6)(7)	10.0/FV (7)	I	-	2/G	
GAS DI PURGA (METANO) DA L.B.	MT	S-A01	CS	1,5	150	AMB	3,00	50 (6)(7)	7.0 (7)	N	-	1/G	
METANO DA L.B. A PILOTI	MT	S-A01	CS	1,5	150	AMB	3,00	50 (6)(7)	7.0 (7)	N	-	1/G	
ARIA STRUMENTI DA L.B.	IA	(13)	CS galvanizzato	1,5	150	AMB	7,00	50 (6)(7)	10.0 (7)	N	-	2/G	
ARIA SERVIZI DA L.B. AI PILOTI	SA	S-A01	CS	1,5	150	AMB	7.00 (7)	50 (6)(7)	10.0 (7)	N	-	2/G	
ACQUA SERVIZI	PW	S-A01	CS	3,0	150	AMB	8.00 (7)	50 (6)(7)	10.0 (7)	F (8)	-	2/L	

LEGEND :

I = Linea coibentata calda
V = Linea con sola verniciatura esterna
F = Linea coibentata fredda
N = linea non verniciata e non coibentata

NOTES :

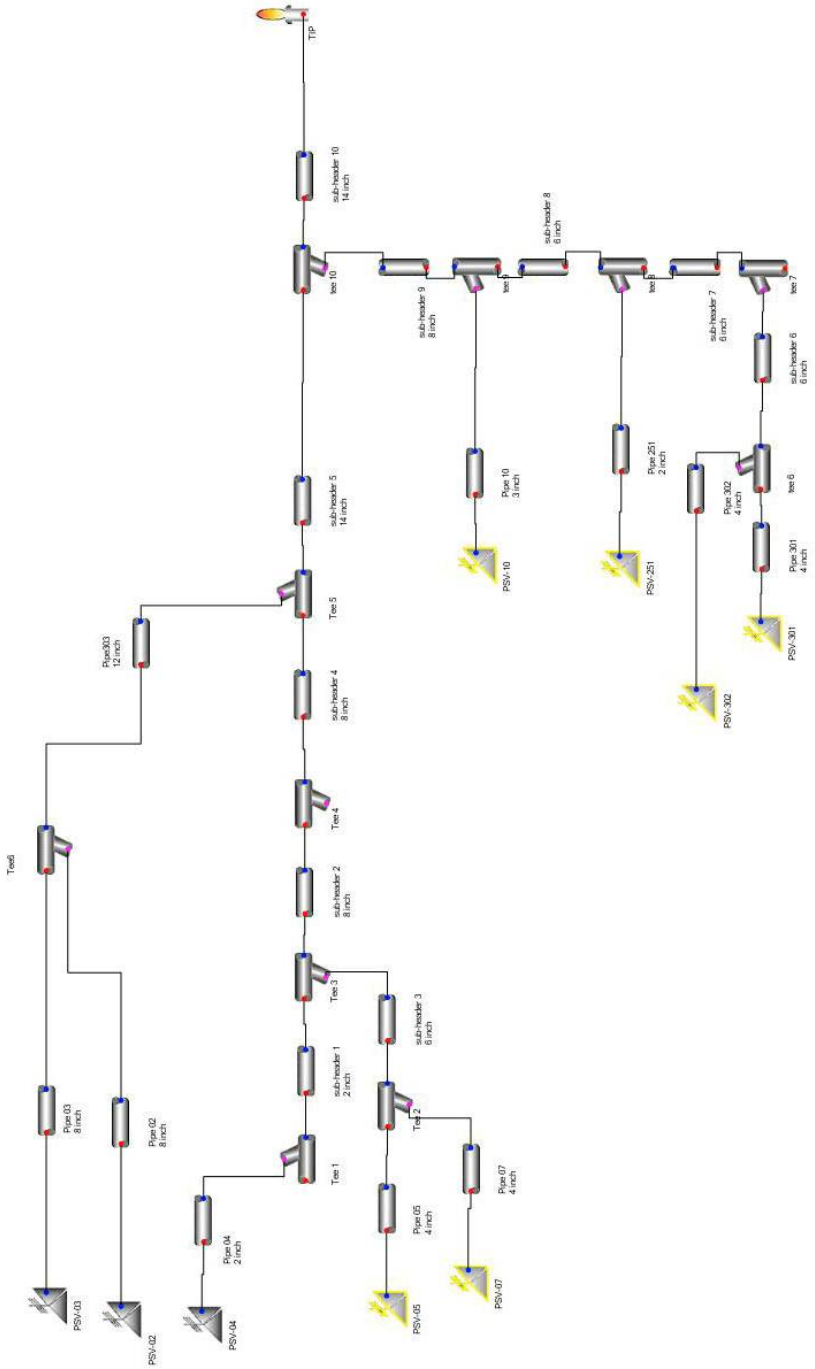
1. Condizioni per breve durata in caso di fuoco in Area Scambiatori.
2. Discontinuo; in caso di blocco forno.
3. Condizioni per breve durata in caso di fuoco in Area Colonne.
4. Condizioni per breve durata in caso di fuoco in Area Lavaggi.
5. Discontinuo; per bonifica collettore.
6. Temperatura minima di design del metallo: -12°C. Verificare l'idoneità della classe tubazione A01.
7. Da verificare/confermare da parte di Alma Petroli durante la fase di ingegneria di dettaglio.
8. Protezione dal congelamento come da standard Alma Petroli.
9. Destinazione Slop serbatoio S69.
10. Materiale in accordo alla normativa NACE MR-0103. Verificare l'idoneità della classe tubazione A01.
11. Per il ramo proveniente dall'area Impianti Lavaggio assumere T op. = 240°C.
12. Da confermare da parte del fornitore della pompa.
13. Classe tubazione servizio aria strumenti come da standard Alma Petroli.
14. Per questo servizio, in deroga alla classe A01, si richiede KCS.
15. Non è richiesto PWHT; si dovranno adottare prcedure operative che prevedano lo spiazzamento e la bonifica dei collettori di blowdown ogni volta che si verificherà lo scarico di soluzioni soda.

HOLD :

7.2 Elenco linee

Si riporta di seguito l' elenco linee num. doc. K027-900-NM-0022-01 (5 fogli)

In aggiunta all'elenco linee si riporta di seguito uno schema semplificato per l'individuazione delle lunghezze equivalenti considerate per il calcolo dei profili di pressione del sistema blowdown. Le lunghezze equivalenti assunte sono mostrate nella tabella che segue. Tali valori dovranno essere verificati sulla base del layout definitivo del sistema di blowdown che sarà sviluppato in fase di ingegneria.



MOD–PRCa – Rev. 5

ELENCO LINEE

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	R. Gavasci	J. Del Gaudio	C. Bonventre / B Binaco

REVISION	LINE NUMBER	NOMINAL SIZE (inch)	PIPE CLASS	RATING	LOCATION		OPERATING CONDITIONS		DESIGN CONDITIONS		MIN. C.A.	PED FLUID PHASE	INSULATION		HEAT TRACE	TEST PRESSURE	PAINTING	TKT P&I SHT No.	CUSTOMER P&I No.	NDE CLASS	PED CLASS		REMARKS
					FROM	TO	Temp	Press.	Temp	Press.			CLASS	THK							GROUP	CAT	
							°C	barg	°C	barg	mm					bar g							
	0101-OG	14 (11)	P-A01	150	0104-MT	KO-DRUM TORCIA	362 (14)	0,43	250	3,5/HV	3	G	V		-			0031-001			1	II	(1)(3)(10)
	0102-MT	2	S-A01	150	0104-MT	IGNITION & CONTROL PANEL	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-001			1	I	
	0103-LS	6	S-A01	150	L.B.	KO-DRUM TORCIA	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-001			2	SEP	(5)
	0104-MT	2	S-A01	150	L.B.	0101-OG	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-001			1	I	
	0105-LS	1 1/2	S-A01	150	0103-LS	0109-OG	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-001			2	SEP	(5)
	0106-LS	2	S-A01	150	0103-LS	0101-OG	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-001			2	SEP	(5)
	0107-LS	2	S-A01	150	0103-LS	0101-OG	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-001			2	SEP	(5)
	0108-LS	1 1/2	S-A01	150	0107-LS	0110-OG	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-001			2	SEP	(5)
	0109-OG	4	P-A01	150	PSV-302	0101-OG	268	0,62	250	3,5/HV	3	G	V		-			0031-001			1	I	(4)(10)
	0110-OG	4	P-A01	150	PSV-301	0101-OG	268	0,63	250	3,5/HV	3	G	V		-			0031-001			1	I	(4)(10)
	0111-OG	2	P-A01	150	PSV-251	0101-OG	147	0,8	250	3,5/HV	3	G	V		-			0031-001			1	I	(4)(10)
	0112-OG	3	P-A01	150	PSV-10	0101-OG	137	0,66	250	3,5/HV	3	G	V		-			0031-001			1	I	(4)(10)
	0113-OG	1 1/2	P-A01	150	B2/B01	0101-OG	40	0,5	250	3,5/HV	3	G	V		-			0031-001			1	I	(2)(10)
	0114-OG	2	P-A01	150	PSV-04	0119-OG	82	0,49	250	3,5/HV	3	G	V		-			0031-001			1	I	(1)(10)
	0115-OG	8	P-A01	150	PSV-03	0120-OG	369	0,53	250	3,5/HV	3	G	V		-			0031-001			1	II	(1)(10)
	0116-OG	4	P-A01	150	PSV-07	0119-OG	105	0,69	250	3,5/HV	3	G	V		-			0031-001			1	I	(3)(10)
	0117-OG	4	P-A01	150	PSV-05	0119-OG	121	0,79	250	3,5/HV	3	G	V		-			0031-001			1	I	(3)(10)
	0118-OG	8	P-A01	150	PSV-02	0120-OG	429	0,66	250	3,5/HV	3	G	V		-			0031-001			1	II	(3)(10)
	0119-OG	6	P-A01	150	HEADER	0101-OG	121	0,79	250	3,5/HV	3	G	V		-			0031-001			1	I	(3)(10)
	0120-OG	12	P-A01	150	HEADER	0101-OG	429	0,66	250	3,5/HV	3	G	V		-			0031-001			1	II	(3)(10)

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REVISION	LINE NUMBER	NOMINAL SIZE (inch)	PIPE CLASS	RATING	LOCATION		OPERATING CONDITIONS		DESIGN CONDITIONS		MIN. C.A.	PED FLUID PHASE	INSULATION		HEAT TRACE	TEST PRESSURE	PAINTING	TKT P&I SHT No.	CUSTOMER P&I No.	NDE CLASS	PED CLASS		REMARKS
					FROM	TO	Temp	Press.	Temp	Press.			CLASS	THK							GROUP	CAT	
							°C	barg	°C	barg	mm					bar g							
	0201-MT	1	S-A01	150	0102-MT	GUARDIA VENTURI	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-002			2	SEP	
	0202-SA	1	S-A01	150	L.B.	IGNITION & CONTROL PANEL	AMB	7(7)	50(7)	10(7)	1,5	G	N		-			0031-002			2	SEP	
	0203-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	10(7)	1,5	G	N		-			0031-002			2	SEP	
	0204-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	10(7)	1,5	G	N		-			0031-002			2	SEP	
	0205-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	10(7)	1,5	G	N		-			0031-002			2	SEP	
	0206-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-002			2	SEP	
	0207-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-002			2	SEP	
	0208-MT	1	S-A01	150	IGNITION & CONTROL PANEL	PILOTA TORCIA	AMB	3	50(7)	7(7)	1,5	G	N		-			0031-002			2	SEP	

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REVISION	LINE NUMBER	NOMINAL SIZE (inch)	PIPE CLASS	RATING	LOCATION		OPERATING CONDITIONS		DESIGN CONDITIONS		MIN. C.A.	PED FLUID PHASE	INSULATION		HEAT TRACE	TEST PRESSURE	PAINTING	TKT P&I SHT No.	CUSTOMER P&I No.	NDE CLASS	PED CLASS		REMARKS
					FROM	TO	Temp	Press.	Temp	Press.			CLASS	THK							GROUP	CAT	
							°C	barg	°C	barg	mm					bar g							
	0301-LS	2	S-A01	150	0103-LS	KO-DRUM TORCIA	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-003			2	SEP	(5)(10)
	0302-LS	10	S-A01	150	L.B.	ATM	170(7)	3,5	200(7)	10/FV(7	1,5	G	I		-			0031-003			2	I	(5)(10)
	0303-IA	HOLD	S-A01	150	L.B.	COLLETTORE	AMB	7	50(7)	10(7)	1,5	G	N		-			0031-003			2	HOLD	
	0304-PW	2	S-A01	150	L.B.	KO-DRUM TORCIA	AMB	5(7)	50(7)	10(7)	3	L	F(8)		F			0031-003			2	SEP	
	0305-SLO	3	P-A01	150	KO-DRUM TORCIA	POMPA	50	0,5	250	3,5/HV	3	G	F(8)		F			0031-003			1	SEP	(9)(10)
	0306-SLO	2	P-A01	150	POMPA	L.B	50	0,5	250	3,5/HV	3	G	F(8)		F			0031-004			1	SEP	(9)(10)
	0307-SLO	3	P-A01	150	KO-DRUM TORCIA	POMPA	50	0,5	250	3,5/HV	3	G	F(8)		F			0031-005			1	SEP	(9)(10)
	0308-SLO	2	P-A01	150	POMPA	0306-SLO	50	0,5	250	3,5/HV	3	G	F(8)		F			0031-006			1	SEP	(9)(10)

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REVISIONE	NOTE
	General notes
	Classe d'isolamento: I: Linea coibentata calda; V: Linea con sola verniciatura esterna; F: Linea coibentata fredda; N: Linea non verniciata e non coibentata
	Categoria PED : I, II, III, SEP (Sound Engineering Practice)
	Note
	1) Condizioni per breve durata in caso di fuoco in Area Scambiatori.
	2) Discontinuo; in caso di blocco forno.
	3) Condizioni per breve durata in caso di fuoco in Area Colonne.
	4) Condizioni per breve durata in caso di fuoco in Area Impianti Lavaggio.
	5) Discontinuo; per bonifica collettore.
	6) Temperatura minima di design del metallo: -12°C. Verificare l'idoneità della classe tubazione A01.
	7) Da verificare/confermare da parte di Alma Petroli durante la fase di ingegneria di dettaglio.
	8) Protezione dal congelamento come da standard dello stabilimento.
	9) Destinazione Slop serbatoio S69.
	10) Materiale in accordo alla normativa NACE MR-0103. Verificare l'idoneità della classe tubazione A01.

Tratto di tubazione	Lunghezza equivalente (m)	Lunghezza fisica (m)
Pipe 02	21.88	10.00
Pipe 04	13.49	10.00
Pipe 03	23.44	10.00
Pipe 05	16.98	10.00
Pipe 07	17.06	10.00
Pipe 10	15.24	10.00
Pipe 251	13.52	10.00
Pipe 301	16.97	10.00
Pipe 302	16.97	10.00
sub-header 1	20.00	20.00
sub-header 2	10.00	10.00
sub-header 3	10.00	10.00
sub-header 4	20.00	20.00
sub-header 5	20.00	20.00
sub-header 6	20.00	20.00
sub-header 7	10.00	10.00
sub-header 8	10.00	10.00
sub-header 9	10.00	10.00
sub-header 10	106.30	86.00

8 SPECIFICA DELLA STRUMENTAZIONE

Sono riportate di seguito le specifiche della strumentazione relativa al sistema torcia, in particolare:

- Data sheet di processo dei misuratori di portata / flange tarate
- Data sheet di processo delle valvole di controllo
- Data sheet di processo dei misuratori di livello
- Data sheet di processo dei misuratori di pressione
- Data sheet di processo dei misuratori di temperatura

I valori riportati in tali specifiche sono da confermare a valle della scelta del fornitore del sistema torcia.

8.1 Data sheet di processo dei misuratori di portata / flange tarate

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-1546-100 (5 fogli)

PROCESS DATA
FOR
FLOW INSTRUMENTS

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

					RO-0103			RO-0104			RO-0105			RO-0106		
	Tag no.															
	Service				VAPORE BASSA P. A 6"-LPF-00101			GAS PURGA A 6"-LPF-00101			VAPORE BASSA P. A 8"-LPF-00101			GAS PURGA A 8"-LPF-00101		
	Line no.				2"-LPS-00107			1"1/2-FG-00104			2"-LPF-00106			1"1/2-FG-00104		
GENERAL	Line size			inches	2			1 1/2			2			1 1/2		
	P&ID no.				0031-001			0031-001			0031-001			0031-001		
	Design pressure			bar (g)	10.0			7.0			10.0			7.0		
	Design temperature			°C	200			50			200			50		
	Fluid name				VAORE BASSA PRESSIONE			GAS NATURALE (1)			VAORE BASSA PRESSIONE			GAS NATURALE (1)		
QUALITY	Fluid phase				VAPORE			GAS			VAPORE			GAS		
OF	Fluid state				GAS			GAS			GAS			GAS		
FLUID	Corrosive	Erosive	Toxic													
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
OPERATING	Upstream pressure @ flow			bar (g)		3.50			3.00			3.50			3.00	
DATA	Temperature @ flow			°C		170			AMB			170			AMB	
	Flow			kg/h		280			30			800			85	
	Density / Specific gravity			kg/m^3		(1)			2.62			(1)			2.62	
	Viscosity			cP		(1)			0.011			(1)			0.011	
	Molecular mass					(1)			16.04			(1)			16.04	
PROPERTIES	Compressibility factor					(1)			0.99			(1)			0.99	
@ FLOW	Cp / Cv					(1)			1.31			(1)			1.31	
	Vapor pressure			bar		-			-			-			-	
	Critical pressure			bar		-			-			-			-	
	Entrained gas / liquid			%		-			-			-			-	
INSTRUMENT	Required range		From													
DATA			To													
	MAX press. drop across flowmeter			bar	3.30			2.80			3.30			2.80		
ALARM	High-high	Alarm	Trip	bar (g)												
AND	High	Alarm														
TRIP	Low	Alarm														
SETTINGS	Low-low	Alarm	Trip													
REMARKS					(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.			(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.		
INTERNAL	No.	By	Date													
REVISION	DESCRIPTION															
EXTERNAL REVISION																

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					RO-0103			RO-0104			RO-0105			RO-0106		
	Tag no.															
	Service				VAPORE BASSA P. A 6"-LPF-00101			GAS PURGA A 6"-LPF-00101			VAPORE BASSA P. A 8"-LPF-00101			GAS PURGA A 8"-LPF-00101		
	Line no.				2"-LPS-00107			1"1/2-FG-00104			2"-LPF-00106			1"1/2-FG-00104		
GENERAL	Line size			inches	2			1 1/2			2			1 1/2		
	P&ID no.				0031-001			0031-001			0031-001			0031-001		
	Design pressure			bar (g)	10.0			7.0			10.0			7.0		
	Design temperature			°C	200			50			200			50		
	Fluid name				VAORE BASSA PRESSIONE			GAS NATURALE (1)			VAORE BASSA PRESSIONE			GAS NATURALE (1)		
QUALITY	Fluid phase				VAPORE			GAS			VAPORE			GAS		
OF	Fluid state				GAS			GAS			GAS			GAS		
FLUID	Corrosive	Erosive	Toxic													
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
OPERATING	Upstream pressure @ flow			bar (g)		3.50			3.00			3.50			3.00	
DATA	Temperature @ flow			°C		170			AMB			170			AMB	
	Flow			kg/h		280			30			800			85	
	Density / Specific gravity			kg/m^3		(1)			2.62			(1)			2.62	
	Viscosity			cP		(1)			0.011			(1)			0.011	
	Molecular mass					(1)			16.04			(1)			16.04	
PROPERTIES	Compressibility factor					(1)			0.99			(1)			0.99	
@ FLOW	Cp / Cv					(1)			1.31			(1)			1.31	
	Vapor pressure			bar		-			-			-			-	
	Critical pressure			bar		-			-			-			-	
	Entrained gas / liquid			%		-			-			-			-	
INSTRUMENT	Required range		From													
DATA			To													
	MAX press. drop across flowmeter			bar	3.30			2.80			3.30			2.80		
ALARM	High-high	Alarm	Trip	bar (g)												
AND	High	Alarm														
TRIP	Low	Alarm														
SETTINGS	Low-low	Alarm	Trip													
REMARKS					(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.			(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.		
INTERNAL	No.	By	Date													
REVISION	DESCRIPTION															
EXTERNAL REVISION																

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						RO-0103			RO-0104			RO-0105			RO-0106		
		Tag no.															
		Service				VAPORE BASSA P. A 6"-LPF-00101			GAS PURGA A 6"-LPF-00101			VAPORE BASSA P. A 8"-LPF-00101			GAS PURGA A 8"-LPF-00101		
		Line no.				2"-LPS-00107			1"1/2-FG-00104			2"-LPF-00106			1"1/2-FG-00104		
	GENERAL	Line size			inches	2			1 1/2			2			1 1/2		
		P&ID no.				0031-001			0031-001			0031-001			0031-001		
		Design pressure			bar (g)	10.0			7.0			10.0			7.0		
		Design temperature			°C	200			50			200			50		
		Fluid name				VAORE BASSA PRESSIONE			GAS NATURALE (1)			VAORE BASSA PRESSIONE			GAS NATURALE (1)		
	QUALITY	Fluid phase				VAPORE			GAS			VAPORE			GAS		
	OF	Fluid state				GAS			GAS			GAS			GAS		
	FLUID	Corrosive	Erosive	Toxic													
						Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
	OPERATING	Upstream pressure @ flow			bar (g)		3.50			3.00			3.50			3.00	
	DATA	Temperature @ flow			°C		170			AMB			170			AMB	
		Flow			kg/h		280			30			800			85	
		Density / Specific gravity			kg/m^3		(1)			2.62			(1)			2.62	
		Viscosity			cP		(1)			0.011			(1)			0.011	
		Molecular mass					(1)			16.04			(1)			16.04	
	PROPERTIES	Compressibility factor					(1)			0.99			(1)			0.99	
	@ FLOW	Cp / Cv					(1)			1.31			(1)			1.31	
		Vapor pressure			bar		-			-			-			-	
		Critical pressure			bar		-			-			-			-	
		Entrained gas / liquid			%		-			-			-			-	
	INSTRUMENT	Required range		From													
	DATA			To													
		MAX press. drop across flowmeter			bar		3.30			2.80			3.30			2.80	
	ALARM	High-high	Alarm	Trip	bar (g)												
	AND	High	Alarm														
	TRIP	Low	Alarm														
	SETTINGS	Low-low	Alarm	Trip													
	REMARKS					(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.			(1) Assumere le proprietà del vapore @ T,P.			(1) Considerato come CH4.		
	INTERNAL	No.	By	Date													
	REVISION	DESCRIPTION															
	EXTERNAL REVISION																

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		Tag no.				FT-0317 (3)			FE-0302 (1)			FI-0319 (3)						
		Service				SCARICO A TORCIA			VAPORE BASSA P. SISTEMA SMOKELESS			GAS DI PURGA A GUARDIA VENTURI						
		Line no.				CAMINO DELLA TORCIA			6"-LPS-00302			1"-FG-00201						
	GENERAL	Line size			inches	14 (1)			6			1 (2)						
		P&ID no.				0031-003			0031-003			0031-003						
		Design pressure			bar (g)	3.5			10.0			7.0						
		Design temperature			°C	250 (2)			200			50						
		Fluid name				GAS SCARICO A TORCIA			VAORE BASSA PRESSIONE			GAS NATURALE (1)						
	QUALITY	Fluid phase				GAS			VAPORE			GAS						
	OF	Fluid state				GAS			GAS			GAS						
	FLUID	Corrosive	Erosive	Toxic														
						Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum				
	OPERATING	Upstream pressure @ flow			bar (g)	0.15		0.50		3.50			3.00					
	DATA	Temperature @ flow			°C	40		311		170			AMB					
		Flow			kg/h	100		40556		(2)			1.5					
		Density / Specific gravity			kg/m^3	1.82		4.06		(2)			2.62					
		Viscosity			cP	0.012		0.014		(2)			0.011					
		Molecular mass				42.41		109.70		(2)			16.04					
	PROPERTIES	Compressibility factor				1.00		0.98		(2)			0.99					
	@ FLOW	Cp / Cv				1.06		1.03		(2)			1.31					
		Vapor pressure			bar	-		-		-			-					
		Critical pressure			bar	-		-		-			-					
		Entrained gas / liquid			%		-			-			-					
	INSTRUMENT	Required range		From														
	DATA			To														
		MAX press. drop across flowmeter			bar		(3)			(3)			0.10					
	ALARM	High-high	Alarm	Trip	bar (g)													
	AND	High	Alarm															
	TRIP	Low	Alarm															
	SETTINGS	Low-low	Alarm	Trip														
	REMARKS					(1) Da confermare dopo la scelta del fornitore della torcia. '(2) 370°C in caso di incendio. '(3) Tipo ad ultrasuoni (SICK-100 o equivalente). Indicazione a DCS.			(1) Installazione futura. Indicazione a DCS. (2) Assumere le proprietà del vapore @ T,P. (3) Da definire dopo la scelta del fornitore della torcia.			(1) Considerato come CH4. (2) Da confermare dopo la scelta del fornitore della torcia. (3) Tipo ad Area Variabile.					
	INTERNAL	No.	By	Date														
	REVISION	DESCRIPTION																
	EXTERNAL REVISION																	

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8.2 Data sheet di processo delle valvole di controllo

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-1541-100 (2 fogli)

PROCESS DATA
FOR
CONTROL VALVES

A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco
Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized

ALMA PETROLI / Tecnimont KT	NUOVO SISTEMA DI TORCIA E BLOWDOWN ALMA PETROLI S.P.A. STABILIMENTO DI RAVENNA	Proj. N. K027 / Unit 900 / Document Code SP 1541 / Serial N. 100 Rev A	

GENERAL	Tag no.				FV-0302 (1)												
	Service				VAPORE BASSA P. A SISTEMA SMOKELESS												
	Line no.				6"-LPS-00302 (2)												
	Line size			inches	6 (2)												
	P&ID no.				0031-003												
	Design pressure			bar (g)	10.0												
	Design temperature			°C	200												
QUALITY OF FLUID	Fluid name				VAORE BASSA PRESSIONE												
	Fluid phase				VAPORE												
	Fluid state				GAS												
	Corrosive	Erosive	Toxic														
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
OPERATING DATA	Upstream pressure @ flow			bar (g)		3.50										
	Temperature @ flow			°C		170										
	Flow			kg/h		(2)										
PROPERTIES @ FLOW	Density			kg/m^3		(3)										
	Viscosity			cP		(3)										
	Molecular mass					(3)										
	Compressibility factor					(3)										
	Cp / Cv (gas only)					(3)										
	Vapour Pressure			bar	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Critical Pressure			bar		-										
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
INSTRUMENT DATA	Pressure drop @ flow			bar		(2)										
	System frict. losses without cv															
	Failure action					CHIUSA										
	Seat leakage					-			-			-				
	Handwheel					NO										
REMARKS	(1) Incluso nello scopo della formitura della torcia. (2) A cura del fornitore della torcia. (3) Assumere le proprietà del vapore @ T,P.															
INTERNAL REVISION	No.	By	Date													
	DESCRIPTION															

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8.3 Data sheet di processo dei misuratori di livello

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-1552-100 (2 fogli)

PROCESS DATA
FOR
LEVEL INSTRUMENTS

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

GENERAL	Tag no.				LG/LT-0311		LG/LT-0318							
	Service				Guardia idraulica		KO Drum							
	Equipment				B-902		B-901							
	P&ID no.				0031-003		0031-003							
	Design pressure			bar (g)	3.5		3.5							
	Design temperature			°C	250		250							
QUALITY OF FLUIDS	Fluid name	Upper			GAS DI TORCIA		GAS DI TORCIA							
		Lower			ACQUA DI PROCESSO		IDROCARBURI / NaOH 30%							
	FLUID SIDE				**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**		
	Fluid phase				GAS	LIQUIDO	GAS	LIQUIDO						
	Corrosive							SI						
	Erosive													
	Toxic							SI						
	Coagulating													
	Solidifying					(3)		(4)						
	Coloured													
	Transparent				X	X	X	X	X	X	X	X		
	Foaming													
	Buil-up tend.													
PROPERTIES @ COND.'S	Density			kg/m^3	0.801	1000.0	0.801	(1)						
	Dielectric Constant													
OPERATING DATA					**Normal**	**Max**	**Normal**	**Max**	**Normal**	**Max**	**Normal**	**Max**		
	Pressure			bar (g)	0.02	0.3	0.02	0.3						
	Temperature			°C	AMB.	360 (1)	AMB.	(2)						
INSTRUMENT DATA	Normal Level			mm	(2)		(3)							
	Reference line				TANGENT LINE FONDO		TANGENT LINE FONDO							
	Measuring range		From	mm	(2)		(3)							
			To	mm	(2)		(3)							
	Visible distance from glass			mm										
ALARM AND TRIP SETTINGS	High-high	Alarm	Trip	mm										
	High	Alarm		mm		(2)		(3)						
	Low	Alarm		mm		(2)		(3)						
	Low-low	Alarm	Trip	mm										
REMARKS					1. Condizione di breve durata in caso d'incendio. 2. Da definire dopo la scelta del fornitore della torcia e del suo dimensionamento . 3. In condizioni invernali.		1. Idrocarburi: 610 kg/m3, NaOH : 1315 kg/m3. 2. Idrocarburi: 99°C, NaOH : 44°C. 3. Da definire dopo la scelta del fornitore della torcia. 4. In condizioni invernali nel caso NaOH 30%.							
INTERNAL REVISION	No.	By	Date											
	DESCRIPTION													
EXTERNAL REVISION														

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8.4 Data sheet di processo dei misuratori di pressione

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-1553-100 (4 fogli)

PROCESS DATA
FOR
PRESSURE INSTRUMENTS

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

					PI-0101			PI-0102			PI-0201			PI-0301		
		Tag no.														
		Service			VAPORE BASSA P. DA L.B.			GAS DI PURGA DA L.B.			ARIA SERVIZI DA L.B. A PILOTI			ACQUA DI PROCESSO DA L.B.		
		Line no. / Equipment			6"-LPS-00103			2"-FG-00104			1"-AU-00202			2"-UW-0034		
	GENERAL	Line size		inches	6			2			1 (1)			2		
		P&ID no.			0031-001			0031-001			0031-002			0031-003		
		Design pressure		bar g	10.0 / FV			7.0			10.0			10.0		
		Design temperature		°C	200			50			50			50		
		Fluid name			VAPORE BASSA P.			GAS NATURALE			ARIA SERVIZI			ACQUA DI PROCESSO		
	QUALITY	Fluid phase			VAPORE			GAS			GAS			LIQUIDO		
	OF	Fluid state			VAPORE			GAS			GAS			LIQUIDO		
	FLUID	Corrosive	Erosive	Toxic												
		Coagulat.	Solidif.	Partic.												
		Buil-up tend.		Pulsation												
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
	OPERATING	Pressure		bar g		3.5			3.0			7.0			8.0	
	DATA	Temperature		°C		170			AMB.			AMB.			AMB.	
		Differential Pressure		bar												
		Density		kg/m^3		(1)			2.62			1.21			(1)	
		Viscosity		cP		(1)			0.011			0.018			(1)	
	PROPERTIES	Molecular mass		kg/kmol		(1)			16.04			28.80			(1)	
		Compressibility factor				(1)			0.99			1.00			(1)	
	INSTRUMENT	Required range	From	bar g	2.0			1.0			3.0			2.0		
	DATA		To	bar g	8.0			6.0			8.0			10.0		
	ALARM	High-high	Alarm	Trip	bar g											
	AND	High	Alarm		bar g											
	TRIP	Low	Alarm		bar g											
	SETTINGS	Low-low	Alarm	Trip	bar g											
	REMARKS					(1) Assumere le proprietà del vapore @ T,P.						1. Da confermare dopo la scelta del fornitore della torcia.			(1) Assumere le proprietà del vapore @ T,P.		
	INTERNAL	No.	By	Date												
	REVISION	DESCRIPTION														
	EXTERNAL REVISION															

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					PI-0307			PT-0309			PI-0310			PI-0324		
GENERAL	Tag no.															
	Service				GAS DI TORCIA			GAS DI TORCIA			SLOP DA P-0901A			SLOP DA P-0901B		
	Line no. / Equipment				B-902			B-901			2"-SLO-00306			2"-SLO-00308		
	Line size			inches	-			-			2			2		
	P&ID no.				0031-003			0031-003			0031-003			0031-003		
	Design pressure			bar g	3.5			3.5			7.1 (1)			7.1 (1)		
	Design temperature			°C	250			250			150			150		
QUALITY OF FLUID	Fluid name				GAS DI TORCIA			GAS DI TORCIA			IDROCARBURI / NaOH 30%			IDROCARBURI / NaOH 30%		
	Fluid phase				GAS			GAS			LIQUIDO			LIQUIDO		
	Fluid state				GAS			GAS			LIQUIDO			LIQUIDO		
	Corrosive	Erosive	Toxic								SI		SI	SI		SI
	Coagulat.	Solidif.	Partic.													
	Buil-up tend.		Pulsation													
OPERATING DATA					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
	Pressure			bar g		0.02	0.30		0.02	0.30		2.28			2.28	
	Temperature			°C		AMB.	360 (1)		AMB.	360 (1)		99			99	
	Differential Pressure			bar												
PROPERTIES	Density			kg/m^3		0.682			0.682			610			610	
	Viscosity			cP		0.011			0.011			0.197			0.197	
	Molecular mass			kg/kmol		16.00			16.00			-			-	
	Compressibility factor					1.00			1.00			-			-	
INSTRUMENT DATA	Required range		From	bar g	0.0			0.0			0.0			0.0		
			To	bar g	5.0			5.0			5.0			5.0		
ALARM AND TRIP SETTINGS	High-high	Alarm	Trip	bar g												
	High	Alarm		bar g												
	Low	Alarm		bar g												
	Low-low	Alarm	Trip	bar g												
REMARKS					1. Condizione di breve durata in caso d'incendio.			1. Condizione di breve durata in caso d'incendio.			1. Da confermare dopo la scelta del fornitore della pompa			1. Da confermare dopo la scelta del fornitore della pompa		
INTERNAL REVISION	No.	By	Date													
	DESCRIPTION															
EXTERNAL REVISION																

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GENERAL	Tag no.				PI-0325													
	Service				ACQUA SERVIZI DA L.B.													
	Line no. / Equipment				2"-UW-0034													
	Line size			inches	2													
	P&ID no.				0031-003													
	Design pressure			bar g	10.0													
	Design temperature			°C	50													
QUALITY OF FLUID	Fluid name				ACQUA DI PROCESSO													
	Fluid phase				LIQUIDO													
	Fluid state				LIQUIDO													
	Corrosive	Erosive	Toxic															
	Coagulat.	Solidif.	Partic.															
	Buil-up tend.		Pulsation															
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
OPERATING DATA	Pressure			bar g		8.0										
	Temperature			°C		AMB.										
	Differential Pressure			bar												
PROPERTIES	Density			kg/m^3		(1)										
	Viscosity			cP		(1)										
	Molecular mass			kg/kmol		(1)										
	Compressibility factor					(1)										
INSTRUMENT DATA	Required range		From	bar g	2.0											
			To	bar g	10.0											
ALARM AND TRIP SETTINGS	High-high	Alarm	Trip	bar g												
	High	Alarm		bar g												
	Low	Alarm		bar g												
	Low-low	Alarm	Trip	bar g												
REMARKS					(1) Assumere le proprietà dell' acqua @ T,P.											
INTERNAL REVISION	No.	By	Date													
	DESCRIPTION															
EXTERNAL REVISION																

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8.5 Data sheet di processo dei misuratori di temperatura

Si riporta di seguito la specifica di processo num. doc. K027-900-SP-1554-100 (2 fogli)

PROCESS DATA
FOR
TEMPERATURE INSTRUMENTS

Revision	Date	Revision Description	Prepared	Verified	Approved/ Authorized
A	Gennaio 2012	Emissione di processo	M. Tranfaglia	C. Bonventre	C. Bonventre / B Binaco

					TI-0306			TI-0308			TI-0323					
GENERAL	Tag no.															
	Service				GAS DI TORCIA			GAS DI TORCIA			FONDO KO DRUM					
	Line no. / Equipment				B-902			B-901			B-901					
	Line size			inches	-			-			-					
	P&ID no.				0031-003			0031-003			0031-003					
	Design pressure			bar g	3.5			3.5			3.5					
	Design temperature			°C	250			250			250					
QUALITY OF FLUID	Fluid name				GAS DI TORCIA			GAS DI TORCIA			IDROCARBURI / NaOH 30%					
	Fluid phase				GAS			GAS			LIQUIDO					
	Fluid state				GAS			GAS			LIQUIDO					
	Corrosive	Erosive	Toxic								SI		SI			
	Oxidizing	Vibrat.	T. Shock													
					Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum	Minimum	Normal	Maximum
OPERATING DATA	Pressure			bar g		0.02	0.30		0.02	0.30		0.30	0.30			
	Temperature			°C		AMB.	360 (1)		AMB.	360 (1)		44 (3)	99 (4)			
	Velocity			m/s		(2)			(2)			(2)	(2)			
	Viscosity			cP		0.011			0.011			5.1 (3)	0.197 (4)			
	Density			kg/m^3		0.682			0.682			1315 (3)	610 (4)			
INSTRUMENT DATA	Required range		From	°C		400			400			400				
			To	°C		0			0			0				
	Accuracy															
ALARM AND TRIP SETTINGS	High-high	Alarm	Trip	°C												
	High	Alarm		°C												
	Low	Alarm		°C												
	Low-low	Alarm	Trip	°C												
REMARKS					1. Condizione di breve durata in caso d'incendio. 2. Da definire dopo la scelta del fornitore della torcia e del suo dimensionamento.			1. Condizione di breve durata in caso d'incendio. 2. Da definire dopo la scelta del fornitore della torcia e del suo dimensionamento.			1. Condizione di breve durata in caso d'incendio. 2. Da definire dopo la scelta del fornitore della torcia e del suo dimensionamento. 3. Caso NaOH 30%. 4. Caso Idrocarburi.					
INTERNAL REVISION	No.	By	Date													
	DESCRIPTION															
EXTERNAL REVISION																

9 CONSUMI SERVIZI

Di seguto si riportano i consumi stimati per garantire il funzionamento del nuovo sistema di blowdown e torcia. Tali valori dovranno essere confermati dopo la selezione del fornitore della torcia.

Servizio	Consumo	Note
Vapore bassa pressione	180 kg/h 3250 kg/h 280/800 kg/h	(1)(11) (2)(11) (3)
Gas naturale	4.5 Nm^3/h 1.0 Nm^3/h 160 Nm^3/h 2.5 Nm^3/h	(4)(11) (5)(11) (6) (7)(11)
Aria strumenti	15 Nm^3/h	
Aria servizi	10 Nm^3/h	(8)(11)
Acqua servizi	11 kg/h	(9)(11)
Energia elettrica	2 kW	(10)

Note:

1. Consumo continuo sistema smokeless (installazione futura)
2. Consumo discontinuo di picco sistema smokeless (installazione futura)
3. Consumo discontinuo di picco per bonifica collettori
4. Consumo continuo per bruciatori pilota
5. Consumo discontinuo per accensione bruciatori pilota (solo durante l'avviamento)
6. Consumo discontinuo per purga collettori
7. Consumo continuo per tenuta guardia venturi
8. Consumo discontinuo per accensione bruciatori pilota (solo durante l'avviamento)
9. Consumo continuo per tenuta guardia idraulica
10. Consumo discontinuo pompa slop (pompa dotata di start/stop automatico)
11. Valori da confermare da parte del fornitore della torcia

10 CONSIDERAZIONI E VERIFICHE DA EFFETTUARE DURANTE L'INGEGNERIA DI DETTAGLIO

Nel presente capitolo si riportano delle cosiderazioni e indicazioni il cui scopo è quello di evidenziare alcune linee guida che dovranno essere tenute in considerazione durante le successive fasi di ingegneria e riorganizzazione delle procedure di sicurezza di stabilimento.

- Tutte le vavole di sicurezza dovranno essere dotate di soffietto di bilanciamento. Le valvole esistenti dovranno essere riverificate e , se necessario, sostituite per garantire il loro funzionamento nelle nuove condizioni di scarico (contropressione come da bilanci di materia riportati nel capitolo 3)
- A seguito dell'installazione del nuovo sistema torcia all'interno dello stabilimento, si dovranno sviluppare nuove procedure per garantire la sicurezza durante le fasi di scarico, in particolare:
    - Definizione delle aree frequentabili da personale solo se adeguatamente vestito
    - Valutazione della necessità di protezione, con pannelli resistenti all'irraggiamento, per apparecchiature e strutture particolarmente sensibili (serbatoi stoccaggio naphtha, strutture civili, baie di carica, passerelle in quota, ecc.)
- Si dovranno prevedere tutte le modifiche strutturali e di protezione tali da garantire l'effettiva segregazione delle aree di fuoco, come descritto nel paragrafo 2.2.4 . Per raggiungere tale obiettivo si dovranno prevedere anche (e non solo) sistemi di spargimento schiuma fissi e controllabili a distanza, tali da impedire l'espansione dell'incendio attraverso i condotti sotteranei (fogne, condotte cavi, ecc.)
- In fase di ingegneria si dovranno controllare le lunghezze equivalenti di ogni singolo tratto di tubazione sulla base del layout finale, e verificare che esse risultino inferiori o uguali alle lunghezze equivalenti assunte durante la fase di processo, come descritto nel paragrafo 7.2 .
- Affinchè gli scarichi delle valvole di sicurezza siano autodrenanti verso il KO Drum della torcia è necessario che le valvole siano collocate ad una quota superiore a quella dei sub-collettori e del collettore di torcia. Poiché attualmente alcune valvole di sicurezza sono montate su apparecchiature poste al di sotto dell'ipotetica quota dei nuovi sub-collettori e del collettore di torcia, sarà necessario ricollocarle in modo da consentire il drenaggio delle linee verso il KO Drum della torcia.
- Per evitare che in caso di malfunzionamento delle valvole di blocco degli sfiati verso i forni e verso la torcia ci sia un ritorno di gas dal collettore di torcia verso il forno, si dovrà prevedere l'installazione di una valvola di ritegno a bassa perdita di carico sulla linea degli sfiati. Si suggerisce, inoltre, di dotare la linea di fuel gas al forno di doppia valvola di blocco con sfiato in torcia manuale.
- Durante la fase di ingegneria, per la numerazione delle linee si dovrà sostituire l'attuale simbologia IS-01XX, con la nuova ID-09XX.

THERMOENGINEERING s.r.l.

ADVANCED COMBUSTION SYSTEMS

Via Monte Suello, 19 - 20133 Milano – ITALY
TEL. +39-02-70.10.92.15 FAX +39-02-70.10.98.27
E-mail : thermoeng@thermoeng.it C.F. P.IVA - VAT - 04768870158

BUDGET COMMERCIAL QUOTATION FOR ELEVATED FLARE SYSTEM

Milan, 21/12/2011

Messrs
TECNIMONT KT

ROMA

REFERENCES :

YOUR : TORCIA PER ALMA PETROLI
OUR : QUOTATION F-5650C rev.2

QUOTATION INDEX

A - COMMERCIAL QUOTATION INDEX

SIGNATURES FOR APPROVAL / *Firme per approvazione*			
FUNCTION *Funzione*	**COMMERCIAL MANAGER** *Responsabile Commerciale*	**TECHNICAL MANAGER** *Responsabile Tecnico*	**QUALITY MANAGER** *Responsabile della Qualita'*
SIGNATURE / *Firma*	**Ugo Levi**	**Arnaldo Thevenet**	**Simone Thevenet**
DATE / *Data*	**21/12/2011**	**21/12/2011**	**21/12/2011**
MOD. 7.1.3 Ed. 1 del 12/03/01			

A - COMMERCIAL QUOTATION

A.1 - Prices :

A.1.1-Price schedule

Pos.	Description	Q.ty	EXW Unit price EURO	EXW Extended price EURO
1	Flare package as per point B.2.1 of the attached technical quotation F-5650T rev.2: - 54 m derrick type flare; -integrated water seal and K.O.D.; - Ultrasonic flow meter	1	463.900,00	463.900,00
			Total EXW price	463.900,00

A.1.2-Optional price

Pos.	Description	Q.ty	Unit price EURO	Extended price EURO
1	Spare part list for two years operation operations as per list SP-5650-2C	1 set	6.703,00	6.703,00

Commercial note :

The prices do not include any additional cost due to stoppage of work, certified strikes, etc…, or any other reason out our control, including Force Majeure.
We shall not be liable for any failure or delay in fulfilling any terms of the contract in case of Force Majeure. Force Majeure includes the event in the following non exclusive list: Embargo, international sanctions and restrictions that may cause the commercial relationships to be impossible, maritime or aviation disasters, earthquake, fire, explosions, floods, and/or other natural physical disasters, civil disturbances, riots, war or armed conflicts, acts of God, strikes or industrial disputes which affect a substantial or essential part of our performance.
All amounts are to be intended net of bank transferring commissions and costs.

A.2- Prices validity :

Our quotation is based on delivery point as per point A.4, packing included.
Duties and value added taxes are not included in our prices.
Our commercial quotation is valid for a period of 60 days from the date printed on the front page.

A.3- Delivery period :

The materials delivery will be 32 weeks from the purchase order date reception.
For the delivery details and program please make reference to the attached FABRICATION PROGRAM.
Note : Final delivery period depends on the date of contract and can be mutually agreed.
Improved schedules might be possible to meet your project needs.

A.4- Delivery point :

Ex works our North Italy Factory as per Incoterms 2010.

A.5- Packing :

Included as per point B.1.6 of the technical quotation.

A.6- Payment terms :

All the payments will be via T/T on our bank account according to the following terms:

a) 10% advanced payment of total P.O. against presentation of advance payment corporate guarantee for the same amount;

b) 10% 1st progress payment of total P.O. for engineering documents (first issue) against:

- Restitution of corporate guarantee as per point a),
- Issuing of 1st progress payment corporate guarantee of 10%;

c) 15% raw materials ready for manufacturing against

- Restitution of 1st progress payment bank guarantee of 10%,
- Issuing of 10% Performance bond bank guarantee validity 24 months from delivery of the goods;
- Declaration on vendor letter head stating raw material are ready for manufacturing at sub-vendors workshops.

d) 60% within thirty (30) days against presentation of shipping documents copy.

e) 5% Final Data books delivery.

A.7- Manufacturer :

Thermoengineering Milan - Italy

A.8- Attachments

- Technical quotation F-5650T rev.2.

We trust that above quotation meets your requirements but should you have any queries please do not hesitate to contact us.

THERMOENGINEERING

Thermoengineering S.r.l.
Via Monte Suello, 19 - Milano - ITALIA

CONTROL QUALITY PROGRAM

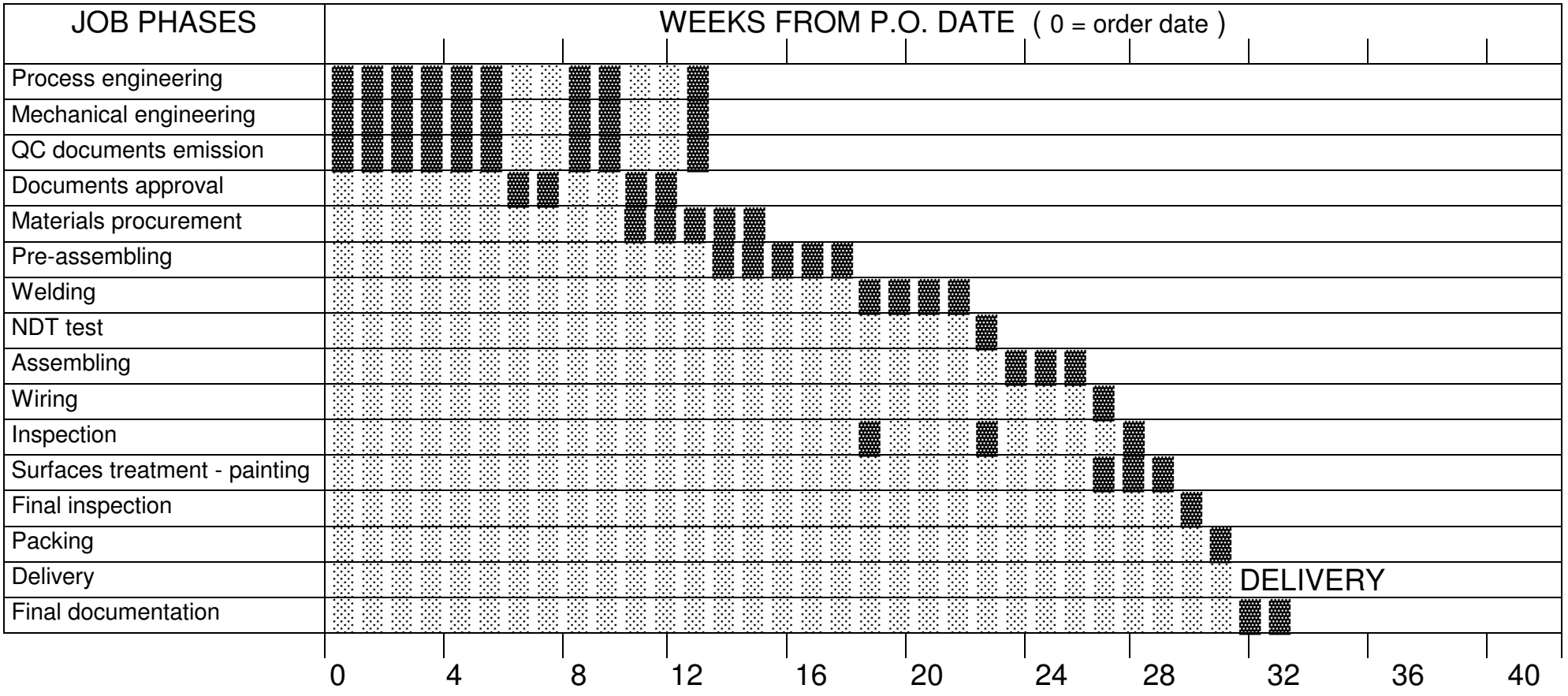
FABRICATION PROGRAM

DOCUMENT No. F-5650-4

CLIENT	TECNIMONT KT
CLIENT REFERENCE	TORCIA PER ALMA PETROLI
SUPPLY DESCRIPTION	ELEVATED FLARE SYSTEM
PLANT LOCATION	RAVENNA
TOTAL DOCUMENT PAGES	2 (including this one)

0	21/12/2011	ISSUED FOR BID	QDEP	AT	
REV	DATE	DESCRIPTION	PREP.D	CHK.D	CLIENT

Thermoengineering S.r.l. Via Monte Suello, 19 - Milan - ITALY	**FABRICATION PROGRAM** **No. F-5650-4**	Sheet 2 di 2 JOB No. F-5650-4
BAR CHART		



THERMOENGINEERING S.r.l.
ADVANCED COMBUSTION SYSTEMS
Via Monte Suello, 19-Milan-ITALY
Fax 0039 02 70109827
E-mail : thermoeng@thermoeng.it

SUGGESTED SPARE PART LIST FOR COMMISSIONING, PRE-COMMISSIONING AND START UP OPERATIONS

Spec. : SP-5650-1C
Page : 1 of 1
Rev. : 2
Date : 21/12/2011

CLIENT : TECNIMONT KT
CLIENT REFERENCE : ALMA PETROLI
QUOTATION No. : F-5650
MAIN SUPPLY DESCRIPTION : ELEVATED FLARE STACK

MATERIALS AND PRICES

Item	Description	Reference drawing	Pos. no.	Parts no.	Material	Q.ty	Unit price EURO	Extended EURO
1	High energy igniters			HEI/9A	Stainless steel	1	260,00	260,00
2	Sight port			SG-1	Brass/Glass	1	225,00	225,00
3	Panel lamp			PL-04	-	4	8,00	32,00
4	Panel relay			R1	-	2	57,00	114,00
5								
6								
7								
							Total price	631,00

COMMERCIAL QUOTATION 516 EURO is the minimum invoice amount for the spare parts only

Materials delivery site	Ex works our Crema (CR) factory - (Milan area)	Extra price for export packing	EURO	
Delivery time	28 weeks	Extra price for delivery to required site	EURO	
Packing	Box included	Extra price for delivery to Your field	EURO	
Prices validity	60 days from the date printed on the front page of the CQ.	Extra price for export documents	EURO	
Transport type				
Port of embarkation				
		GRAND TOTAL	EURO	

PACKAGE DIMENSIONS AND WEIGHTS

Net weight (Kg)	5	Dimensions (cm)	30 x 30 x 20
Gross weight (Kg)	8	Cubic measurement (m3)	

THERMOENGINEERING - (N. Herrera)

THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**SUGGESTED SPARE PART LIST FOR 2 YEARS OPERATION**	Spec. : SP-5650-2C Page : 1 of 1 Rev. : 2 Date : 12/12/2011

CLIENT : TECNIMONT KT	CLIENT REFERENCE : ALMA PETROLI
QUOTATION No. : F-5650	MAIN SUPPLY DESCRIPTION : ELEVATED FLARE STACK

MATERIALS AND PRICES

Item	Description	Reference drawing	Pos. no.	Parts no.	Material	Q.ty	Unit price EURO	Extended price EURO
1	High energy ignitor			HEI/9A	Stainless steel	1	260	260
2	Sight port			SG-1	Brass/Glass	1	225	225
3	Thermocouple			TC-K-35	Inconel 600	2	295	590
4	Temperature switch			TSH-01	-	2	510	1020
5	Panel lamp			PL-04	-	20	8	160
6	Panel relay			R1	-	3	57	171
7	High energy supply unit			HEC-02	-	1	1752	1752
8	Complete flare pilot (Thermocouple excluded)			SFP-8	AISI-321/310	1	2525	2525
9								
							Total price	6703

COMMERCIAL QUOTATION 516 EURO is the minimum invoice amount for the spare parts only

Materials delivery site	Ex works our Crema (CR) factory - (Milan area)	Extra price for export packing	EURO	To be defined
Delivery time	28 weeks	Extra price for delivery to required site	EURO	To be defined
Packing	Box included	Extra price for delivery to Your field	EURO	To be defined
Prices validity	60 days from the date printed on the front page of the CQ.	Extra price for export documents	EURO	To be defined
Transport type				
Port of embarkation				
		GRAND TOTAL	EURO	

PACKAGE DIMENSIONS AND WEIGHTS

Net weight (Kg)	55	Dimensions (cm)	320 x 60 x 40
Gross weight (Kg)	80	Cubic mesurement m3)	

THERMOENGINEERING - (N. Herrera)

THERMOENGINEERING s.r.l.

ADVANCED COMBUSTION SYSTEMS

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TECHNICAL QUOTATION FOR ELEVATED FLARE SYSTEM

Milan, 21/12/2011

Messrs
TECNIMONT KT

ROMA

REFERENCES :

YOUR : TORCIA PER ALMA PETROLI
OUR : QUOTATION F-5650T rev.2

QUOTATION INDEX

SIGNATURES FOR APPROVAL / *Firme per approvazione*			
FUNCTION *Funzione*	**COMMERCIAL MANAGER** *Responsabile Commerciale*	**TECHNICAL MANAGER** *Responsabile Tecnico*	**QUALITY MANAGER** *Responsabile della Qualita'*
SIGNATURE / *Firma*	**Ugo Levi**	**Arnaldo Thevenet**	**Simone Thevenet**
DATE / *Data*	**21/12/2011**	**21/12/2011**	**21/12/2011**

B.2 - Scope of supply

B.2.1 Elevated Flare Derrick Type item Emergency Blow-down Flare

B.3 - Attachments

A - SECTION I - GENERAL INFORMATION'S ABOUT OUR COMPANY

A.1 - Company address.

Thermoengineering Legal and Commercial address :

Street	:	20133 Via Monte Suello, 19
City	:	Milano
State	:	Italia

A.2 - Company data.

THERMOENGINEERING S.r.l.

A.3 - Phone numbers.

Phone	:	0039 - (0)2 - 70109215 a.r.
Fax	:	0039 - (0)2 - 70109827

A.4 - Contact persons.

About commercial quotations information's	:	Mr.	U. Levi
About technical quotations information's	:	Mr.	A. Thevenet
Information's about jobs in execution	:	Mr.	V. Thevenet
Information's about spare parts supply	:	Mr.	N. Herrera

A.5 - General information's about Thermoengineering Company.

Thermoengineering is an engineering and construction company founded in 1979 and it is located in Milan (Italy), working in the combustion field mainly in petrochemical, chemical and refining plants.

The partners of the firm are A. Thevenet as General Manager and V. Thevenet as Construction General Manager.

Thermoengineering has its own know how in engineering, design and supply of the following main equipment's :
- Elevated Flares with steam or air assist for smokeless operation.
- Ground Flares Combustor or Finger type
- Elevated Flare explosion proof type (with CESI certificate)
- Venting Systems

- Venting System explosion proof type (with CESI certificate)
- Knock Out drums
- Water Seals
- Inert Gas Generators
- Thermal oxidiser for gas and liquid streams
- Fuel and utilities supply line systems
- Oil pumping and heating units
- Coal gasification units
- Flame arrestors (with CESI certificate)
- Snuffing systems for Flame Arrestors and Vents

For a better idea about our capabilities on flaring and thermal oxidiser systems design please make reference to the present quotation.

In the design of our equipment's special attentions are made on pollution levels and energy conservation problems.

Thermoengineering offers a complete range of computerised programs for the design of new flare systems or for the checking of existing units in order to obtain the highest possible efficiency on your flaring systems.

Our company can supply you with combustion field engineers to assist you during erection, start-up and operation of our equipment's.

B - SECTION II - TECHNICAL QUOTATION

B.1 - Information's about the quotation

B.1.1 - General.

Guarantee

- We guarantee that all materials and manufacturing of quoted equipment shall conform with the relevant standard, codes, specifications, approved drawing, other supplied descriptions and that all materials will be new, fit and adequate for the purpose for which they are intended, free from bad workmanship and defects.
- We will replace any equipment's or parts that shall, in normal use and service, fail to perform adequately on the specified service due to faulty workmanship, or defective materials.
- The guarantee will be 24 months after shipment or 12 months after start-up.
- Our guarantee includes :
  - . Flare capacity at design flow
  - . Flame stability at any flows (up to design flow)
  - . Pilots flame stability
  - . Heat radiation intensity at flare ground level
  - . Utility consumption's
  - . Flare system pressure drop
  - . Smokeless capacity (for smokeless flare)

Special tools

- No special tools are required for the quoted equipment's.

Technical data

- For the flare technical data please see the attached specifications.

Electrical equipment's

- All electrical equipment's will be explosion proof type with certificates in accordance with CENELEC rules.

Codes & standard

- The main followed code & standard are :

- Flare stack design	:	API
- Radiation at ground	:	API - RP 521
- Flare features	:	API 537
- Piping design	:	ANSI
- Flanges and forging		ASTM
- Vessel	:	ASME
- Materials	:	ASTM or Equivalent
- Welding		ASME / AWS
- Electrical equipment's	:	CENELEC IEC Eex(d) type
- Structural calculation		UBC / AISC

B.1.2 - Declaration.

- Our quotation is in exact accordance with the specifications, drawings, terms and conditions and other requirements of the inquiry, with no exceptions and/or deviations other than those clearly listed in a separate paragraph titled "Exceptions and Deviations ". The present offer excludes whatever is not clearly mentioned in the technical offer under scope of supply paragraph.

B.1.3 - Exceptions and deviations.

- No major deviations from your received technical specifications are foreseen, if not expressly noted, at this stage, Thermoengineering reserves the right to discuss any minor deviation arising during detailed engineering phase.

B.1.4 - Exclusions.

- Our supply excludes:
  - . Civil engineering
  - . Foundations
  - . Field assembling
  - . Transports from delivery point to field (if required see extra price on commercial quotation).
  - . Interconnecting piping and cables between flare stack and control panel
  - . Instrument for combined K.O.D. and Water Seal
  - . Discharging pumps for K.O.D. liquid.

B.1.5 - Prefabrication.

Flare Tip with Pilots	completely prefabricated and ready for field assembling
Seal	completely prefabricated and assembled into flare tip
Ignition and control panel	completely prefabricated, cabled and tested, ready for field assembling
Gas riser (stack)	in prefabricated trunks with ladders, platforms and piping supports already welded and with the end(s) bevelled for field welding.
Derrick	completely prefabricated and ready for field bolted assembling
Service piping	in commercial length and quantity suitable for field fabrication and assembling
Ladders and platforms	completely prefabricated and ready for field assembling
Integrated KOD and Water Seal	ready for field assembling
Mass flow meter & ancillaries	ready for field assembling

B.1.6 - Packing.

Flare Tip with Pilots	into wooden crate with plastic protection
Seal	into flare tip
Ignition and control panel	into wooden crate with plastic protection
Gas riser (stack)	in bundles with steel/wooden saddles, steel supports and lifting hooks
Derrick	in bundles with steel supports, saddles and lifting hooks
Service piping	in bundles with steel supports and lifting hooks
Ladders and platforms	in bundles with steel supports and lifting hooks
Integrated KOD and Water Seal	in bundles with steel/wooden saddles, connections protection
Mass flow meter & ancillaries	into box

B.1.7 - Supply list.

Items		Supply	Erection
1	Documentation's as per our Control Quality Manual	yes	-
2	Process engineering and calculation	yes	-
3	Mechanical design	yes	-
4	Mechanical report	yes	-
5	System P & I	yes	-
6	Equipment's specifications	yes	-
7	General lay-out drawings	yes	-
8	General drawings for specialist items	yes	-
9	Construction drawings for non specialist items	yes	-
10	Electrical drawings for the complete system	yes	-
11	Instruments specifications	yes	-
12	Field assembling drawings with remarks	yes	-
13	Materials certificates	yes	-
14	WPS	yes	-
15	Welders qualifications	yes	-
16	Mechanical book	yes	-
17	Instruction manuals	yes	-
18	Flare tip name plate	yes	-
19	Ignition and control panel name plate	yes	-
20	Earth lugs	yes	-
21	Flare tip	yes	no
22	Pilot/s	yes	no
23	Pilots thermocouples	yes	no
24	Seal	yes	no
25	Ignition panel (manual device)	yes	no
26	Pilot/s control panel	yes	no
27	Gas riser (stack)	yes	no
28	Platforms and ladders supports	yes	no
29	Complete derrick	yes	no
30	Service piping and piping supports	yes	no
31	Platforms	yes	no
32	Vertical ladders	yes	no
33	Thermocouples compensate cables	yes	no
34	Conduit with accessories and supports	yes	no
35	Anchor bolts	no	no
36	Combined KOD and WS	yes	no
37	Mass flow meter & accessories	yes	no
38			
39			
40			

B.1.8 - Supply notes.

1. Maximum acceptable nozzle loads will be derived from API 560 / API 537 standards.

2. All flanges within battery limit will be according to API 537.

3. In order to save space, we suggest a combined K.O.D. and Water Seal drum to be integrated directly to the flare stack and a derrick structure. For more details please make reference to the attached “General arrangement” for a similar project.

4. The “U stamp” certification for K.O.D. and Water Seal drum is not included in the base scope of supply.

5. Instrument and discharging pumps for K.O.D. is not included in the scope of supply.

6. As per Client e-mail dated 20th October, the flare height has been increased in order to respect the radiation limit of 4.7 kW/m2 even at a vertical elevation of 15 m.

7. As per Client e-mail dated 20th October, the gas flow-meter considered for flare gas metering has been changed to an ultrasonic type one.

8. We confirm that a minimum hold-up volume of 1.5 m3 has been considered for K.O.D. design.

9. According to Client e-mail dated 2nd November 2011 we submit three different height options, as follows:

   - Option 1 with a Flare height = 60 m: this solution respects only the radiation limit of 4730 W/m2 at an horizontal distance of 15 meters and an elevation from ground level of 15 m;
   - Option 2 with a Flare height = 87 m: this solution also respects only the radiation limit of 1580 W/m2 at an horizontal distance of 95 meters from flare stack base;
   - Option 3 with a Flare height = 100 m: this solution respects the radiation limit of 1580 W/m2 at an horizontal distance of 80 meters from flare stack base.

10. According to Client e-mail dated 25th November 2011 the technical and commercial offer have been revised, as follows:

    a) The maximum derrick base side could be not higher than 10 m if the maximum flare height is 54-60 m. This value will be obviously checked during detail engineering;

    b) In order to reduce the flare height and granting a maximum radiation level of 4.7 kW/m2 at an horizontal distance of 15 m from flare stack centre and at an elevation of 15 m (K.O.D. platform) and a maximum radiation of 1.58 kW/m2 at a distance of 85 m, we have reduced the solar radiation contribute to 0.500 Kw/m2. The resulting flare height is 54 m;

c) The radiation calculation method is according API 521 and DEP. SHELL standards;

d) The new flare height takes into account the radiation limits as per above point b);

e) Considering a steam utility with a pressure of 3.5 barg and 165°C, we can guarantee a 30% of the total discharged flow rate (Fire Case) for smokeless operation with a maximum consumption of 2762 kg/hr for internal injectors and 487 kg/hr for external one.

B.2 - Scope of supply

B.2.1 Elevated Flare Derrick Type item Emergency Blowdown Flare

In order to burn the flows as per attached specification we quote the following equipment :

- n. 1 54 mts. derrick type elevated flare completed by the following equipment:

  - n. 1 Flare Tip equipped with pilots each one complete with K type thermocouples for the pilot flame detection. For the tip description see the attached Spec. F-5650-3
  - n. 1 Seal as per attached Spec. F-5650-4.
  - n. 1 Flame Front Generator Control Panel as per attached Spec. F-5650-5.
  - n. 1 Flare stack system including :
    - n. 1 Flange for tip connection
    - n. 1 Gas inlet connection at stack base
    - n. 1 Set of service piping complete with :
      - gas line/s to continuous pilot
      - ignition pilot line/s
      - steam smokeless line
      - conduit for thermocouples cables
      - compensate cables for thermocouples

      Note:
      The service piping will be delivered at elevation + 1.5 mts.
      The service piping will be complete with supports, supports connection and required expansion loops if required.
    - n. 1 Drain connection
    - n. 1 Base plate with anchor boxes for the stack connection with the foundation.
  - n. 1 360° top platform complete with hot galvanised grating.
  - n. 1 Set of 90° intermediate platform complete with hot galvanised grating.
  - n. 1 Set of vertical ladders from grade up to top platform.

  - n. 1 Derrick type structures with the following characteristics:

- section type	: triangular
- column	: from pipes or profiles
- intermediate beams	: from profiles
- braces	: from profiles

    - n. 4 Base plate with anchor boxes for the derrick connection with the foundation.

    Notes :
    - The structure will be complete prefabricated at shop to assure an easy assembling on field and no welds will be required during the assembling.
    - All the structure connections will be bolted type.
    - All structure members will be hard stamped with erection marks.
    - The structure will be designed in accordance with AISC rules.

- n. 1 Knock-Out Drum and Water Seal as per attached Spec. F-5650-7.

- n. 1 Ultrasonic flow meter for flared gas measurement operation as per attached Spec. F-5650-8.

For the radiations at ground level, equipment design data, physical data, construction data, utilities consumption, dimensions and weights please make reference to the attached specifications.

B.3 - Attachments

Option 1

- Spec. F-5650-1 Technical specification for radiations at ground level
- Spec. F-5650-1.1 Technical specification for radiations at 15 m vertical elevation
- Spec. F-5650-2 Technical specification for derrick type elevated flare
- Spec. F-5650-3 Technical specification for SSFTC flare tip
- Spec. F-5650-4 Technical specification for SVS seal
- Spec. F-5650-5 Technical specification for FFGCP ignition and control panel
- Spec. F-5650-6 Technical specification for combined K.O.D. + W.S
- Spec. F-5650-8 Technical specification for combined ultrasonic flow-meter
- Spec. F-5650-9 Technical specification for sound pressure at ground
- Spec. F-5650-11 Technical specification for AWL system

- Fabrication program

We trust that above quotation meets your requirements but should you have any queries please do not hesitate to contact us.

THERMOENGINEERING

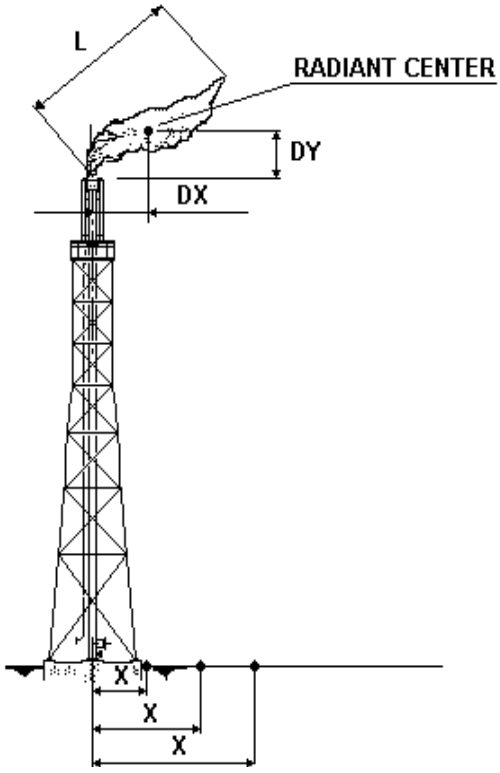
THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR RADIATION AT GROUND FOR 54 m ELEVATED FLARE**	Spec. : F-5650-1 Page : 1 of 1 Rev. : 2 Date : 02/12/2011

ITEM : Emergency Blowdown Flare

DESIGN DATA			FLAME GEOMETRY AS PER API 521		
Release condition		Case1	L = Flame length at max. flow	(m)	45.21
Max. gas flow	(kg/h)	40556	DX = Distance from radiant point		
Flare height	(m)	54	axis to tip axis	(m)	15.49
Low Heating Value	(kcal/kg)	11000	DY = Distance from radiant point		
=	(Btu/lb)	19800	axis to tip top	(m)	14.06
Emissivity factor		.3			
Relative humidity	(%)	25			
Wind velocity for radiation	(m/s)	10			
Sun radiation (note 1)	(W/m2)	**500 (note 3)**			
=	(Btu/ft2h)	158.5			

RADIATION AT GROUND LEVEL AS PER API 521 LAST EDITION					
- Max. radiation	(W/m2)	4162	Distance from flare basis	(m)	15.49
=	(Btu/ft2h)	1319			

Distance from	Radiation		
flare (x) m	Kcal/m2h	Btu/ft2h	W/m2
0	3321	1225	3865
5	3453	1274	4020
10	3541	1307	4122
15	**3575**	**1319**	**4161**
20	3552	1311	4135
25	3474	1282	4044
30	3350	1236	3899
35	3190	1177	3713
40	3006	1109	3500
45	2812	1038	3273
50	2616	965	3045
55	2425	895	2823
60	2245	829	2614
65	2078	767	2419
70	1926	711	2242
75	1788	660	2081
80	1663	614	1936
85	1552	573	1807
90	1453	536	1691
95	1364	503	1587
100	1284	474	1495



GENERAL NOTES	
1	If the declared sun radiation is equal to 0, the above radiation do not includes the sun radiation, vice versa if the sun radiation is declared the above radiation includes the sun contribute.
2	The bolded value represents the max. radiation level at an height of 15 m from ground level and a distance of 15 from flare center.
3	The calculated flare height has been determinated considerind a reduction of solar radiation contribute as per Client Request on e-mail dated 25th November 2011.

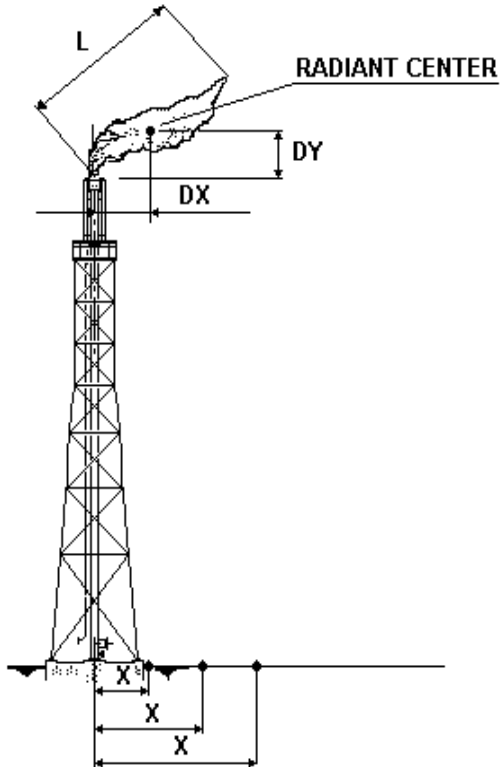
THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR RADIATION AT GROUND FOR 54 m ELEVATED FLARE**	Spec. : F-5650-1.1 Page : 1 of 1 Rev. : 2 Date : 02/11/2011

ITEM : Emergency Blowdown Flare

DESIGN DATA			FLAME GEOMETRY AS PER API 521		
Release condition		Case1	L = Flame length at max. flow	(m)	45.21
Max. gas flow	(kg/h)	40556	DX = Distance from radiant point		
Flare height	(m)	54	axis to tip axis	(m)	15.49
Low Heating Value	(kcal/kg)	11000	DY = Distance from radiant point		
=	(Btu/lb)	19800	axis to tip top	(m)	14.06
Emissivity factor		.3			
Relative humidity	(%)	25			
Wind velocity for radiation	(m/s)	10			
Sun radiation (note 1)	(W/m2)	500			
=	(Btu/ft2h)	158.5			

RADIATION AT GROUND LEVEL AS PER API 521 LAST EDITION					
- Max. radiation	(W/m2)	2691	Distance from flare basis	(m)	15.49
=	(Btu/ft2h)	853			

Distance from	Radiation		
flare (x) m	Kcal/m2h	Btu/ft2h	W/m2
0	2216	818	2580
5	2267	836	2639
10	2299	848	2676
15	2312	853	2691
20	2303	850	2681
25	2275	839	2648
30	2228	822	2593
35	2165	799	2520
40	2089	771	2432
45	2005	740	2334
50	1916	707	2231
55	1825	673	2124
60	1733	640	2018
65	1644	607	1914
70	1559	575	1814
75	1478	545	1720
80	1401	517	1631
85	**1331**	**491**	**1549**
90	1265	467	1472
95	1204	444	1402
100	1149	424	1337



GENERAL NOTES	
1	If the declared sun radiation is equal to 0, the above radiation do not includes the sun radiation, vice versa if the sun radiation is declared the above radiation includes the sun contribute.
2	The bolded value represents the max. radiation level at a distance of 85 from flare center that is lower than 1.580 kW/m2.
3	The calculated flare height has been determinated considerind a reduction of solar radiation contribute as per Client Request on e-mail dated 25th November 2011.

THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR MEDIUM-LOW INTENSITY AIR CRAFT WARNING LIGHT SYSTEM FOR 54 m ELEVATED FLARE**	Spec. : F-5650-11 Page : 1 of 2 Rev. : 2 Date : 21/12/2011

ITEM : Emergency Blowdown Flare

EQUIPMENT DESCRIPTION

The Aviation Warning Lights system medium-low intensity type is complete with:

Top level lights including:
- Flashing lamps medium intensity 2000 cd, optical assembly with clear Fresnel lens at symmetrical distribution and internal filter red coloured and explosion proof type.
- Junction box with two inlets, one for conduit connection and one with plug. All the steel parts will be weatherproofed with suitable protective paint.

Intermediate and lower levels will include :
- Double focus lights low intensity, optical assembly with clear Fresnel lens at symmetrical distribution and internal filter red coloured and explosion proof type with low intensity lamp 50 cd with clear bulb with reinforced filament (traffic type lights).
- Junction box with two inlets, one for conduit connection and one with plug. All the steel parts will be weatherproofed with suitable protective paint.

- Light control panel complete of all necessary equipment for the following operation :
  - automatic lights on in the evening
  - automatic lights off in the morning
  - flashing for the medium intensity lights
  - automatic lamps inversion in case of first burned lamp.

- Set of conduit for lamps connection with the control panel. The conduit will be complete with explosion proof derivation boxes for the connection of all the lamps. The conduit will be delivered prefabricated with junction box at 1,5 mts. from ground level.

- Set of electrical wires for lamps connections with the control panel. The wires will be delivered in length for connection with junction box.

All the electrical equipment's will be mounted in explosion proof enclosure certified EEx(d) II B T3 and waterproof protection IP 55. Each electrical equipment's will be supplied complete with CENELEC certificates. The panel will be delivered completely assembled, cabled and tested ready to be installed and connected.

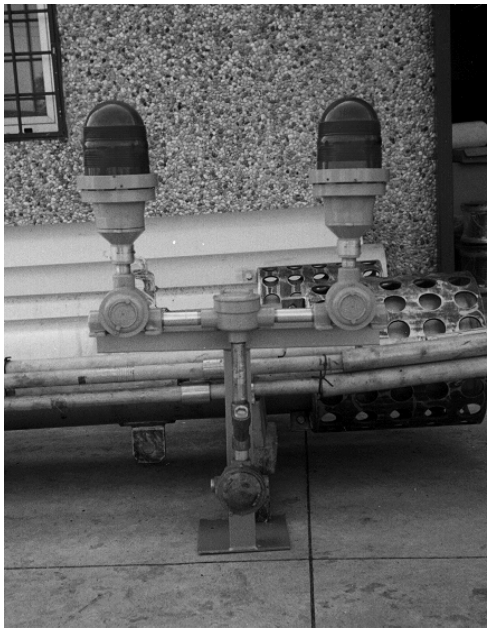
SYSTEM DATA	
- Lights level number	2
- Flashing lights medium intensity at top level	
- Double focus lights per intermediate and lower levels	2
- Lights control panel number	1
- Automatic lights inversion for each lights out of service	Yes

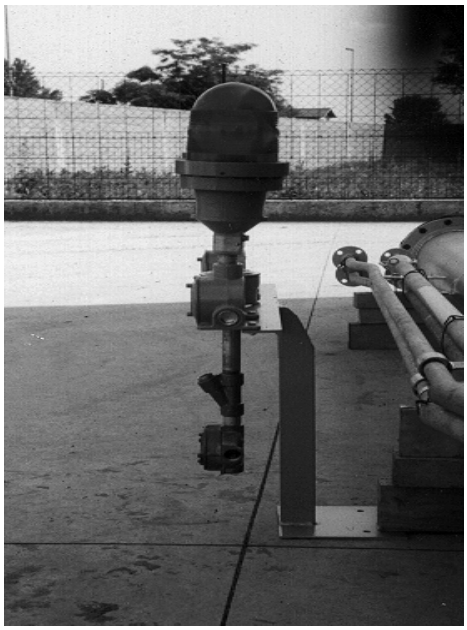
CONSTRUCTION DATA

Pos.	Description	Nr.	Conn. rating	Material	Notes
1	Flashing medium lights		UNI 6125	-	
2	Double focus lights	4	UNI 6125	-	
3	Lights shield protection	3	Bolted	AISI-304	
4	Conduit and accessories	1	UNI 6125	Galvanised C.S.	2" dia conduit
5	Electrical wires	Set	-	-	194.4 mt.
6	Control panel	1	UNI 6125	-	

REQUIRED UTILITIES		
- Control panel electrical supply voltage	(V)	110 or 220
- Frequency	(Hz)	50 or 60
- Electrical power max.	(W)	2370

LIGHTS TYPE





GENERAL NOTES
1 - The system is as per ICAO rules.
2 -
3 -
4 -

THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR 54 m DERRICK TYPE ELEVATED FLARE**	Spec. : F-5650-2 Page : 1 of 2 Rev. : 2 Date : 02/12/2011

ITEM : Emergency Blowdown Flare

DESIGN DATA				
Release case		Case1		
Max. gas flow	(kg/h)	40556		
Gas temperature	(°C)	311		
Average gas molecular weight	(kg/kmole)	109.71		
Cp/Cv ratio		1.03		

FLARE PHYSICAL DATA				
Exit gas velocity at max. flow	(m/s)	89.60		
Mach number at max. flow		0.42		
Flare total pres. drop at max. flow	(mmH2O)	2925		

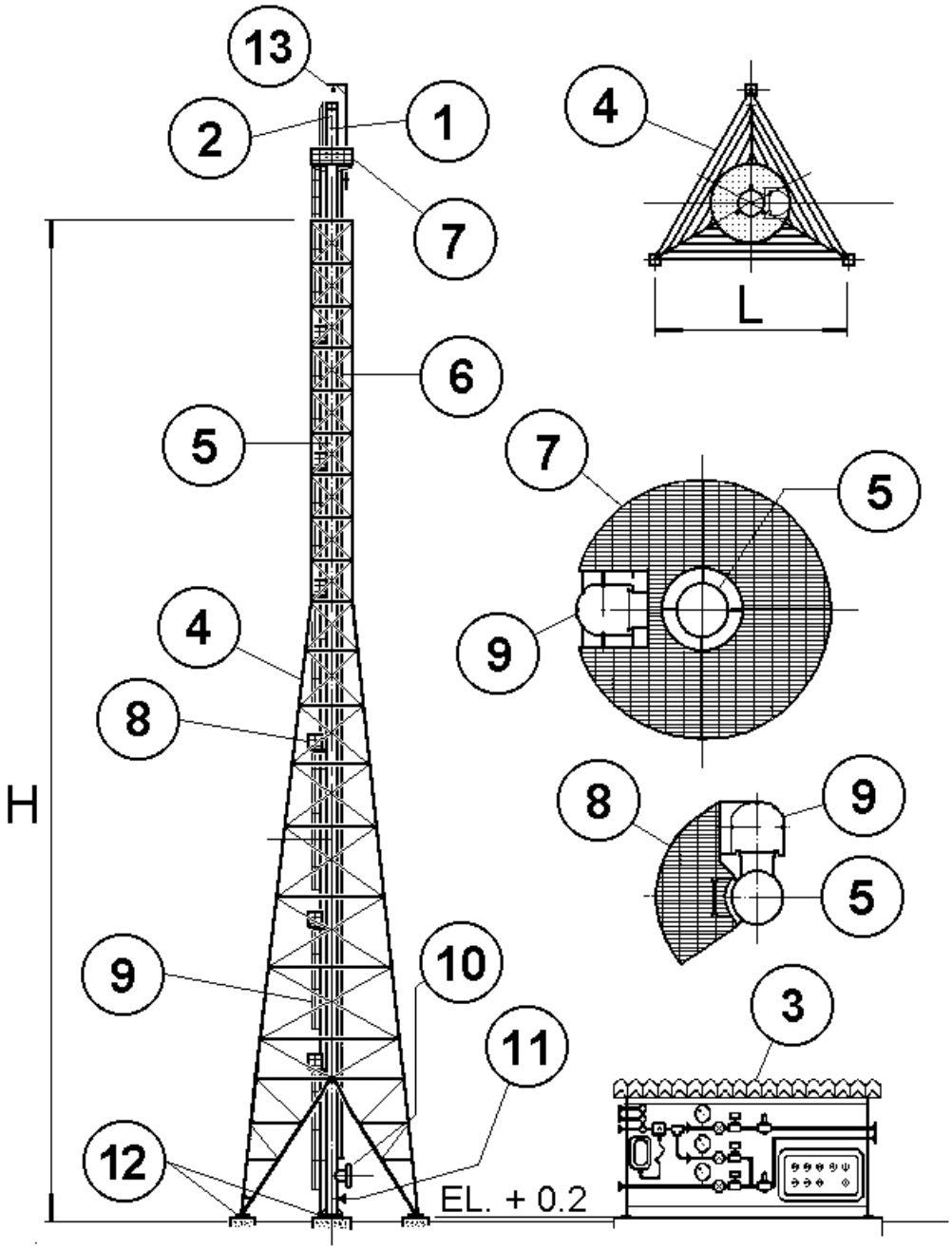
CONSTRUCTION DATA

Pos	Description	No.	Diameter "	Conn. rating	Material	Notes
1	Tip type SSFTC	1	12	150# RF	AISI-310 S	See attached specific.
2	Seal type SVS	1	12	into tip	AISI-316L	See attached specific.
3	Ignition/control panel	1	-	150# RF	AISI-316 / C.S.	See attached specific.
4	Derrick structure	1	-	-	A-36 or equival.	Triangular section
5	Flare riser	1		150# RF	A-105	For flanged connections
	- upper section	1	12	-	A-105	
6	Service piping - Pilot/s					
	- Continuous pilot gas	3	3/4	150# RF	A-105/106	
	- Ignition pilot line	3	1	150# RF	A-105/106	
	- Conduit for cables	1	1 1/2	Threated	Galvanised C.S.	With EEx-d junction boxes
	- Drain for Seal	2	inter. holes	-	A-105/106	
	- Ext.smokeless steam	1		300# RF	A-105/106	With loops if req.
	- Inter.smok.s steam	1		300# RF	A-105/106	With loops if req.
7	Top and 360° platform	1	-	-	A-36 or equival.	With hot galv. grating
8	Rest platform/s	6	-	-	A-36 or equival.	With hot galv. grating
9	Vertical ladder/s	7	-	-	A-36 or equival.	
10	Gas inlet connection	1	12	150# RF	A-105/106	
11	Drain connection	1	2	150# RF	A-105/106	
12	Base plate/anchor box	1	-	-	A-36 or equival.	Anchor bolts excluded
13	Retractable davit	1	-	-	Carbon steel	
14						

REQUIRED UTILITIES				
- Pilot gas consumption	(Nm3/h)	1.5		
- Pilots total consumption	(Nm3/h)	4.5		
- Pilot gas pressure min/max.	(barg)	0.5 / 1.5		
- Purge gas or min. gas flow	(Nm3/h)	2.27		

DIMENSIONS AND WEIGHTS				
- Total flare height	(m)	54		
- Flare total weight	(kg)	37537		
- Delivered number of trunks		5		
- Trunks max. length	(cm)	1200		
- Structure base side	(m)	L = 5.5/6	**(Note 7)**	

FLARE GENERAL ARRANGEMENT



GENERAL NOTES	
1	The above pilot gas consumption flow is of CH4 or equivalent kcal.
2	For the purge gas consumption see the Seal Specification.
3	Carbon steel external surface treatment:
	- Sandblasting at grade 2.5 SA + Inorganic zinc primer for 75 microns thk. + Final painting. The white and red painting for structure marking in case of AWL system is not included in the scope of supply.
4	The flare will be delivered at max. prefabrication level in trunks.
5	The structure will be bolted type and will be delivered in packed bundles.
6	We designed our system considering an integrated K.O.D. and W.S. to be integrated to the flare stack.
7	To be confirmed in order to reduce the impact on the disposable space in the plant. Max. 10 m.

THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR 12" - SSFTC STEAM SMOKELESS FLARE TIP**	Spec. : F-5650-3 Page : 1 of 2 Rev. : 2 Date : 21/12/2011

ITEM : Emergency Blowdown Flare

Equipment description

The flare tip type SSFTC (Steam Smokeless Flare Tip with Centre steam jet) is a smokeless burner complete with ignition and continuous pilots equipped with K type thermocouple/s for flame detection.

The tip will be supplied complete with the following main items :

- Burner shell complete with flanged connection for raiser or seal, pilots and steam system support plates.
- Flame retention ring that allow a very good flame stability also with exit gas speed up to one Mach.
- Continuous pilots self inspirating air type capable to remain lighted also with every atmosphere conditions.
- Ignition pilots suitable to operate with flame front type generator panel or, if required, with electrical ignition. No maintenance action is required on the pilots during the normal operation period.
- External steam injection system complete with header and manifold with steam jets. The injected steam produce a high gas/air mixture, a flame temperature reduction with consequent smokeless combustion at low steam consumption. The steam header connection will be flanged type.
- Internal steam injection system complete with internal steam jet and external flanged connection. The internal steam function is to increase the gas turbulence, to maintain a low temperature at the centre of the flame. At low gas flow will be possible to use the internal steam jet to avoid the presence of the flame into the flare tip. The above operation can be automatic using a thermocouple located on the tip.
- The tip will be delivered completely assembled with all components and ready to be installed.
- No maintenance is required during the normal operations.

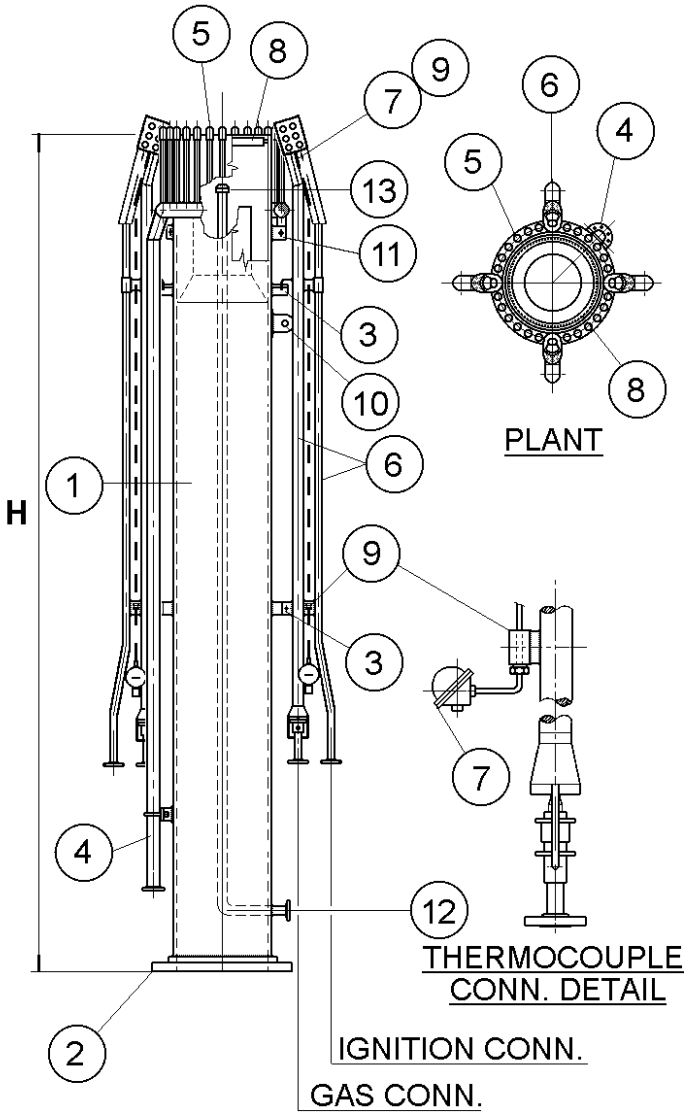
DESIGN DATA				
Release case		Case1		
Max. gas flow	(kg/h)	40556		
Gas temperature	(°C)	311		
Average gas molecular weight	(kg/kmole)	109.71		
Cp/Cv ratio		1.03		
FLARE PHYSICAL DATA				
Exit gas velocity at max. flow	(m/s)	89.60909		
Mach number at max. flow		.4197839		
Flare tip pres. drop at max. flow	(mmH2O)	1033.669		
Smokeless percentage on max. gas flow	(%)	30		

CONSTRUCTION DATA

Pos.	Description	No.	Diameter "	Conn. rating	Material	Notes
1	Tip shell	1	12	-	AISI-310 S	
2	Connection flange	1	12	150# RF	A-105	
3	Pilot/s support/s	6	-	-	AISI-310 S	
4	External steam system	1	3	300# RF	AISI-321	
5	External steam jets	15	1	Welded	AISI-310	
6	Pilot/s	3	-	-	-	
	- ignition pipe	3	1	150# RF	AISI-321/A-105	
	- continuous gas pipe	1	11/2 – ¾	150# RF	AISI-321/A-105.	
7	Thermocouple/s	1	6.35 mm	½"-NPT-F	INCONEL 600	L = pilot length
8	Flame retention ring	1	12	-	AISI-310	
9	Thermocouples guide	6	-	-	INCOLOY 800 H	
10	Lifting hooks	2	-	-	AISI-310 S	With reinforcing pad
11	Steam manifold supports	3	-	-	AISI-310 S	
12	Internal steam system	1	2	300# RF	AISI-321	
13	Internal steam ejector	1	2	welded	AISI-310	
14	Thermocouple	1	6.35 mm	½"-NPT-F	INCONEL 600	

REQUIRED UTILITIES				
- Pilot gas consumption	(Nm3/h)	1.5		
- Pilots total consumption	(Nm3/h)	4.5		
- Pilot gas pressure min/max.	(barg)	0.5 / 1.5		
- Purge gas or min. gas flow	(Nm3/h)	2.27		
DIMENSIONS AND WEIGHTS				
- Tip net weight	(kg)	410		
- Dimension for transport	(cm)	330x 100x 90H		
- Gross weight for transport	(kg)	480		
- Flare tip height	(m)	H = 3		

EQUIPMENT GENERAL SCHEME TYPICAL FOR 4 PILOTS



SMOKELESS STEAM DATA				
- Steam pressure	(Barg)	3.5		
- Steam temperature (see note 4)	(°C)	165		
- Max. external sys. steam flow	(kg/h)	2762.92		
- Min. external sys. steam flow	(kg/h)	97.5		
- Max. internal sys. steam flow	(kg/h)	487.5742		
- Min. internal sys. steam flow	(kg/h)	82.875		

GENERAL NOTES
1 - The above pilot gas consumption flow is of CH4 or equivalent kcal.
2 - For the purge gas consumption see the Seal Specification.
3 - Standard packing: Steel/wooden saddles + Steel strap with lifting hooks + Flange and top protection.
4 - As smokeless steam we suggest to use a little superheated steam.
5 - It is necessary to maintain purged the external and internal steam system with the minimum steam quantity during any flare operation in order to avoid damages of the tip and steam ejectors.
6 -
7 -

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Via Monte Suello, 19-Milan-ITALY
Fax 0039 02 70109827
E-mail : thermoeng@thermoeng.it

TECHNICAL SPECIFICATION FOR 12 " - SVS SPIRAL VENTURI SEAL

ITEM : Emergency Blowdown Flare

Equipment description

The Seal type SVS (Spiral Venturi Seal) is a system capable to avoid the air inlet into the flare riser using the minimum possible purge gas quantity as indicated on this specification.
The indicated flow is the minimum quantity necessary to maintain the oxygen concentration below the seal **less than 6%.** Into the seal are located strategically four sagomated plates that produce a vorticosity at the exit gas.
The vorticosity flow produce an excellent air/gas mixture immediately at the top of the tip. The final result of this effect is an improvement of combustion efficiency and a steam or air smokeless consumption reduction in the smokeless flares.
It is intuitive that the phenomena increases with the increasing of the exit gas velocity and consequently the combustion efficiency does not change at any flow.

The main components are :

- Internal reduction cone. The size reduction is calculated in function of the available gas pressure.
- Internal shell to keep the required restriction and to obtain the venturi effect.
- Shaped plates to produce the necessary vorticosity to exit gas. It is important note that the above plates do not create any size restriction.

The specified quantity does not consider the purge gas volume change due to ambient temperature variations.
The seal is self draining type and no external drain line is required. Normally the seal is directly installed into the flare tip. No internal seal parts are in movement and no block is possible.
No maintenance is required during the normal operations.

DESIGN DATA				
Release case		Case1		
Max. gas flow	(kg/h)	40556		
Gas temperature	(°C)	311		
Average gas molecular weight	(kg/kmole)	109.71		
Cp/Cv ratio		1.03		

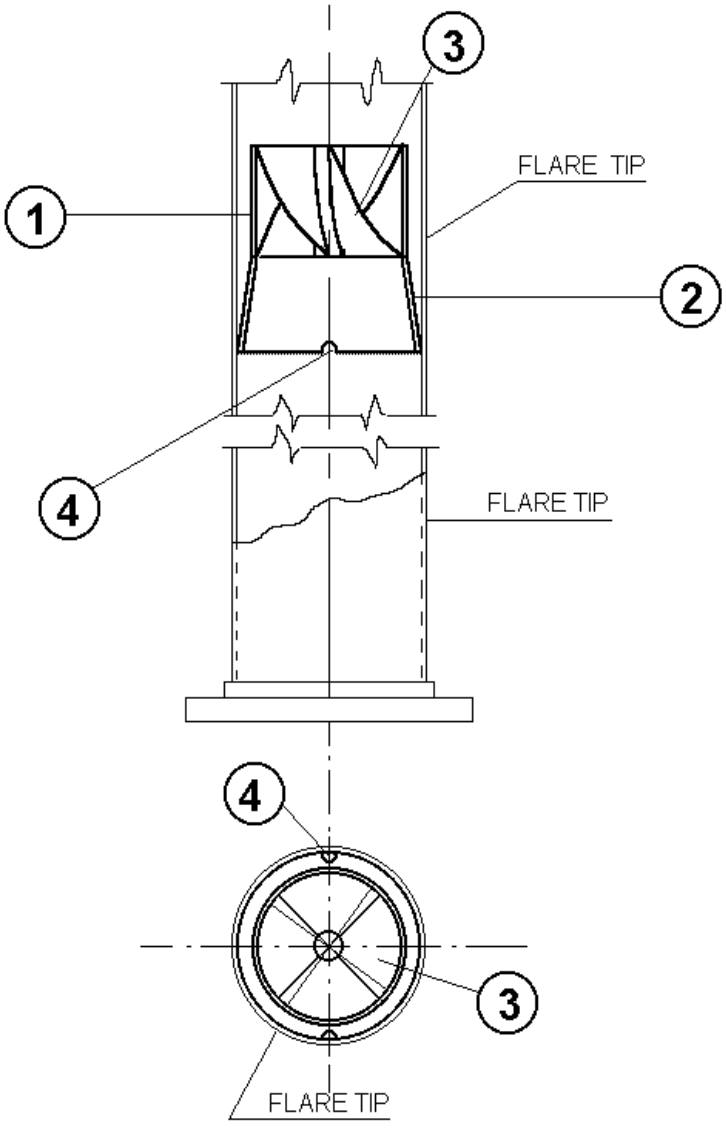
FLARE PHYSICAL DATA				
Seal pressure drop at max. flow	(mmH2O)	714		

CONSTRUCTION DATA						
Pos	Description	No.	Diameter "	Conn. rating	Material	Notes
1	Seal diameter	1	12	-	AISI-316L	
2	Reduction cone	1	-	-	AISI-316L	
3	Internal sectors	4	-	-	AISI-316L	
4	Drain	2	-	-		Internal
5						
6						
7						
8						

REQUIRED UTILITIES				
- Purge gas or min. gas flow	(Nm3/h)	2.27		

DIMENSIONS AND WEIGHTS				
- Seal net weight	(kg)	30		

EQUIPMENT SCHEME



GENERAL NOTES	
1	The seal is assembled into the flare tip.
2	The indicated purge quantity is of inert or combustible gas in order of preference.
3	
4	
5	
6	

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Fax 0039 02 70109827
E-mail : thermoeng@thermoeng.it

TECHNICAL SPECIFICATION FOR FFGCP- 3 P IGNITION AND CONTROL PANEL

ITEM : Emergency Blowdown Flare

EQUIPMENT DESCRIPTION

The FFGCP (Flame Front Generator Control Panel) is an equipment suitable for the ignition and the control of the pilot/s installed on the flare tip.
The ignition and control panel will be located at ground level at a distance from the flare base up to a maximum distance of 800 mt.
The pilot ignition will be activate from panel with the following manually operation :
- Select the pilot to ignite by means of the three way valves - Open the gas and air valves - Push the ignition button.

The panel will be suitable for the ignition of one pilot per time (T.E. does not suggest the ignition of all pilots together but can supply if required).
The pilots will be checked by K type thermocouples installed on the pilots that will check the pilots tip metal temperature and not the flame temperature to avoid the thermocouples destruction.
The electrical ignition of the gas/air flow will be obtained using an high energy system that allows to have a very strong spark (from capacitor) also in water presence (the working voltage of the ignitor is 2000 V).
The control panel will be equipped with the following indications :
- one yellow lamp for power ON
- one green lamp for each pilot for flame ON
- one red lamp for each pilot for flame OFF

The controls panel will be equipped with the following controls :
- one switch for power ON
- one push button for manual ignition
- one push button for lamps test

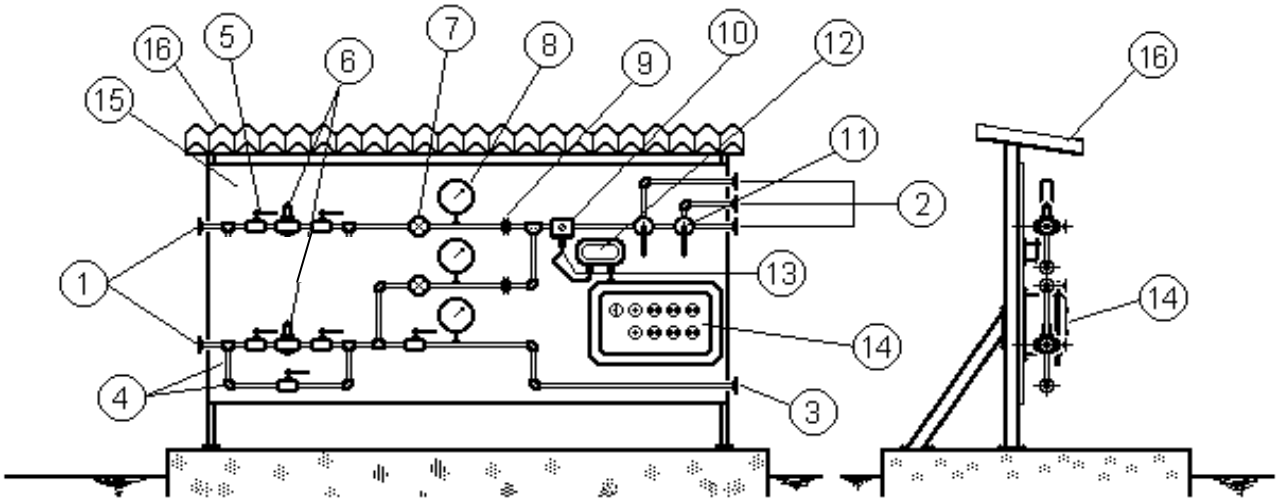
From the control panel it will be possible to bring out all the above signals for remote alarms indication by means of free tension contacts.
All the electrical equipment's will be mounted in explosion proof enclosure certified EEx(d) II B T3 and waterproof protection IP 55. Each electrical equipment's will be supplied complete with CENELEC certificates.
The panel will be delivered completely assembled, cabled and tested ready to be installed and connected.

IGNITION PANEL DESIGN DATA			CONTROL PANEL CHARACTERISTICS		
- Ignition gas type (see note 1)		CH_4	- Controlled pilots	No.	3
- Ignition gas temperature	(°C)	Ambient	- General switch	No.	1
- Ignition gas pressure	(Barg)	From .5 to 7	- Ignition button	No.	1
- Ignition air temperature	(°C)	Ambient	- Red lamp/s for pilot/s off	No.	3
- Ignition air pressure	(Barg)	From .5 to 7	- Green lamp/s for pilot/s on	No.	3
- Number of pilots to ignite		3	- Lamps test button	No.	1

CONSTRUCTION DATA

Pos.	Description	Nr.	Diameter "	Conn. rating	Material	Notes
1	Gas/Air inlet connections	2	1	150# RF.	AISI-316	
2	Ignition lines connections	3	1	150# RF.	AISI-316	
3	Continuous pilots connections	3	3/4	150# RF.	AISI-316	
4	Piping and fittings	1	-	-	AISI-316	
5	Block valves	7	1	NPT	AISI-316	
6	Gas/Air press.control valves	2	To define	NPT	C.S. / AISI	
7	Manual regulating valves	2	1/2	NPT	AISI-316	
8	Pressure indicator	3	1/2	NPT	AISI	
9	Calibrate orifice	2	1	Into flanges	AISI-316	
10	Ignition chamber	1	1	NPT	AISI-316	
11	Three way valves	2	1	Socked weld	AISI-316	
12	HE ignition system	1	-	-	-	Box Eexd in Silumin
13	HE ignition electrode	1	-	-	-	With flexible pipe
14	Control panel	1	-	-	-	Box Eexd in Silumun
15	Front plate	1	-	-	AISI-316	
16	Support structure + roof	1	-	-	A-36 / FE-360	

EQUIPMENT SCHEME TYPICAL FOR NO. 3 PILOTS



REQUIRED UTILITIES		
- Ignition gas consumption	(Nm3/h)	1
- Ignition air	(Nm3/h)	10
- Electrical voltage	(V)	110 or 220
- Frequency	(Hz)	50 or 60
- Electrical power max.	(W)	350
DIMENSIONS AND WEIGHTS		
- Dimensions	(cm)	210 x 140H x 50
- Transport dimensions	(cm)	230 x 160 x 70H
- Net weight	(kg)	260
- Gross weight	(kg)	351

GENERAL NOTES	
1	Or other combustible gas with a consumption equivalent to the indicated CH_4 kcal.
2	The indicated utilities are required only during the ignition period.
3	Carbon steel external surface treatment:
	- Hot Dip Galvanized
4	The FFGCP panel is considered as MANUFACTURER STANDARD.

THERMOENGINEERING Via Monte Suello, 19 Milan - ITALY Fax 0039 (0)2 70109827	TECHNICAL SPECIFICATION FOR COMBINED K.O.D. AND W.S.	Spec. : F-5650-6 Rev. : 2 Page : 1 of 3 Date : 21/12/2011

ITEM : Emergency Blowdown Flare

Equipment description

The combined KOD and WS Vertical Type is an equipment suitable to separate the solid and liquid particles from gas stream and it is capable to avoid the flame return into the gas header in case of no purge gas presence in the flare system.
The drum should be located immediately at the bottom of the stack because the first required operation is to separate the particles from the gas.
The vessel will be calculated for the design internal pressure and temperature.
The drum will be complete with skirt and baseplates to connect the system with foundation by means of foundation bolts (foundation and foundation anchor bolts are not in our scope of supply).
The inlet gas connections will be flanged type.
The outlet gas pipes will be complete with internal pipe system to increase the separation efficiency.
With the KOD proposed dimensions, all the particles > 400 microns will be separated from the gas and will be collected into the KOD bottom.

The Water Seal will be located directly at the top of the KOD and will be itself part of the combined system. The vessel will be calculated for the design internal pressure and temperature and verified as part of riser at the mechanical stability.
The top of the seal (gas exit connection) will be constitute of a reduction cone bevelled, at top, for the field welding with gas riser.
The gas inlet pipe incoming from the KOD will be complete with gas inversion system to preserve the water and will be complete with reducer pulsation system from stainless steel perforated plate.
The reducer pulsation's system is important for the flare tip time life and for the smokeless operation (in the smokeless flares).

The combined system will be delivered completely assembled and ready for field installation.
The system will be delivered at max. prefabrication level following the max. admitted transport dimensions.

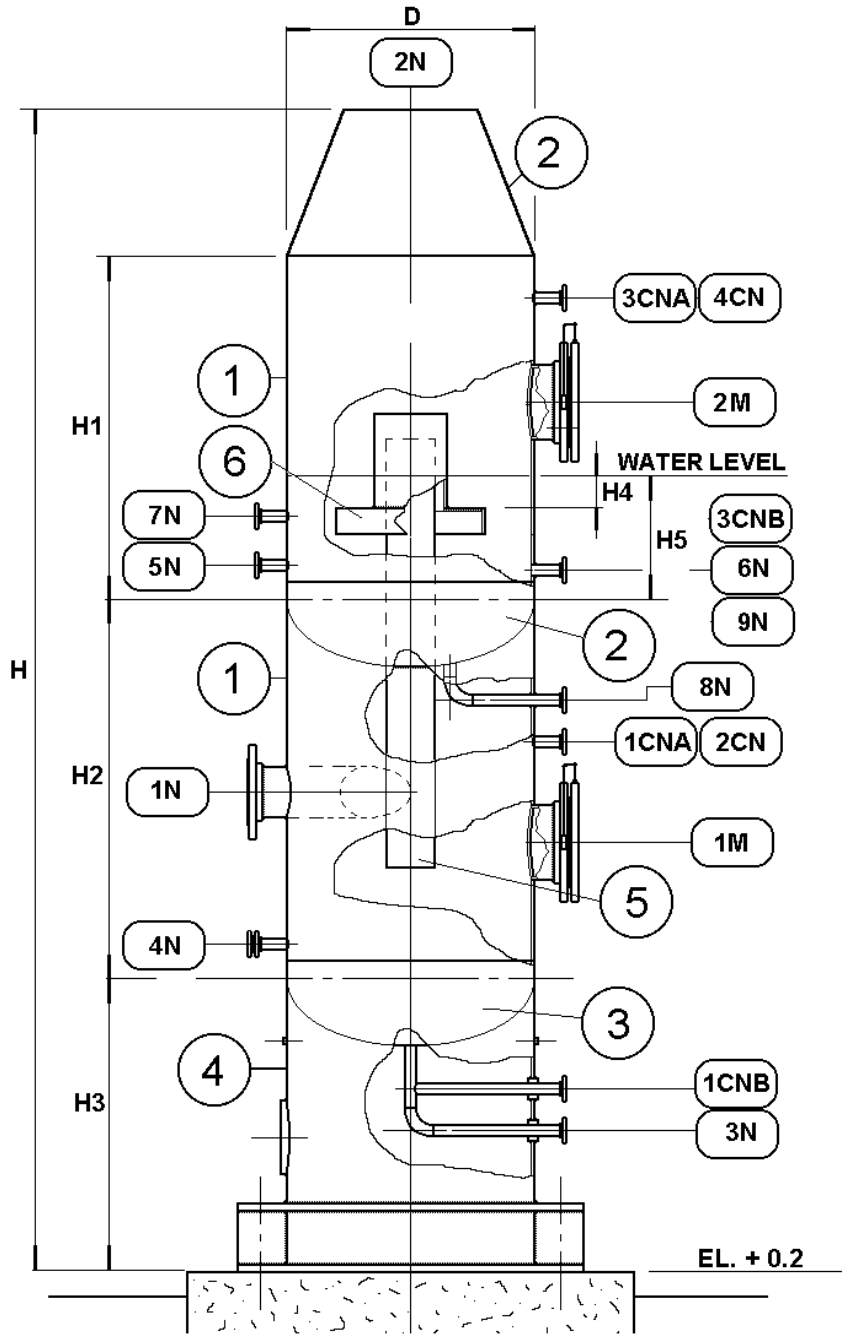
DESIGN DATA		
- Max. gas flow	(Kg/h)	40556
- Operating temperature	(°C)	362
- Design temperature	(°C)	400
- Operating pressure	(mmH2O)	ATM
- Design pressure	(Barg)	3.5
- Average gas molecular weight	(Kg/Kmoli)	134.33
- System pressure drop at max. flow	(mmH2O)	645 (K.O.D) +172 (W.S.)
- Water consumption at maximum flow	(Kg/s)	0.003
- Corrosion allowance	(mm)	3
- Liquid type for seal		Water
- External insulation (see note 1)		Yes / No
- Design code		ASME VIII
- Test by		Client

CONSTRUCTION DATA (See scheme at page 3 of 3)				
Pos.	Description	No.	Material	Notes
1	Shell	1	A-516 Gr.60 or equiv.	
2	Upper reduction cone	1	A-516 Gr.60 or equiv.	
3	2 : 1 elliptical head	2	A-516 Gr.60 or equiv.	
4	Seal skirt	1	A-285 or equiv.	
5	Internal gas pipe	1	A-106 or equiv.	
6	Pulsation's reducer	1	AISI-304	
7				
8				
9				
10				

DIMENSIONS AND WEIGHTS		
D = shell diameter	(mm)	1539
H = total KOD+WS height	(mm)	8769
H1 = WS height	(mm)	3975
H2 = KOD height	(mm)	4794
H3 = skirt height	(mm)	1085
H4 = water height from gas exit	(mm)	300
1		
Total seal weight	(Kg)	4565

NOZZLES						
Item	Size "	Type	Rating	Facing	Service	Note
1N	12	S.O.	150	RF	Gas inlet	
2N	12	S.O.	150	RF	Gas outlet	Bevelled for welding with stack
3N	2	W.N.	150	RF	Drain	
4N	2	W.N.	150	RF	Spare	
5N	2	W.N.	150	RF	Water inlet	
6N	2	W.N.	150	RF	Water outlet	
7N	2	W.N.	150	RF	Steam inlet	With sparger pipe in AISI-304
8N	2	W.N.	150	RF	Drain	
9N	2	W.N.	150	RF	Spare	
1CNA	2	W.N.	150	RF	LG - LT	
1CNB	2	W.N.	150	RF	LG - LT	
2CN	1	W.N.	150	RF	PI - TI	
3CNA	2	W.N.	150	RF	LG - LT	
3CNB	2	W.N.	150	RF	LG - LT	
4CN	1	W.N.	150	RF	PI - TI	
1M	24	S.O.	150	RF	Manhole	
2M	24	S.O.	150	RF	Manhole	

COMBINED K.O.D. AND W.S. SCHEME



GENERAL NOTES
1 - The external insulation will be applied on field during the erection operation and is **out of our scope of supply.**
2 - Carbon steel external treatment : - Sandblasting at grade SA-2.5 + Inorganic zinc primer for 75 microns thk. + Final painting.
3 - The seal will be delivered at max. prefabrication level following the max. admitted transport dimensions.
4 - The vessel instruments are out of our scope of supply.
5 -
6 -

2.1 Field computer

Complete Flow computer mounted in an Ex-d/e enclosure.
The computer is delivered from stock.
The only project adjustments are the input of relevant process parameters.
The computer will be tested and ready for shipment within three (3) weeks after acceptance of PO

Input	Velocity	Ultrasonic signals from transducers.
	Temperature	4-20 mA or HART interface Support for dual or double TT through HART interface
	Pressure:*)	4-20 mA or HART interface Support for double PT through HART interface
Output - Standard		
	3 ea. **)	Analogue 4-20 mA output channels RS 422/ RS 485 DCS serial interface
	1 ea.	Modbus ASCII or RTU
	1 ea.	RS 485 Operator & Service Console serial
	interface	Modbus RTU
Output - Optional		
	3 ea.**)	Analogue 4-20 mA output channels
	1 ea.	HART output (If in use, only 5 ea 4-20 mA output channels available)
	1 ea.	Pulse output Totalized Volume or Mass, scalable
General		
	Mains supply	24 VDC / (110 - 240 VAC 50/60 Hz optional)
	Power consumption	12 W
	Power cable	Standard twisted pair: RFOU (i) 2 x 2 x 0.75 mm2
	Cable glands:	Italsmea as standard, or. acc. to project spec.
	Terminals:	Phoenix
	Safety class:	Ex de [ia] II C T6

*) *Pressure input must be BarA*

**) *The analogue 4-20 mA outputs can be individually set to one of the following:*

- *Standard Volume Flow*
- *Actual Volume Flow*
- *Molecular Weight*
- *Mass Flow*
- *Density (Standard conditions)*
- *Density (Actual conditions)*
- *Temperature*
- *Pressure*
- *Alarm Low*
- *Alarm High (failsafe)*

2.2 Ultrasonic Transducers*), Ball Valves and Transducer holders

Ultrasonic Transducers

Our Ultrasonic transducers are non-instructive for all pipe diameters. This is an advantage based on the fact that intrusive sensors are more exposed to deposits and particles in the flow. In addition, high flow velocity may cause vibration of the sensors. Such vibration can over a period of time, lead to a reduced performance of the sensors.

Our non-instructive transducers have built in retraction mechanism which makes it possible to retract the transducers in operation without any special retraction tool.

Transducers will be delivered from stock without any adjustments. The standard transducer cable is 3 meters. (There is an option for 6 or 10 meter cable)

Pipe sizes	6" dia. min. and up (for smaller pipes than 6" a spool section with reducers in each end can be supplied to fit into the flare line.)
Velocity range	0.03 - 100 m/s (0.1 - 328 ft/s)
Uncertainty	*(at 95 % confidence level under fully developed flow conditions)* Less than 5.0 % of measured value Qv in turbulent flow range up to 100m/s (328ft/s)
Resolution	0.0008 m/s (0.003 ft/s)
Repeatability	Better than 1% of volume flow with velocity: 0.3-100m/s (1-328 ft/s)
Turn down ratio	3330:1
Pressure Rating	ANSI CLASS B16.5 150# RF
Operating temp	-70 to +145°C (-94 to +293°F)
Electrical safety	Intrinsically safe
Safety Class	EEx ia IIC T4 - T6
Electrical safety	Intrinsically safe

Ball Valves

Mounting	2" FB 150# RF Intrinsically safe
Material on a standard delivery	ASTM A350 LF2 ASTM A182 F316 or F316L

Transducerholders

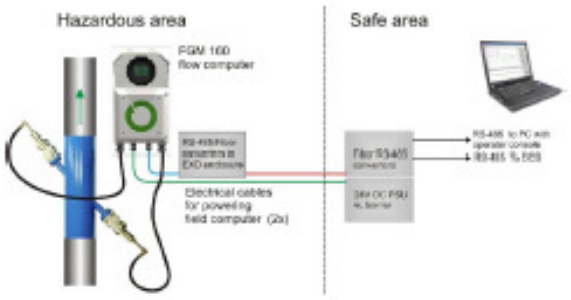
Mounting	2" RF (machined transducer angel) Mounted on spool piece or hot- or cold tapped to the line
Material	Either SS316L or ASTM 350 LF2

*)*The transducers do not require any special tool for insertion or retraction*

2.3 Operator Console

Operator Console (Windows based) for remote control of the FGM 160 field computer. For installation on a PC located in the safe area; control room-, service- and remote computer.

The Operator Console (OC) software gives you the opportunity to easily access and set up the parameters and functions in the Fluenta FGM 160 Flare gas meter Field Computer (FC).



The OC can monitor several field mounted FC systems simultaneously. The operator can select between an overall view of key parameters from all connected FC systems, and detailed information of a specific system. Parameters can be viewed as momentary ("live") values and trend line values. In addition, the system configuration parameters can be viewed and modified.

Remote control and configuration of the OC can be utilized by using a dedicated personal computer, with the OC installed, in the safe area at the site. This PC can then be remotely controlled using remote access software like MS Windows Remote Desktop. It is also possible to use a RS485 - TCP/IP converter with the OC installed at the remote computer. Either way, the operator can monitor the performance of multiple FC systems on a specific plant, or at several different plants.

Still, the greatest advantage is that the OC allows our service engineers to do diagnostic work from our office in Bergen, Norway. Or anywhere they may be in the world, via the Internet. This feature can reduce service costs significantly.

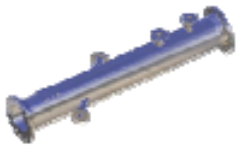
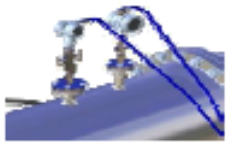
In order to maintain system integrity and unintended modifications of parameters password protection is incorporated.

Additional Outputs	The operator Console provides additional outputs:	3 additional 4-20mA analog outputs HART output Pulse output

The Operator Console (OC) provides	
	Trend curves of all relevant measured and calculated values
	Full access to all parameters
	Log of historical measurement
	Configuration an SW upload to field computer
	Integrated Service Console (SC)
	TCP/IP interface option for remote diagnostics and control

2.4 Options

These optional items are not included in the standard system supply and might be supplied by others; however it could be beneficial including them as a part of Fluentas supply.

Spool Piece		
	Spool piece is recommended as part of the scope to minimize the measurement uncertainties caused by the uncertainty in the positioning of the transducer holders.	
Specifications	Complete with transducer holders & weldolettes for pressure and temperature transmitters welded on. NDT & pressure test included. Spool piece will be delivered according to the projects pipe specification.	
Pressure and Temperature Transmitters		
Model	Fisher Rosemount 3051S and 3144P	
	The FGM 160 requires input from temperature and barA pressure transmitters that are located as close as possible to the measurement point.	
Mounting Frame for Field Computer		
Material	Stainless Steel; SS316	
	Free standing frame, special and robust design for mounting of Field Computer Available in full size and half size	
110 – 230V AC (50-60 Hz) – 24V DC converter		
	AC / DC converter including Ex d enclosure and sunshade	
	The FGM 160 requires input of 24V DC, if this is not available the 110 – 230V AC – 24V DC converter is a recommended option.	

3.1 Materials

Transducers*	AISI 316
Transducer heads	Titanium Gr 2
Ball valves (if included in bid)*	ASTM A350 LF2 ASTM A182 F316 or F316L
Bolting (if included in bid)*	Stud bolt CS: ASTM A193 gr.B8M (gr.B7) Stud bolt 316: ASTM A320 L7 Nut CS: ASTM A194 gr.8M (2H) Nut 316: ASTM A194 7
Gaskets (if included in bid)*	Graphite
Transducer holders, (if included in bid)*	ASTM A350 LF2 ASTM A182 F316 or F316L ASTM A350 LF2 or F316L (Other material on request)
Field Computer Enclosure	AISI 316

** If other materials are required this has to be specified by client prior to quotation.*

3.1.1 Required space for transducers.

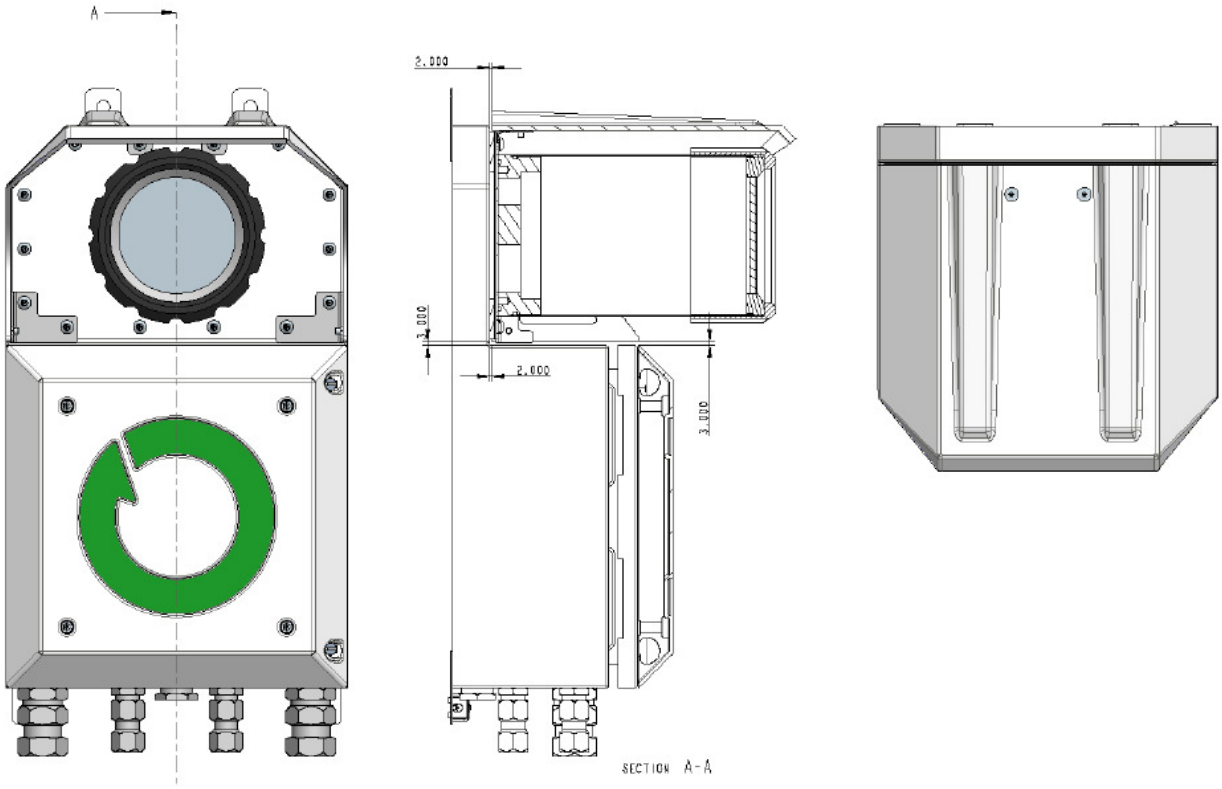
Ref. Attached Drawing 77.120.354

DIMENSIONS	MM	INCH
IN OPERATION, OFFSET FROM PIPE	500	19.69
IN OPERATION, AXIAL, 45° TO PIPE	700	27.56
RETRACTED, OFFSET FROM PIPE	730	28.74
RETRACTED, AXIAL, 45° TO PIPE	1030	40.55

3.1.2 System Weight

Weight	kg	lbs
Field computer	17	37
Pair of transducers, complete with cables (3m standard)	44	97
Pair of ball valves	20	44
Pair of transducer holders	11	24
Total weight one system	99	(218)

GENERAL SCHEME



THERMOENGINEERING S.r.l. *ADVANCED COMBUSTION SYSTEMS* Via Monte Suello, 19-Milan-ITALY Fax 0039 02 70109827 E-mail : thermoeng@thermoeng.it	**TECHNICAL SPECIFICATION FOR SOUND PRESSURE LEVEL AT GROUND FOR 54 m. ELEVATED FLARE**	Spec. : F-5650-9 Page : 1 of 1 Rev. : 2 Date : 04/11/2011

ITEM : Emergency Blowdown Flare

DESIGN DATA			NOTES
- Release case		Case1	
- Flare height	(m)	54	
- Type of flare tip		SSFTC	
- Max. gas flow	(kg/h)	40556	
- Low Heating Value	(kcal/kg)	11000	
- Smokeless steam flow	(kg/h)	3250.494	
- Steam temperature	(°C)	165	
- Mean ambient temperature	(°C)	20	
- Mean relative humidity	(%)	15	

SOUND PRESSURE LEVEL (SPL) AT GROUND (dB and dB(A))									
Distance from	Frequencies								Total
flare (m)	63	125	250	500	1K	2K	4K	8K	dB(A)
0	82.01	79.51	75.88	82.87	79.04	77.36	74.01	66.96	84.6
15	81.69	79.19	75.55	82.55	78.71	77.02	73.64	66.53	84.26
30	80.84	78.34	74.7	81.69	77.84	76.12	72.68	65.38	83.38
45	79.72	77.21	73.57	80.55	76.68	74.93	71.39	63.8	82.2
60	78.51	76	72.35	79.33	75.44	73.64	69.98	62.05	80.92
75	77.33	74.82	71.17	78.13	74.21	72.37	68.57	60.25	79.67
90	76.22	73.71	70.05	76.99	73.06	71.15	67.22	58.48	78.49
105	75.2	72.68	69.01	75.94	71.98	70.02	65.93	56.77	77.38
120	74.25	71.73	68.05	74.97	70.98	68.96	64.72	55.11	76.36
135	73.38	70.86	67.17	74.08	70.05	67.98	63.58	53.51	75.41
150	72.58	70.05	66.36	73.25	69.2	67.06	62.5	51.97	74.53
165	71.83	69.31	65.6	72.48	68.4	66.2	61.47	50.47	73.71
180	71.14	68.61	64.9	71.76	67.65	65.39	60.5	49.03	72.94
195	70.49	67.96	64.24	71.09	66.95	64.62	59.57	47.62	72.21
210	69.89	67.35	63.62	70.46	66.28	63.9	58.68	46.25	71.53
225	69.32	66.78	63.04	69.86	65.66	63.21	57.82	44.92	70.89
240	68.78	66.24	62.49	69.3	65.06	62.56	57	43.61	70.28
255	68.28	65.73	61.97	68.77	64.5	61.93	56.2	42.33	69.7
270	67.8	65.25	61.48	68.26	63.96	61.33	55.43	41.08	69.15
285	67.34	64.79	61.01	67.78	63.45	60.75	54.68	39.84	68.62
300	66.9	64.35	60.57	67.31	62.96	60.19	53.96	38.63	68.12

POWER LEVEL (PWL)								
Frequencies								Total
63	125	250	500	1K	2K	4K	8K	dB(A)
127.67	125.18	121.57	128.63	124.91	123.46	120.73	115.46	130.63

GENERAL NOTES
1 The Sound Power and Pressure Levels are referred to the flows as per the above design data.
2
3
4

THERMOENGINEERING S.r.l.
ADVANCED COMBUSTION SYSTEMS
Via Monte Suello, 19-Milan-ITALY
Fax 0039 02 70109827
E-mail : thermoeng@thermoeng.it

SUGGESTED SPARE PART LIST FOR COMMISSIONING, PRE-COMMISSIONING AND START UP OPERATIONS

Spec. : SP-5650-1T
Page : 1 of 1
Rev. : 2
Date : 21/12/2011

CLIENT : TECNIMONT KT	CLIENT REFERENCE : ALMA PETROLI
QUOTATION No. : F-5650	MAIN SUPPLY DESCRIPTION : ELEVATED FLARE STACK

MATERIALS AND PRICES

Item	Description	Reference drawing	Pos. no.	Parts no.	Material	Q.ty	Unit price EURO	Extended EURO
1	High energy igniters			HEI/9A	Stainless steel	1		
2	Sight port			SG-1	Brass/Glass	1		
3	Panel lamp			PL-04	-	4		
4	Panel relay			R1	-	2		
5								
6								
7								
							Total price	

COMMERCIAL QUOTATION 516 EURO is the minimum invoice amount for the spare parts only

Materials delivery site	Ex works our Crema (CR) factory - (Milan area)	Extra price for export packing	EURO	
Delivery time	28 weeks	Extra price for delivery to required site	EURO	
Packing	Box included	Extra price for delivery to Your field	EURO	
Prices validity	60 days from the date printed on the front page of the CQ.	Extra price for export documents	EURO	
Transport type				
Port of embarkation				
		GRAND TOTAL	EURO	

PACKAGE DIMENSIONS AND WEIGHTS

Net weight (Kg)	5	Dimensions (cm)	30 x 30 x 20
Gross weight (Kg)	8	Cubic measurement (m3)	

THERMOENGINEERING - (N. Herrera)

THERMOENGINEERING S.r.l.
ADVANCED COMBUSTION SYSTEMS
Via Monte Suello, 19-Milan-ITALY
Fax 0039 02 70109827
E-mail : thermoeng@thermoeng.it

SUGGESTED SPARE PART LIST FOR 2 YEARS OPERATION

Spec. : SP-5650-2T
Page : 1 of 1
Rev. : 2
Date : 21/12/2011

CLIENT : TECNIMONT KT
CLIENT REFERENCE : ALMA PETROLI
QUOTATION No. : F-5650
MAIN SUPPLY DESCRIPTION : ELEVATED FLARE STACK

MATERIALS AND PRICES

Item	Description	Reference drawing	Pos. no.	Parts no.	Material	Q.ty	Unit price EURO	Extended price EURO
1	High energy ignitor			HEI/9A	Stainless steel	1		
2	Sight port			SG-1	Brass/Glass	1		
3	Thermocouple			TC-K-35	Inconel 600	2		
4	Temperature switch			TSH-01	-	2		
5	Panel lamp			PL-04	-	20		
6	Panel relay			R1	-	3		
7	High energy supply unit			HEC-02	-	1		
8	Complete flare pilot (Thermocouple excluded)			SFP-8	AISI-321/310	1		
9								
							Total price	

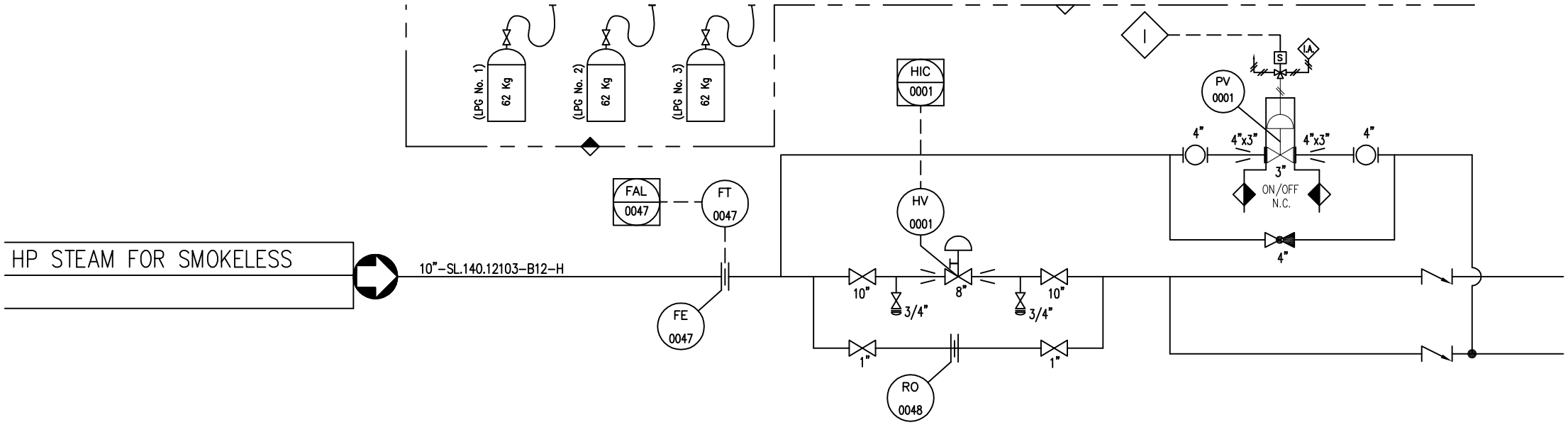
COMMERCIAL QUOTATION 516 EURO is the minimum invoice amount for the spare parts only

Materials delivery site	Ex works our Crema (CR) factory - (Milan area)	Extra price for export packing	EURO	To be defined
Delivery time	28 weeks	Extra price for delivery to required site	EURO	To be defined
Packing	Box included	Extra price for delivery to Your field	EURO	To be defined
Prices validity	60 days from the date printed on the front page of the CQ.	Extra price for export documents	EURO	To be defined
Transport type				
Port of embarkation				
		GRAND TOTAL	EURO	

PACKAGE DIMENSIONS AND WEIGHTS

Net weight (Kg)	55	Dimensions (cm)	320 x 60 x 40
Gross weight (Kg)	80	Cubic mesurement m3)	

THERMOENGINEERING - (N. Herrera)


(LPG No. 1)
62 Kg
(LPG No. 2)
62 Kg
(LPG No. 3)
62 Kg
HIC
0001
PV
0001
S
LA
4"
4"x3"
4"x3"
4"
3"
ON/OFF
N.C.
4"
FAL
0047
FT
0047
HV
0001
HP STEAM FOR SMOKELESS
10"-SL.140.12103-B12-H
10"
8"
10"
3/4"
3/4"
FE
0047
1"
1"
RO
0048

RILOCATA PSV05-4"

RILOCATA PSV07-4"

RILOCATA PSV04-2"

PSV301-4"

PSV302-4"

PSV251-2"

6"

8"

PSV03-8"

PSV02-8"

12"

PSV10-3"

14"

Recinzione

rieta' Lloyd Ravenna

Descrizione	Pos.	Descrizione
Impianto di abbattimento fumi bitume (VEPAL)	SC	Area scarico aregaio

01/06/2011

2. individuazione dei fluidi potenzialmente fonte di perdite (gas naturale, oli, gas di processo, etc.) e per ogni componente (o gruppo di componenti) indicazione del fluido che li attraversa;
3. individuazione delle perdite mediante controllo, almeno sensoriale, dell'operatore incaricato (visivo/uditivo/olfattivo) con frequenza settimanale o più restrittivo e con l'ausilio di strumentazione se previsto dal programma di manutenzione del gestore; utilizzo con frequenza mensile di dispositivi di rilevazione delle perdite quali schiume, cercafughe, misuratori di perdite in aria, rilevatori acustici, misuratori di differenze di pressione per tratte di tubazioni, fialette colorimetriche, misuratori di VOC portatili (FID, fotoionizzazione, NDIR...) etc.;
4. definizione di una scala di priorità di interventi sulla base dell'entità e tipologia della perdita individuata;
5. riparazione della perdita secondo le tempistiche definite dal gestore nel punto 4;
6. implementazione e adozione di un programma di manutenzione programmata finalizzato alla prevenzione di eventuali perdite;
7. registrazione di tutte le azioni di rilevamento delle perdite e delle attività di manutenzione.

Il suddetto programma deve essere trasmesso all'Ente di Controllo.
Il gestore deve inoltre effettuare una stima annuale delle perdite mediante l'utilizzo di fattori di emissione, con riferimento a quelle effettive calcolate sulla base del numero di componenti in perdita rilevati durante le ispezioni. Tali stime devono essere fornite sia come dato complessivo relativo all'intero impianto, sia come emissioni specifiche per categorie di componenti, indicando esplicitamente i fattori di emissione utilizzati e la loro origine. Tali informazioni devono essere inserite all'interno del rapporto annuale.

L) MONITORAGGIO DELLE TORCE (NUOVA)

Molte AIA sinora emanate contengono la prescrizione di un valore minimo di temperatura di combustione per le torce di sicurezza ed emergenza, con i relativi obblighi di monitoraggio per la verifica di conformità.
Nel corso delle attività di controllo è emerso che, anche alla luce di prove in campo effettuate da alcuni gestori in ottemperanza a specifiche prescrizioni, la realizzazione operativa nelle condizioni di normale gestione risulta di difficile implementazione.
In particolare è stata valutata la scarsa rappresentatività dei dati di monitoraggio ottenibili, in considerazione dell'estrema variabilità delle condizioni di combustione che vedono la presenza di gas di composizione variabile, in alcuni casi con presenza di fiamma di colorazione non compatibile con i sistemi di misura, e con posizionamento della fiamma stessa vincolato alle condizioni meteo climatiche e di efflusso.
Pertanto si ritiene modalità equivalente, per la valutazione dell'efficienza di combustione della torcia, quella basata sulla misurazione delle caratteristiche di portata e di potere calorifico inferiore del gas inviato alla torcia stessa, in rapporto alle condizioni di progetto dell'apparecchiatura per gli stessi parametri. Tali modalità alternative di monitoraggio possono garantire equivalente efficacia nel raggiungimento dell'obiettivo della prescrizione originaria, che è proprio quello di garantire un'efficace combustione del gas.
La descrizione completa delle modalità equivalenti di misurazione dell'efficacia di funzionamento delle torce è disponibile nella "stanza di lavoro virtuale Controlli AIA", accessibile come visto al punto D, in particolare nella BACHECA VIRTUALE CONTROLLI AIA, sottocartella DOCUMENTAZIONE TECNICA.

ISPRA

Allegato L

Modalità di misurazione del flusso e del peso molecolare dei gas inviati alla torcia.

Il gestore deve essere in grado di monitorare quantità e qualità del gas inviato in torcia in qualsiasi condizione operativa dell'impianto. Per applicare questo criterio di monitoraggio valgono le seguenti prescrizioni specifiche.

Metodi

E' necessario, anche per motivi di sicurezza, eseguire il campionamento dei gas inviati in torcia esclusivamente con procedura strumentale automatica. La successiva analisi dei gas inviati in torcia può essere effettuata sia con procedura strumentale automatica connessa ai campionatori, procedura che si ritiene preferibile, sia con modalità fuori linea consegnando i campioni ai laboratori incaricati.
I metodi di riferimento applicabili, nei due casi, sono stabiliti dall'ente di controllo, una volta acquisita dal gestore la composizione chimica tipica dei gas inviati in torcia.
Il gestore può proporre all'Ente di controllo metodi equivalenti, purché questi ultimi siano stati sottoposti a verifica di equivalenza ed i risultati delle prove di equivalenza siano allegati alla richiesta stessa. La proposta del gestore è soggetta ad approvazione.
La misurazione di portata deve essere sempre effettuata con procedura strumentale automatica e continua secondo le seguenti prescrizioni.

Misura di portata
Il flusso di gas mandato alla torcia deve essere monitorato continuamente con l'utilizzo di un flussimetro che risponda ai seguenti requisiti minimi:

1. limite di rilevabilità 0,03 metri al secondo
2. intervallo di misura corrispondente a velocità tra 0,3 e 84 metri al secondo nel punto in cui lo strumento è installato
3. lo strumento deve essere certificato dal costruttore con un'accuratezza, nell'intervallo di misura specificato al precedente punto 2, di ± 5%
4. lo strumento deve essere installato in un punto della tubazione d'adduzione alla torcia tale da essere rappresentativo del flusso di gas bruciato in fiaccola
5. il gestore deve garantire, mantenendo una frequenza di taratura non inferiore a una volta al mese, una accuratezza di misura di ± 20%.

Soglia di portata
Al fine di eliminare eventuali eventi spuri, il gestore deve determinare la soglia di portata al di sopra della quale il sistema di campionamento dei gas deve essere automaticamente attivato, in corrispondenza della tubazione di adduzione. Tale portata è stabilita in 10 volte la portata minima misurabile, al più basso valore dell'intervallo di misura dello strumento adottato. Tale portata soglia verrà definita nel seguito semplicemente "soglia".
Il campionamento dei gas inviati in torcia, per portate superiori alla "soglia" prima definita, deve essere attivato, come detto, in modalità automatica.

Campionamento e analisi del gas (automatico)

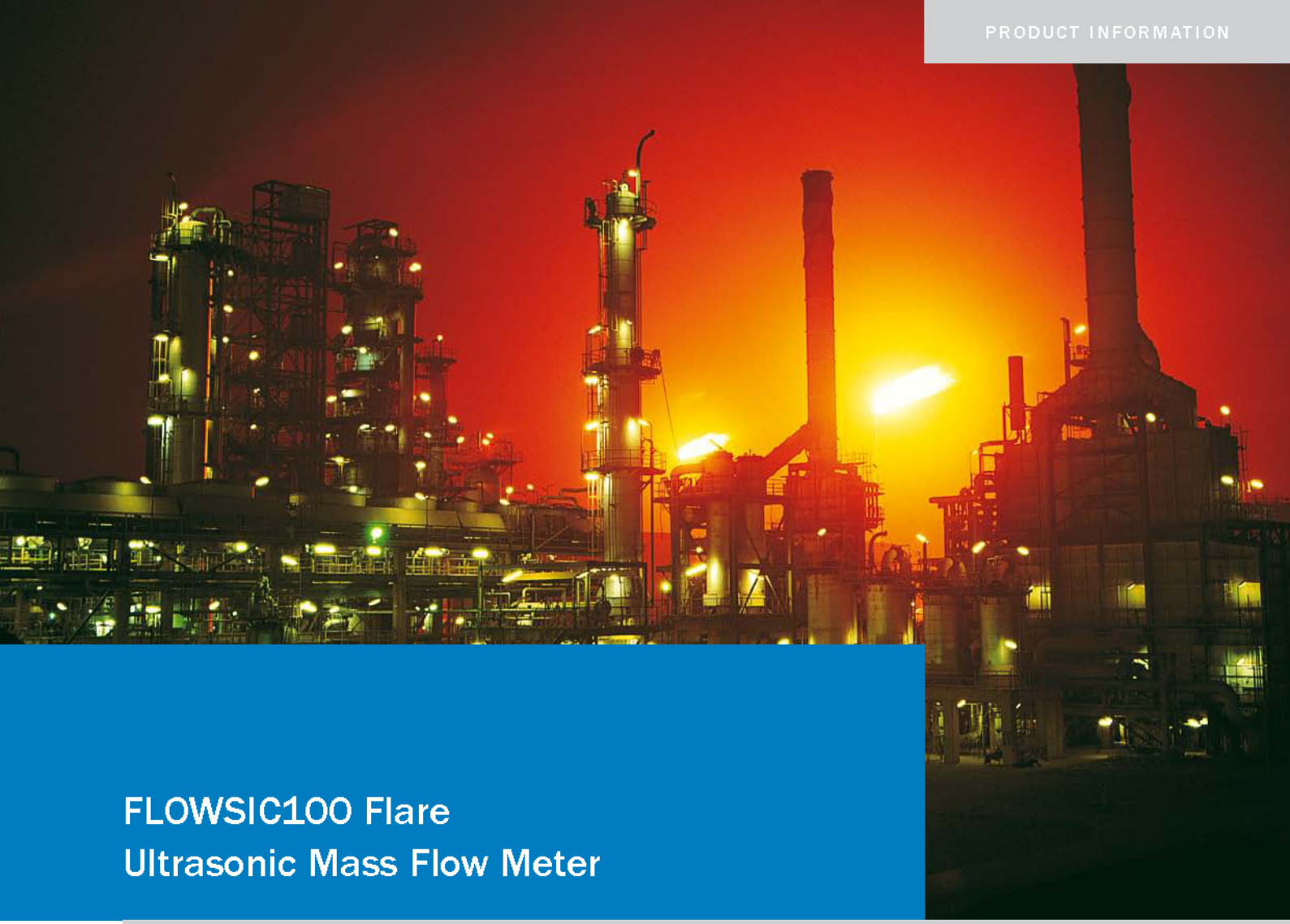
Il gestore dovrà installare un sistema di campionamento del gas mandato alla torcia che risponda ai seguenti requisiti minimi:

1. il punto di campionamento del gas deve essere rappresentativo della reale composizione del gas;
2. il sistema di campionamento deve essere tale da rispettare i seguenti criteri:
   a. se il flusso di massa è superiore alla "soglia", un campione deve essere completamente acquisito entro 15 minuti, e successivamente ad intervalli di 1 ora, fino a quando il flusso di massa sia inferiore alla soglia; la durata di ciascun campionamento deve essere sufficiente all'acquisizione di un campione rappresentativo sulla base della misura da effettuare;
   b. i campioni acquisiti devono essere analizzati in accordo ai metodi di riferimento specificati.

È ovviamente possibile, ed è fortemente raccomandato dall'Ente di controllo, l'utilizzo di un sistema di campionamento e analisi in linea continuo. In quest'ultimo caso il gestore potrà adottare le frequenze che ritiene preferibili per il campionamento e analisi, nel rispetto dei requisiti minimi stabiliti al punto a, ovvero potendo in ogni caso disporre quanto meno di una misura entro 15 minuti dall'attivazione del campionamento e di una misura ogni ora, sino al termine dell'evento, al fine delle verifiche di cui al punto seguente.

Determinazione dell'efficacia di distruzione in torcia

Con le misure effettuate in conformità ai punti precedenti è possibile stabilire, per gli istanti di campionamento stabiliti, le condizioni operative di funzionamento della torcia (potere calorifico inferiore del gas e velocità massima, ovvero portata massima di adduzione). Le condizioni operative rilevate strumentalmente devono essere confrontate con le condizioni di progetto della torcia, per dimostrare l'efficacia di distruzione del gas.



FLOWSIC100 Flare
Ultrasonic Mass Flow Meter

Gas Mass Flow Measurement for
Flare Gas Applications

SICK
Sensor Intelligence.

FLOWSIC100 Flare –
The reliable mass flow measurement for flare and vent gas applications

AREAS OF APPLICATION

- CO_2 emission monitoring for compliance with government regulations
- Valve leakage detection and gas identification
- Optimization of steam usage in flare gas systems
- Gas wastage reduction
- Accurate mass balance calculations and process optimization

FLOWSIC100 EX-S

- Cross-duct high speed version (patent pending)
- 90° nozzle installation
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

FLOWSIC100 EX/EX-RE

- Cross-duct high power version for large ducts and signal damping gases
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

FLOWSIC100 EX-PR

- High speed probe version (patent pending)
- Single flange installation
- Optional: retractable under process conditions
- Hermetically sealed stainless steel and titanium probes
- ATEX and CSA approved for use in hazardous areas

KEY FEATURES

- Operation under very high gas velocities – using an innovative high speed sensor design
- Accurate operation at low flow (near zero)
- Easy installation steps – welding of nozzles perpendicular to pipeline
- Remote installation of control unit up to 1,000 m (serial interconnection)
- Single flange installation using probe version FLOWSIC100 EX-PR
- Improved accuracy – spool piece solution
- Assured and reliable device function – automatic self diagnosis

FLOWSIC100 EX-S Retractable (measuring position)

FLOWSIC100 EX-PR

SYSTEM COMPONENTS

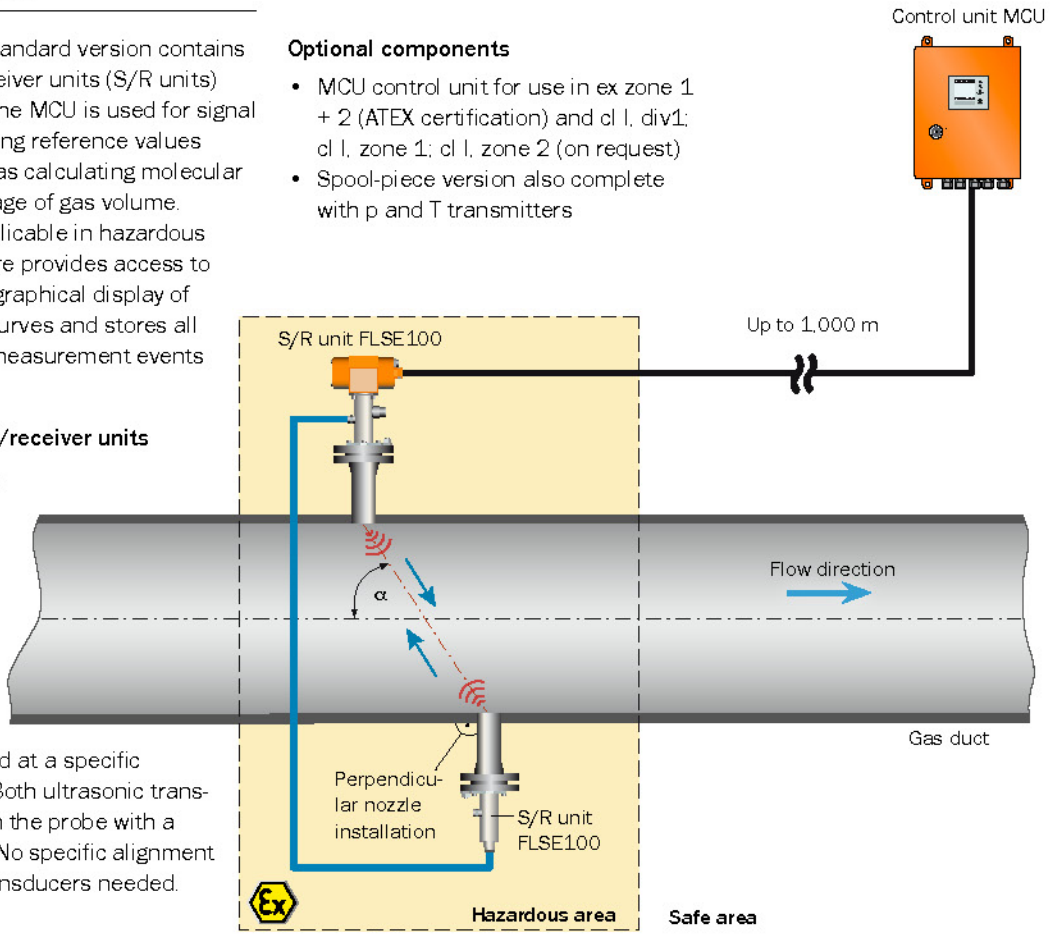
The FLOWSIC100 Flare standard version contains two FLSE100 sender/receiver units (S/R units) and a MCU control unit. The MCU is used for signal inputs/outputs, determining reference values (standardization) as well as calculating molecular weight, mass flow or storage of gas volume. Optionally the MCU is applicable in hazardous areas. The SOPAS software provides access to all parameters, contains graphical display of measured values, trend curves and stores all parameter changes and measurement events in an integrated log book.

Installation of the sender/receiver units

- Cross-duct installation: two sender/receiver units are mounted on both sides of a duct – rectangular to the gas flow direction.
- One-side installation: Only one single sender/receiver unit (probe type) is mounted at a specific angle to the gas flow. Both ultrasonic transducers are installed on the probe with a fixed measuring path. No specific alignment between ultrasonic transducers needed.

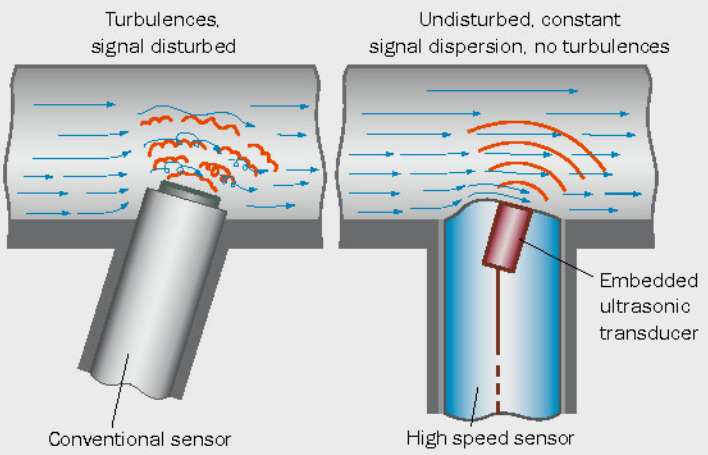
Optional components

- MCU control unit for use in ex zone 1 + 2 (ATEX certification) and cl I, div1; cl I, zone 1; cl I, zone 2 (on request)
- Spool-piece version also complete with p and T transmitters



UNIQUE HIGH SPEED SENSOR DESIGN (PATENT PENDING)

For the FLOWSIC100 Flare an innovative sensor design was developed. The ultrasonic transducer is embedded in a flow optimized sensor shape – qualified for high speed gas flow conditions. The unique design reduces flow noise and signal drift to a minimum and enables stable and reliable measurement results at very high gas velocities. A new developed 2-stage signal algorithm ensures best signal processing under low flow as well as and under high flow conditions.



8011249/2009-08. DIV03/KE. Printed in Germany (2009-09). Subject to modifications.

Technical Data	FLOWSIC100 Flare		
Version	EX-S	EX/EX-RE	EX-PR
Measuring parameter			
Measuring principle	Ultrasonic transit time measurement method		
Measuring values	Mass flow, standard and actual volumetric flow, molecular weight, totalized standard volume and mass, gas velocity, gas temperature, speed of sound		
Measuring range [1]	0.03 up to 120 m/s		
Accuracy [2] [3]	1-path measurement: ±1.5 ... 5 %/0.5 ... 2.5 % [4]; 2-path measurement: 1.0 ... 3.0 %/0.5 ... 1.5 %[4]		
Accuracy of molecular weight [5]	< 2% of measured value, 2 ... 120 kg/kmol (non-carbon hydrogens < 10 vol %)		
Accuracy of mass flow [5]	1-path measurement: ±2.5 ... 5% of meas. value; 2-path measurement ±2 ... 4% of meas. value		
Resolution	0.001 m/s		
Repeatability	0.2 % at 10 m/s		
Rangeability	up to 4000 : 1		
Inner duct diameter	≥ 0.1 ... 1.8 m (≥ 4 ... 72 in)		≥ 0.3 ... 1.8 m (≥ 12 ... 72 in)
Measurement conditions			
Gas temperature	• Standard range: –70 ... +180 °C (–95 ... 356 °F) • High temperature range zone 1: –70 ... +280 °C (–95 ... 535 °F) zone 2: –70 ... +260 °C (–95 ... 500 °F) • Low temperature range: –200 ... +100 °C (–325 ... 210 °F) (on request)		
Pressure range	–0.5 ... 16 barg		
Ambient conditions			
Temperature range	• Sender/receiver units: –40 ... +70 °C (–40 ... 158 °F); option: –50 ... +70 °C (–58 ... 158 °F) • MCU control unit: –40 ... +60 °C (–40 ... 140 °F)		
Approval			
Ex-certification S/R unit, zone 1	• ATEX II 2G Ex d [ia] IIC T4 • ATEX II 2G Ex de [ia] IIC T4 • CSA CI I, Div1/Div2; CI I, Zone 1/Zone 2 Option • Temp. class T6 • Zone 0 for ultrasonic transducers ATEX I/2G Ex d [ia] IIC T4	• ATEX II 2G Ex d IIC T4 • ATEX II 2G Ex de IIC T4 • CSA CI I, Div1/Div2; CI I, Zone 1/Zone 2 Option • Temp. class T6	• ATEX II 2G Ex d [ia] IIC T4 • ATEX II 2G Ex de [ia] IIC T4 • CSA CI I, Div1/Div2; CI I, Zone 1/Zone 2 Option • Temp. class T6 • Zone 0 for ultrasonic transducers ATEX I/2G Ex d [ia] IIC T4
S/R unit, zone 2	• ATEX II 3G Ex nA II T4		
Control unit MCU, non-ex Control unit MCU, zone 1 Control unit MCU, zone 2	• for remote installation up to 1,000 m (3.280 ft) away from measuring point • ATEX II 2G Ex d IIC T4; CSA cl, div1; cl I, zone 1 (pending) • ATEX II 3G Ex nA II T4; CSA cl I, zone 2		
Protection class S/R unit Control unit MCU	• Aluminium, stainless steel IP 65/67 • Steel, stainless steel wall housing IP 65; Ex d housing IP 66; 19" rack housing		
Inputs, outputs, controls via MCU control unit			
Analog output	1 output active: 0/2/4 ... 22 mA, max. load 750 Ω [4], according to NAMUR NE43		
Analog inputs	2 inputs: 0 ... 5/10 V or 0 ... 20 mA [6]		
Digital outputs	Pulse/frequency output (opt. module); 5 outputs: 30 V DC/2A, 120 V AC/1 A, floating, status signals: operation/malfunction, maintenance, check cycle, limit value, maint. request [6]		
Digital inputs	4 inputs for connection of floating contacts [6]		
Interfaces	• USB • RS232 (service)	• RS485 via optional module • Ethernet via optional module	
Bus protocol (option)	• MODBUS via RS485 or via Ethernet • PROFIBUS DP via RS485 • TCP/IP via Ethernet		• HARTBUS (pending) • Foundation Fieldbus (on request)
General			
System components	• Sender/receiver unit(s) FLSE100 • MCU control unit, optional 24 V DC version		• Mounting parts (nozzles, ball valves, mounting material)
Operation	Via MCU control unit or SOPAS ET software		
Check function	Internal check cycle for zero-point and span check		

[1] Depending on pipe size
[2] For fully developed flow profile
[3] Of measuring value
[4] Flow calibrated
[5] Hydrocarbons
[6] Option: additional inputs/outputs when using I/O modules

SICK MAIHAK GmbH | Germany
Nimburger Str. 11 | 79276 Reute | www.sick.com
Phone +49 7641 469-0 | Fax +49 7641 469-1149 | info.pa@sick.de

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Sensor Intelligence.

SICK S.p.A. Via Cadorna, 66 – 20090 Vimodrone (MI) - Tel. 02/274341

Flow Calculation PA_AG_083 Rev 00

Project:	**Alma Petroli**					
TAG Number:	**Flare Stack**					
Customer:	**Tecnimont KT**					
Contact name:	**Andrea Galdino**					
Address:						
	TBA		T norm:	0,00	°C	
	TBA		P norm:	1,013250	bar	
Meter type:	**FL100 Ex PR & RE**			**[inch]**	**[inch or m]**	
Path angle:	**75**	°	Line size:	**14**	0,3556	m
Path number:	**1**		Wall thickness:	**10**	0,0064	m

Mol. Weight based

Load case scenario

Input type: Massflow

Load case	Min	Norm	Max	Unit
Pressure abs.	1,11325	1,21325	1,41325	bar
Temperature	40	180	280	°C
Molecular weight	42	78	110	kg/kmol
Massflow	100	22000	40500	kg/h

Calculation results

Load case		Min	Norm	Max	Unit
Massflow	MF	100,0	22000,0	40500,0	kg/h
Normflow	Q sc	53,4	6321,9	8252,4	nm^3/h
Flowrate act	Q ac	55,7	8759,0	11981,7	m^3/h
Velocity at	VOG	0,168	26,347	36,041	m/s
Density	Roh	1,796	2,512	3,380	kg/m^3
SOS	SOS	246,056	171,089	139,825	m/s

Fax 02/27409087 – Internet: www.sick.it
C.F. 07006690015 – P.IVA 11934730158 – Cap. Soc. €.1.508.000 i. v.
Reg. Impr. Di Milano n. . 07006690015 – R.E.A. n. 1495183
Banca d'appoggio: UNICREDIT CORPORATE BANKING SPA
Filiale di Segrate (MI)
ABI 02008 – CAB 09434 – C/C 000030097145
IBAN IT08G0200809434000030097145

Translation

(1) EC-Type Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 94/9/EC**

(3)	**Certificate Number**	**TÜV 09 ATEX 554975**
(4)	for the equipment:	Flow control system FLOWSIC 100 with the transceiver FLSE100-EXS or the transceiver FLSE100-EXPR
(5)	of the manufacturer:	SICK Engineering GmbH
(6)	Address:	Bergener Ring 27 01458 Ottendorf-Okrilla Germany
	Order number:	8000554975
	Date of issue:	2009-05-11

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, notified body No. 0044 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in the confidential report No. 09 203 554975.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2006 **EN 60079-1:2007** **EN 60079-7:2007**
EN 60079-11:2007 **EN 60079-26:2007**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

See schedule

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Fon +49 (0)511 986 1455, Fax +49 (0)511 986 1590

(13) **S C H E D U L E**

(14) **EC-Type Examination Certificate No. TÜV 09 ATEX 554975**

(15) Description of equipment

The flow control system FLOWSIC 100 with the transceiver FLSE100-EXS or the transceiver FLSE100-EXPR is for contactless measurement of the flow of gases. The equipment measures over the running time of ultrasonic pulses the flow speed of the gas and calculated the resulting operating volume flow rate. The product line consists of different model variants.

Technical data

Permitted range of the ambient temperature	Temperature class
-50 °C bis +55 °C	T6
-50 °C bis +70 °C	T4

Electrical data

Power supply connection
(Terminals +24V, GND)
15 VDC bis 28 VDC
U_m = 125 V

Data Interface IF1 (RS485)
(Terminals MASTER A, MASTER B)
U_N = ± 2.5V
I_N = ± 100 mA
Terminator 100 Ω
U_m = 125 V

Data Interface IF2 (RS485)
(Terminals SLAVE A, SLAVE B)
U_N = ± 2.5V
I_N = ± 100 mA
Terminator 100 Ω
U_m = 125 V

Ultrasonic converter connections
(MCX/TNC-jack)
in the type of protection intrinsic safety Ex ib/ia IIA/IIB/IIC only for connection of intrinsically Ex ia SICK –Ultrasonic converter/sensors with a cable length up to 5 m:

		IIA	**IIB**	**IIC**
	U_o =	± 60.8 V	± 51.2 V	± 38.9 V
	I_o =	± 92 mA	± 77 mA	± 59 mA
	P_o =	1399 mW	986 mW	574 mW
effective internal capacitance	C_i =	negligibly small	negligibly small	negligibly small
effective internal inductance	L_i =	6.7 mH	6.7 mH	6.7 mH

Temperature sensor connection (MCX/TNC-Buchse)	in the type of protection intrinsic safety Ex ib/ia IIC with the maximum values : U_O = 8.6 V I_O = 5 mA P_O = 11 mW effective internal capacitance C_i = negligibly small effective internal inductance L_i = negligibly small
Ultrasonic converter, passive	in the type of protection intrinsic safety Ex ia IIC only for connection to FLSE100-EXS
Temperature sensor, passive	in the type of protection intrinsic safety Ex ia IIC only for connection to FLSE100-EXS

Marking of equipment:

II 1/2 G Ex d [ia] IIC/IIB/IIA T4 resp. II 1/2 G Ex d [ia] IIC T6

II 2 G Ex d [ib] IIC/IIB/IIA T4 resp. II 2 G Ex d [ib] IIC T6

II 1/2 G Ex de [ia] IIC/IIB/IIA T4 resp. II 1/2 G Ex de [ia] IIC T6

II 2 G Ex de [ib] IIC/IIB/IIA T4 resp. II 2 G Ex de [ib] IIC T6

II 1/2 G Ex ia IIC T6 (Ultrasonic sensor, passive and temperature sensor, passive)

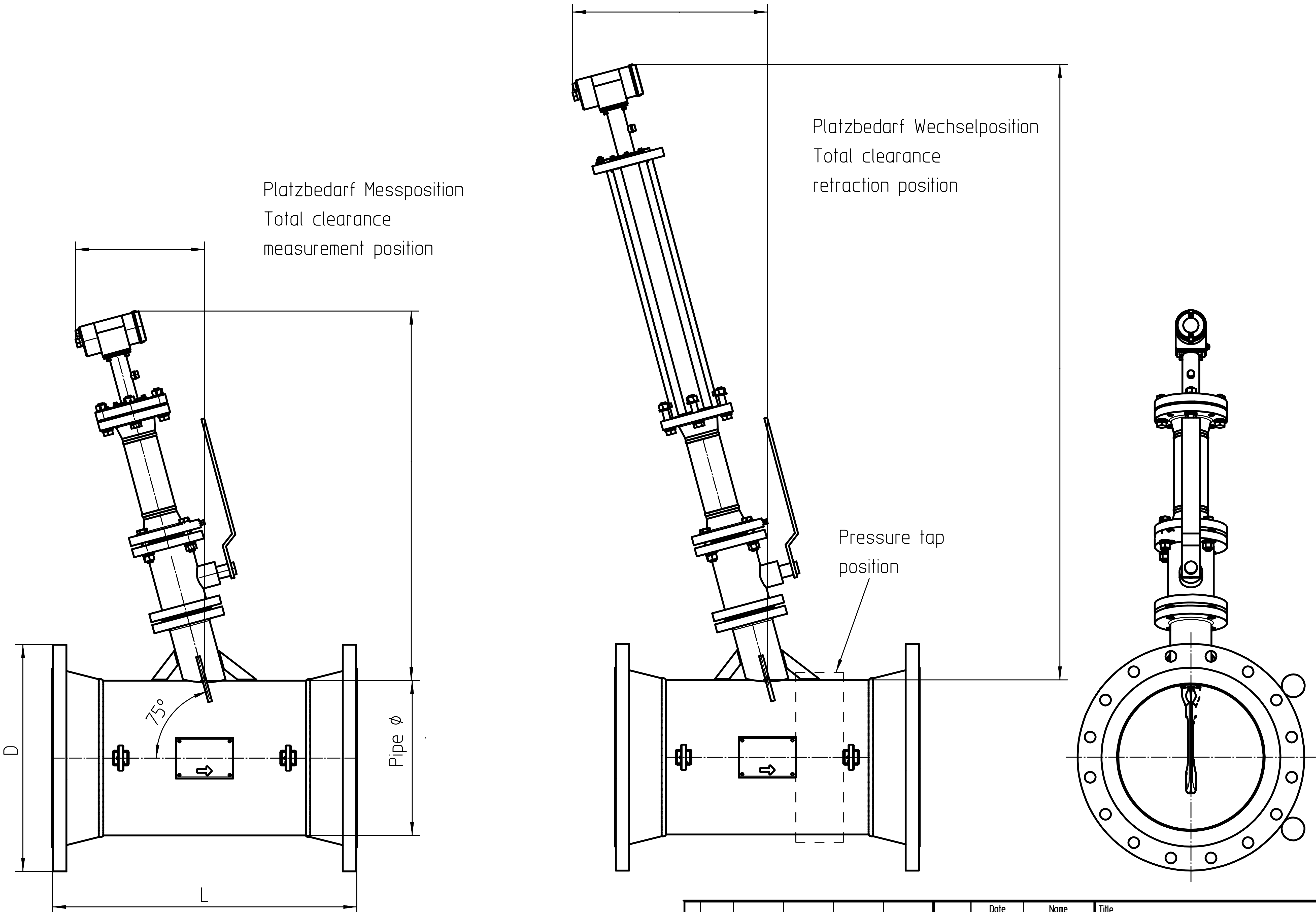
(16) Test documents are listed in the test report No. 09 203 554975.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones



For information on main dimensions only!
Aussenabmessungen zur Information!
Dimensions in brackets are given in inch.
Masse in Klammer sind in der Einheit Zoll angegeben.

Ind.	Rev.	Date	Drawn by	Date	Released by

	Date	Name
Drawn by	2010-08-19	mahje
Released by		

SICK|MAIHAK

SICK-engineering GmbH
D-01458 Ottendorf-Okrilla

Scale: 1:10

Title: OUTL. FL100 EX-PR RETRACTABLE

Drawing Number: E_58853

Sheet-No. 1of 2

Type/DIN: FL1R

Material

View

Origin

Replaces

Size A3

FL100 EX-PR (retractable)							
Nennweite	**Gesamtlänge**		**Ausführung S/E Einheit**	**Platzbedarf Messposition**		**Platzbedarf Wechselposition**	
Pipe size	***Total length***		***execution of S/R unit***	***Total clearance measurement position***		***Total clearance retraction position***	
[inch]	**[mm]**	**[inch]**		**[mm]**	**[inch]**	**[mm]**	**[inch]**
12	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
14	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
16	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
18	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
20	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
22	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
24	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
26	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
28	800	31,50	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
30	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
32	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
34	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
36	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
38	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
40	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
42	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
44	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
46	1100	43,31	short	339 x 971	13,344 x 38,230	512 x 1617	20,154 x 63,646
48	1100	43,31	short	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
50	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
52	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
56	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
60	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
64	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
68	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582
72	1100	43,31	long	374 x 1097	14,724 x 43,189	581 x 1869	22,874 x 73,582

General Tolerances	Surface according ISO 1302	Edge processing of part according DIN 6784	Dimension in a class of fit	Variation allowance
	✓ ✓ ✓			

Ind.	Rev.	Date	Drawn by	Date	Released by

	Date	Name
Drawn by	2010-08-19	mohje
Released by		

SICK
SICK_engineering GmbH
D-01458 Ottendorf-Okrilla

Scale: 1:1

Title: OUTL. FL100 EX-PR RETRACTABLE

Drawing Number: E_58853

Sheet-No.: 2 of 2

Type/DIN: FL1R

Material:

View:

Origin | Replaces | Size A3

SICK S.p.A. Via Cadorna, 66 – 20090 Vimodrone (MI) - Tel. 02/274341

Tecnimont KT

Viale Castello della Magliana, 75
00148 Rome - Italy

Egr. Ing. Tranfaglia

Budget Quotation

Reference number	PA_AG_ 083_Rev 00
Internal reference No.	WAK105084
Subject	Ultrasonic Flowmeter for Flare Gas
Project	Sistema Torcia - Alma Petroli
Date	12.12.2011
Validity	90 Days
Your contact person	Andrea Galdino Tel:+ 39 02 27.434.285 Fax:+39 02 27.40.90.87 Mail: andrea.galdino@sick.it

Flare Gas Ultrasonic Flowmeter.

The FLOWSIC100 Flare measuring system measures Velocity Of Gas (VOG)
From gas velocity, the volume flow can be calculated and output in the operating state and in the standard state when gas temperature and internal pipe pressure are fed by external PT and TT transmitters.
Other derivable measured variables are Mass Flow and Molecular Weight.

Areas of application

The measuring devices of the FLOWSIC100 Flare device family can be used for flow measurement in the pipelines of flare gas plants.
The FLOWSIC100 Flare measuring devices can be used in the following areas, for example:
– Petrochemical and chemical industry
– Determination of CO2 emissions
– Leak detection in the flare gas network
– Control of steam injection for soot reduction at the flare
– Plant balancing
– Operative measurement of flare gas as a source of energy
– Oil production (associated gas)
– Determination of CO2 emissions

System characteristics and advantages

● Design according to the modular principle By the selection of modules, components can be combined to meet the different requirements depending on the existing application conditions. The measuring system can therefore be used in a wide specification range.
● Integral velocity measurement over the pipeline diameter, independent of pressure, temperature and gas composition
● Digital measured value processing, thus high precision and interference immunity
● Self-test by automatic check cycle
● No pressure-reducing installations in the gas flow, therefore no influence on flow behavior
● Simple installation
● Low wear due to selection of the most suitable modules for the respective application
● Minimum maintenance effort

System overview

The measuring system consists of the following components:

“FLSE100 EX-PR sender/receiver unit”
To send and receive ultrasonic pulses, for signal processing and control of system functions

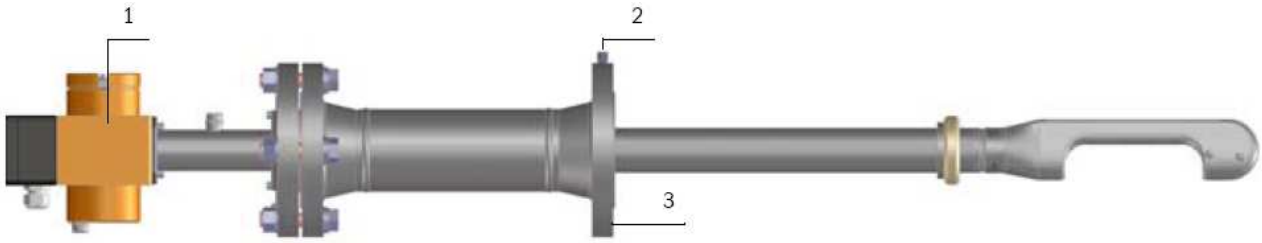


Fig. 1 Probe Device

1 Electronic unit in Exd housing
2 Connection for optional venting
3 Retraction flange for Probe’s extraction under operating conditions

- Ball valve:
Used to mount retractable sender/receiver units onto the pipeline and allows transducer’s extraction under operating conditions.

Control Unit :

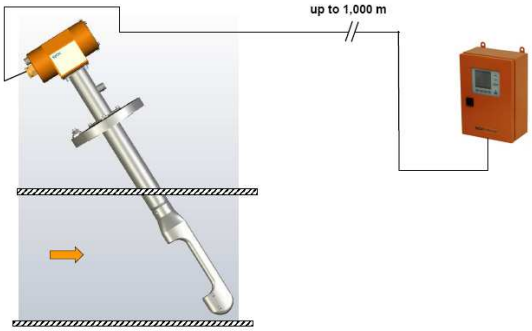
- MCUP control unit (available also as RACK Version) and Connection cable between sender/receiver units and MCUP to control, evaluate and output the data of the sensors connected via the RS485 interface

General Purpose / Atex Zone 2
Control Unit

Atex Zone 1
Control Unit

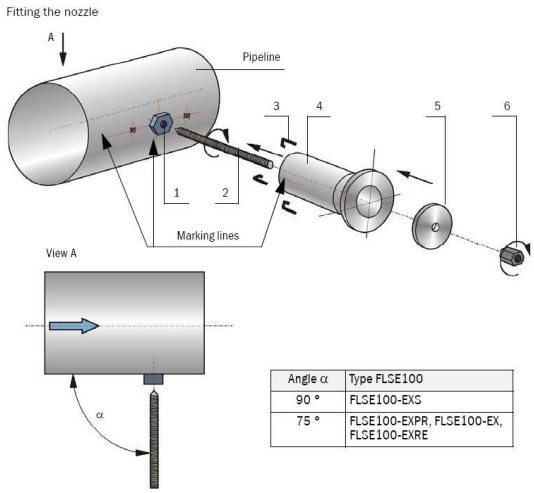
Remote Rack 19”
Control Unit

Control Unit can be remotely mounted up to 1000 meters away from measurement location,



- Mounting Kit :

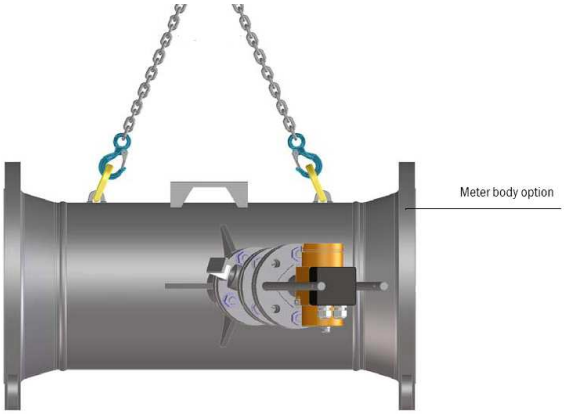
- Used to properly align and weld the installation nozzle onto the plant’s flare gas collector.



Angle α	Type FLSE100
90 °	FLSE100-EXS
75 °	FLSE100-EXPR, FLSE100-EX, FLSE100-EXRE

- Optional Spoolpiece:

Spoolpiece Is quoted as option and allows easy and trouble-free installation and start up,



All flowmeter's geometries are accurately measured in-house and flowmeter is pre-programmed for the specific application.

- Optional Flow calibration:

Accuracy of measurement can be improved to 0,5% of reading (Velocity) for a single path flare meter by Wet Calibration performed with Air.

Sick Engineering GmbH low pressure calibration facility has been built in cooperation with German Physikalisch-Technische Bundesanstalt (PTB),for high accuracy calibrations of SICK natural gas Custody Transfer Ultrasonic Flowmeters.

Fig 1: Sick Engineering GmbH, Dresden
In-House Calibration Facility

Price Summary

Hardware

Description	Qty	Unit Price	Total net price
Ultrasonic Flowmeter for Flare gas flow measurement **14” Line Size** **TAG: XXXXX**	**1**	**28.639,00**	**28.639,00**
TOTAL HARDWARE without cables, options, documentation and services			**28.639,00**

SICK S.p.A. Via Cadorna, 66 – 20090 Vimodrone (MI) - Tel. 02/274341

Scope of supply: FLOWSIC100 EX-PR Single path Flare Gas Mass Flowmeter

Pos.	Description	Selling Price per Unit (€)	Qty	Total Price (€)
01.				
			TAG: XXXXXXXXXXX	
01.1	**Retractable Sensor Assembly with Inserction Mechanism**		**1**	
01.1.0	1047665 Digital Probe SS/TI for Zone 1		1	
01.1.1	FB_08 Gas temperature range -70…+280℃		1	
01.1.2	Electronics housing Ex-d without Exe junction box		1	
01.1.3	FB_05 Offshore execution			
01.1.4	Ball Valves 3” Ansi 150#		1	
01.1.5	FA_07 Venting ball valve for retractable S/R unit		1	
01.1.6	FG_01 Material certificates		1	
	Subtotal Sensors	**23.910,00**	**1**	**23.910,00**
01.2	**Mounting Material**		**1**	
01.2.0	2057110, Nozzle material carbon steel A105, prepared for pipe size 14"		1	
01.2.1	2050601 Nozzle Installation Tool EX-PR		1	
	Subtotal Spoolpiece	**904,00**	**1**	**904,00**
01.3	**Control Unit For Safe Area**		**1**	
01.3.0	Control unit MCUP- with LC-Display, FRAM		1	
01.3.1	Module analog output (AO), 2 channels			
01.3.2	2 058 778 MCUP Mounting Set For 2" pipe installation		1	
01.3.3	Stainless Steel 316 Nameplate		1	
01.3.4	Stainless Steel Material			
	Subtotal Control Unit	**3.825,00**	**1**	**3.825,00**
01.4	**Connection Cable**			
01.4.0	6042293 Connection cable, armoured,		**€/m**	
		14,40		**14,40**

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C.F. 07006690015 – P.IVA 11934730158 – Cap. Soc. €.1.508.000 i. v.
Reg. Impr. Di Milano n. . 07006690015 – R.E.A. n. 1495183
Banca d’appoggio: UNICREDIT CORPORATE BANKING SPA
Filiale di Segrate (MI)
ABI 03226 – CAB 2600 – C/C 000030097145
IBAN IT91J0322620600000030097145

Pos.	Description	Selling Price per Unit (€)	Qty	Total Price (€)
	OPTIONS			
01.5	**Spoolpiece**		**1**	
01.5.0	14” Ansi 150# LTCS Spoolpiece		1	
01.5.1	FF_03 3D-surveying for 1-path meter body		1	
	Subtotal Spoolpiece	**5.935,00**	**1**	**5.935,00**
01.6	**In House Calibration**		**3**	
01.6.0	FF_05 14" Low pressure flow calibration		1	
		1.900,00	**3**	**1.900,00**

Pos.	Description	Selling Price per Unit (€)	Qty	Total Price (€)
02.	**Documentation**		**1**	
02.1.0	Documentation for Approval		1	
02.1.1	Documentation Shipment		1	
	Subtotal Documentation		**1**	**TBA,00**
03	**Packing**		**1**	
03.1.0	Standard Sick, Suitable for transportation via road		1	
	Subtotal Packing	**500,00**	**1**	**500,00**
04	OPTIONS			
04.1	**Witnessed Hydrotest**		**1**	
04.1.0	Hydrotest Witnessing at supplier premises 3 meters per day		**€/day**	
	Subtotal	**1.350,00**	**1**	
04.2	**Witnessed FAT**		**1**	
04.2.0	Fat Witnessing at Sick GmbH premises 3 meters per day		**€/day**	
	Subtotal FAT	**950,00**	**1**	
05	SPARES			
05.1	**Spare parts for commissioning**		**1**	
05.1.0	Gasket		4	
05.1.1	2054541 Fuse set T 2 A for ex-protected MCUP		1	
	Subtotal Spares	**223,00**	**1**	**223,00**
06	SERVICES			
06.1	**Services**		**1**	
06.1.0	Start Up		**€/day**	
	Subtotal Services	**950,00**	**1**	**950,00**

Technical Description:

TAGS: XXXXXXXXXX

Quoted system is composed of the following parts:

Item 01.1 - Sensor and Insertion Mechanism Assembly

Ultrasonic Sensor and Insertion Mechanism, Note: (1 pcs. per measuring path)

Sender/Receiver unit model: "FLSE100-EX-PR Retractable"
Type : Digital probe retractable under operating conditions,
Length: Suitable for 12" to 72" Line size
Materials: Probe material: stainless steel, Transducers and Transducer's carrier material: Titanium
Configuration: High speed, 1 x Measuring path
Design Conditions: Pressure max.16 bar, gas temperature range -70 ... +280℃
Connection Size 3"ANSI CL150
Electronics housing material: Die Cast Aluminium ,
Protection class Ex d, ATEX Zone 1, IP 67
Ex-classification: ATEX II 2G Ex d [ia] IIC T4,
Metrical cable entries, Brass Nickel Plated cable glands
Ambient temperature -40 ... +70 ℃
Material certificates 3.1 acc. to EN 10204, NACE conformity acc. to MR0175: 2003

Ball valve, Note: (1 pcs. per measuring path)
Full Bore, Metal Seated Ball valve
ANSI CL150,
Valve Body Material: stainless steel
Connection: 3" ANSI CL150
Design Conditions: -50 ℃... +350 ℃, incl. Gasket
Material certificate 3.1 acc. to EN 10204, NACE conformity acc. to MR0175: 2003

Item 01.2 – Spoolpiece

Spoolpiece for FL100 EX-PR, NPS 14",
connect. flange CL150 RF acc. ANSI B16.5,
wall thick. 9,5mm, length 800mm,
1path, 90°nozzles 3" CL150 RF
ANSI B16.5 LTCS A350 Gr. LF2,
A333 Gr.6, compliant with NACE MR0175-2003,
material cert. 3.1 acc. to EN 10204,
unmachined surfaces (hot-rolled), sandblasted,
coating acc. SICK Standard 2 layer.

Item 01.3 – Control Unit

Control Unit Note: (1 pcs. per measuring path)
Control unit in Stainless Steel housing , with LCD Display , FRAM
(To be installed in safe area)

Available I/Os:
3 x Analog outputs, Software configurable (Typically: Mass Flow; Molecular Weigh; Gas Velocity)

5 x Relay outputs; 4 x Digital inputs; 2 x Analog inputs for PT and TT connections
1 x Interface module: Modbus RS485

Supply voltage:90...250 V a.c.
Supplied with “Sopas” Interface software for configuration and diagnostic via PC.
Supplied with 2” pipe mounting Kit

Item 01.4 – Connection Cable

Connection cable, armoured, xx meter’s length
Lappkabel INSTRUM BS 5308 Part 1,
Type 2, 2x2x1 mm2, XLPE
(high temp., halogen free),

Item 01.5 – In House calibration

FF_05 In House flow calibration
14" Low pressure flow calibration
with air, at ambient pressure,
Max flowloop capacity : 10.000 am3/h
with manufacturer certificate
Achievable Accuracy: 0,5% Of reading on Actual flow (for gas velocity > 1m/s)
Overall Flowmeter’s range: 0,03m/s to 90m/s*
(* Depending on Gas Composition, heavy hydrocarbons can reduce the overall measurable flow velocity)

Item 02.1 – Documentation

Approval Documentation (No. 1 x Paper Copy; No 1 x Electronic Copy)
Documentation shipment (No. 1 x Paper Copy; No 1 x Electronic Copy)

Item 03.1 – Packing

Flowsic 100 Flare Packing in wooden crate
Seaworty

OPTIONS

Item 04.1 –Witnessing Hydrotest

Witnessing of Hydrotest at supplier premises
Duration: approx. 1 day/s
Travel and accomodation: not included

Item 04.2 – Witnessing FAT

It Includes:
Zero-Point Verification and Speed Of Sound check for one FLOWSIC100 Flare
Verification with requirement sheet / order
Visual and Dimensional check
In house Calibration witnessing (If applicable)
Review of certificates

Duration: approx. 2 days
Travel and accomodation: not included

Item 05.1 – Spare parts for commissioning

Grooved gasket with graphite layer
3" ANSI150 stainless steel

2054541
Fuse set T 2 A
for ex-protected MCUP

Item 06.1 – Onsite Commissioning

1 engineer, 10 h working a day, will
- connect FLOWSIC100 Flare with wiring
- check configuration
- provide tools and parts required

Prerequisites:
- FLOWSIC100 mounted into the pipeline
- Wiring towards DCS established
- System ready for power-on

Estimated Time for travel and commissioning: 1 day per meter.
Travel and accomodation not included

Remarks and Exclusions:

GENERAL:

- Present proposal has been based on the Specification provided, Sick reserves the right to adjust the price if additional requirements will be revealed later.

- Exclusions: All what has been not expressly specified in present quotation

Commercial Conditions:

Payment:

RIBA TBA

Invoicing Schedule:

TBA

Delivery Schedule:

- 3 weeks from PO for documentation for approval submittal
- 12 weeks from approval of documents for material ready for FAT
- 2 weeks after receipt of release note for material packed and ready to be picked-up.

Attachements:

A) Atex Certificates
B) Product Information Flowsic 100 Flare
C) Outline Drawing Typical
D) Flow Calculations

Best Regards

Andrea Galdino
BU Flow Manager
Tel. + 39 02 27.434.285
Mobile + 39 348.22.16.196
e-mail: andrea.galdino@sick.it

SICK S.p.A.
Via Cadorna 66 – 20090 – Vimodrone (MI)
Tel. +39 02 27.434.1 – Fax +39 02 27.40.90.87

GENERAL SUPPLY CONDITIONS

The contractual relationship resulting from an order is supported by these General Supply Conditions.
Any derogation or additional terms shall only be valid if agreed on in writing by the parties.
SICK S.p.A. does not acknowledge the validity of agreements defined verbally by its Agents and/or Officials. Each Purchaser order implies acceptance of these General Supply Conditions with no reserves.
By accepting these General supply Conditions, the Purchaser specifically renounces to its own General Purchasing conditions considered either singly or as a whole.

OFFERS

Delivery time is scheduled as follows:

- 3 weeks after PO for documentation for approval submittal
- 25 weeks after approval of documents for material ready for FAT at factory
- 1 weeks after receipt of release note.

PRICE LISTS

Prices in offers are in Euro, VAT excluded.
Sick S.p.A. reserves the right to change its price list with no prior notice.

ORDERS

The Purchaser shall demonstrate its will to buy by sending SICK S.p.A. a purchase order.
The purchase order shall indicate the quantity of SICK S.p.A. product ordered.
Each order must be sent in writing to the SICK S.p.A. Process Automation COMMERCIAL OFFICE and be confirmed in writing by SICK S.p.A..
The contract is considered as valid when the purchase order sent to SICK S.p.A. by the Purchaser has been accepted by Sick.
If SICK S.p.A. can and does not intend to accept the order, it will inform the Purchaser in writing within 15 days from receiving the order.
Sick can accept orders with delivery scheduling of up to 12 months from order date, except for exceptions to be agreed on each time..

DELIVERIES

Delivery of products ordered will be ex Warehouse or Works indicated by SICK in the offer or in the purchase order acceptance.
To respect delivery conditions, goods are considered as delivered to the Purchaser at the moment they are collected by the Purchaser's shipper or by the Purchaser itself from the warehouse or plant indicated above.

The bill of lading for the products ordered (Transport Document) must clearly state: i) order reference; ii) SICK product identifying code; iii) kind and quantity of products delivered.
Delivery dates are purely indicative and subordinate to variations due to goods availability in SICK S.p.A. warehouses and to the fact that the Purchaser has paid for any amounts due for prior supplies.
If there are any delivery delays, SICK will inform the Purchaser of the reason for said delay indicating new delivery availability dates.
If events that do not depend on SICK S.p.A. should occur to stop it being able, partially or fully, to fulfil its contractual obligations, SICK S.p.A. can in no way be held liable for damages.

PACKAGING

Packaging is included in the price except when it is quoted for in the offer.
Special packaging is only supplied at Purchaser request and quoted in the offer or in purchase acceptance by SICK S.p.A.

TRANSPORT

All costs for and connected to transport will be charged exclusively to the Purchaser, with goods delivered ex-warehouse or works indicated by SICK S.p.A. in the offer or purchase order acceptance.
The shipping charge is included in the offer or in the SICK SpA order acceptance, also considering kind, weight and volume of goods to be shipped.
Goods shipped always travel at a Purchaser's risk and peril: shipping risks are fully Purchaser liability.

PAYMENTS

The payment terms and methods indicated in the invoice are mandatory; in particular, payment terms are to be considered essential in SICK S.p.A. interest, pursuant to and for the purpose of art. 1457 of the civil code, thus, if not observed, the contractual relationship resulting from the purchase order attributed to SICK S.p.A. by the Purchaser and accepted by the latter is terminated by right.
If there are any delays on payment terms indicated in the invoice, default interest at a monthly rate of 0.3 per cent shall be charged, with no prejudice to the claiming of further damages.
Default interest is applicable for the period between the expiry date and the effective payment date.
In the case of lengthy delay, SICK S.p.A. reserves the right to take legal action.
Any contestation raised by the Purchaser or that should arise between the latter and SICK S.p.A., cannot suspend Purchaser obligation to pay SICK S.p.A. the amounts due within the terms agreed on.

WARRANTY

Products sold by SICK S.p.A. are free of flaws and/or defects and are guaranteed for 12 months from installation date and, anyhow, no longer than 18 months from delivery date. The Purchaser must inform SICK, by mail or fax, of product installation by and no later than 48 hours from the

time of installation.
As this is not a sale of consumer goods, art. 132 of Legislative Decree no. 206, 6 September 2005, (Consumer Law) is not applicable.
The warranty is only effective for the direct Purchaser of SICK S.p.A.; any complaints presented by third parties, even those entitled as customers of SICK Purchasers, will not be accepted. Any flaws and/or defects in goods must be notified in writing as quickly as possible and, anyhow, within no later than eight days from receiving the goods; this term starts from the date said flaws/defects are discovered if they are hidden defects.
If there should be any ascertained and immediately communicated flaws and/or defects, SICK can, at its choice, replace or repair defective products, after prior control that all connections and/or installation has been carried out conforming to the instructions in the technical manuals; excluding, in the widest extension foreseen by law, any other and further liability for damages occurring to the Purchaser or third parties following and resulting from use of products it distributes.
Samples, prototypes and products being developed are delivered in the state they are found in and are not covered by warranty.
The Purchaser renounces, pursuant to art. 131 of the Consumer Law, to the right of recourse against SICK beyond limits going beyond the warranty provided contractually. The guaranteed product must be sent free of charge, with prior authorisation to:

SICK S.p.A.
Via Cadorna 66
20090 Vimodrone (MI)

LIABILITY LIMITS

In no case can SICK S.p.A. be held liable for damage to the Purchaser or third parties from the purchase, possession or use of SICK S.p.A. products, from use of services supplied by the SICK S.p.A. website or from technical advice supplied by SICK S.p.A., unless foreseen by the above Warranty clause.
In no case can SICK S.p.A. be held liable for indirect damage or damage resulting from use of products supplied by SICK S.p.A. occurring to the Purchaser or third parties; thus including, as an example with no limitation, loss of profit, loss of income, expenses sustained by the Purchaser to purchase spare parts for products supplied by SICK S.p.A.
The Purchaser shall safeguard SICK S.p.A. from any claim, action, exception taken by third parties with reference to products supplied by SICK S.p.A..
The supplier's liability will not exceed the value of the total amount of the supplied products or of the services rendered.
In any case, the supplier will not be responsible in case of fault (including negligence) and for any damages occurred (special, accidental, consequential or remote damages), included, for example, loss of income, loss of use, non-working of the machineries and expenses sustained for it, investment's costs, claims of the customer's clients due to delayed or missed obtainment of profits or production.

RETURNS

All returns must have prior authorisation from SICK S.p.A.

Goods must be sent free of charge exclusively to the warehouse or plant indicated by SICK in said authorisation to return and will travel at Purchaser risk and peril.
The warehouse will refuse to accept any returns arriving with no prior SICK S.p.A. authorisation.
Products must be returned in tact in their original packaging and complete with all parts supplied.
On the contrary, SICK S.p.A. has the faculty not to accept said returns.

REPAIRS

Products to be repaired that are no longer under warranty must be sent free of charge with prior authorisation to:

SICK S.p.A.
Via Cadorna 66
20090 Vimodrone (MI)

SUSPENSION OF ORDER

If the Purchaser does not respect, even partially, one of the supply conditions set or if there are variations of any kind to the Purchaser's corporate name, constitution or commercial capacity, and in the case of proven payment difficulties for the Purchaser, even to third parties, SICK S.p.A. can suspend further deliveries.

COMPETENT COURT OF LAW AND LAWS APPLICABLE

Monza Court of Law is exclusively competent for any controversy re validity, execution and interpretation of these general supply conditions and re every single order they apply to.

These general supply conditions, as well as every single order of the Purchaser, are governed by Italian Law.

The non effectiveness of any single condition in these general supply conditions does not effect the remaining conditions.

TREATMENT OF PERSONAL DATA

By accepting these General Supply Conditions, the Purchaser, pursuant to and for the purpose of Legislative Decree no 196 of 30 June 2003, having read the information notes pursuant to art. 13 and the rights established in art. 7 of said law, hereby gives its consent for all data regarding it to be handled by SICK S.p.A..

IN ACCEPTANCE:
The Purchaser (date, stamp and signature)

For the purpose of arts. 1341 and 1342 of the civil code, the Purchaser hereby grants specific approval of the following general supply condition clauses: OFFERS, PRICE LISTS, ORDERS, DELIVERIES, TRANSPORT, PAYMENT, WARRANTY, LIABILITY LIMITS, RETURNS, SUSPENSION OF ORDERS, COMPETENT COURT OF LAW AND LAWS APPLICABLE.

IN ACCEPTANCE:
The Purchaser (date, stamp and signature)