APA Group

FYFE
Earth Partners
ENVIRONMENT
DEVELOPMENT
RESOURCES

PALM VALLEY INTERCONNECT METER STATION HAZARDOUS AREA DOSSIER



FYFE REFERENCE: 18756-4-HAD-002

APA REFERENCE: HAD DATA REPOSITORY/ADP_003_PVI

Prepared by: _____ Date: 20-Sep-2011
Arjun Patel
Graduate Mechanical Engineer - Fyfe

Reviewed by: _____ Date: 20-Sep-2011
Tony Bird
Principal Process Engineer - Fyfe

Client Accepted: _____ Date:
Anthony Comerford
Pipeline Engineer – APA Group

Manager: _____ Date:
Henry Dupal
Engineering Manager - APA Group Northern Territory

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Credential Exposure

PERSONNEL

Tony Bird from Fyfe Pty Ltd is a principal process engineer with over ten years of experience in hazardous area classifications of new and existing projects. His experience in the development of retrospective hazardous area classifications includes Palm Valley gas plant, Torrens Island power station, Pelican Point power station and numerous Santos facilities.

His experience covers oil and gas pipeline and facility projects during all stages of design from concept, feasibility, and FEED through to detailed design. He also has experience in procurement, construction supervision, commissioning and operations support of pipeline facilities.

Tony's responsibilities for this project included the examination of site, confirmation of installed equipment, and development of hazardous area classification and hazardous area mapping drawings.

Daniel Williams from Sitzler Pty Ltd is a sub-contract industrial/commercial electrician with experience in various hazardous area installations and inspections. His competencies in accordance to AS/NZS 4761 include (Refer attachments):

UTE NES 010 A	Report on integrity of explosion protected equipment in hazardous areas
UTE NES 107	Install explosion-protected equipment and wiring systems (Ex)
UTE NES 214	Maintain equipment in hazardous areas (Ex)
UTE NES 408	Test installations in hazardous areas (Ex)
UTE NES 409	Inspect visually existing hazardous area installations (Ex)
UTE NES 410	Inspect in detail hazardous area installations (Ex)

He was previously an electrical supervisor for the Blacktip gas plant construction, hazardous area inspector / supervisor and leading hand electrician for the Darwin LNG plant, and construction electrician for the Darwin biodiesel plant.

Daniel's role for this project was to perform close inspection of all electrical equipment in accordance to AS/NZS 60079 series on site to verify installation.

Neville Green from Sitzler Pty Ltd is an electrical engineer with over ten years of experience in the design, construction, commissioning and inspection of installation in hazardous environment in the oil and gas industry. Neville has the following competencies in accordance to AS/NZS 4761(Refer attachments):

UTE NES 010 A	Report on integrity of explosion protected equipment in hazardous areas
UTE NES 107	Install explosion-protected equipment and wiring systems (Ex)
UTE NES 707	Design electrical installations in hazardous areas (Ex)

Neville's role was to review inspection sheets and provide recommendations for remedial actions to ensure compliance.

Michael Hayden from Fyfe Pty Ltd is the surveyor who completed three dimensional (3D) scanning and photography of the facilities. The 3D images were used by Fyfe drafters to update site arrangement drawings. The 3D scan data is retained by Fyfe for future use if required by APA Group.

METHODOLOGY

The Hazardous Area Verification Dossier is produced to ensure that the installation complies with the appropriate certification documents as well as with AS/NZS 2381.1 and any other relevant part of the AS/NZS 2381 and AS/NZS 60079 series. In addition equipment and installations where hazardous areas exist are required to comply with the applicable regulations of the applicable Australian State or Territory. It should be borne in mind that an installation can come under the jurisdiction of several authorities with different areas of responsibility, e.g. mining, electrical safety, handling and transport of flammable materials and occupational health and safety.

This dossier has been prepared in accordance with the following codes and standards:

- Dossiers AS 2381.1:2005 - Electrical equipment for explosive gas atmospheres - Selection, installation and maintenance Part 1: General requirements
- Hazardous area AS/NZS 60079.10.1:2009 - Explosive atmospheres: Classification of areas - Explosive gas atmospheres (IEC 60079-10-1, Ed. 1.0 (2008) MOD) (2009)
- AS/NZS 60079.17:2009 : Explosive atmospheres - Electrical installations inspection and maintenance (IEC 60079-17, Ed.4.0 (2007) MOD)

Note that a Hazardous Area Verification Dossier is a living document and should be updated by APA and / or its contractors. Any modifications to electrical equipment, including removing an instrument cover should be recorded and stored within the Dossier. Changes to the operation or equipment installed within the station will require a review of the hazardous area classification and may require revision of the classification, hazardous area mapping drawings, hazardous area equipment lists and associated certificates of conformity. An extract from AS 2381.1 (2005) is included STET to provide guidance to APA.

Equipment requires conformity to the following standards:

- AUS Ex
- IEC Ex

Previously AS / NZS Ex and FLP have been recognised certification standards for equipment in hazardous areas and may have been applicable at the time of construction / installation. Equipment that was identified as having any of the certification to show conformity to the above standards was deemed to be acceptable. Where no certification was available or certification was available to standards not recognised in Australia, a conformity assessment document (CAD) is required. The CAD shall be completed by a suitably qualified organisation and the associated residual risk shall be accepted by the head of APA. For new installations, equipment with the correct certificates of conformity should be used unless no item exists and then a CAD should be produced. No information on the date of installation/ of equipment purchase/manufacturer has been provided of the

site. Therefore no checking has been undertaken to determine the currency of the certificate at the time of installation.

DISCLAIMER

Opportunities for improvements (OFI) are provided for items associated with hazardous area and general engineering. The scope of work for the project was to identify hazardous area and provide visual inspection of the equipment. The visual inspection did not include opening of equipment and the OFIs are limited to the level of inspection. General engineering OFIs are non-exhaustive and require APA to confirm the OFI and the recommendation.

Extract from AS 2381.1 (2005)

1.6 DOCUMENTATION

It is necessary to ensure that any installation complies with the appropriate certification documents as well as with this Standard and any other requirements specific to the plant on which the installation takes place.

To achieve this result, a verification dossier shall be prepared for every plant and shall be either kept on the premises or stored in another location in which case a document shall be left on the premises indicating who the owner or owners are and where that information is kept, so that when required, copies may be obtained. This dossier should contain the information detailed in the appropriate Parts of this series of Standards for the types of protection concerned.

Up-to-date information typically required is as follows:

a) *Where applicable a statement of the identity of the person(s) having legal ownership of the installation or parts thereof and where the verification dossier is located.*

b) *The classification of hazardous areas and the Standards used for the classification.*

c) *Equipment group and temperature class.*

d) *Installation instructions.*

e) *Documentation/certification for electrical equipment, including those items with special conditions, for example, equipment with certificate numbers that have the suffix 'X'.*

f) *Descriptive system document for the intrinsically safe system.*

g) *Documentation relating to the suitability of the equipment for the area and environment to which it will be exposed, e.g. T rating, Ex rating, IP rating, corrosion resistance.*

h) *Documentation certifying that the equipment is rated for the voltages and frequency applied during normal operation.*

i) *Manufacturer's/qualified person's declaration, e.g. tradesperson's documentation and inspector's inspection reports.*

j) *Records sufficient to enable the explosion-protected equipment to be maintained in accordance with its type of protection (for example, list and location of equipment, spares, technical information).*

k) *Records covering any maintenance, overhaul and repair of the equipment.*

l) *Records of selection criteria for cable entry systems for compliance with the requirements for the particular explosion technique.*

m) *Drawings and schedules relating to circuit identification (see Clause 3.8.16).*

n) *In New Zealand, the Hazardous Area Statement of Periodic Verification on completion of a periodic inspection. (Refer to Appendix B).*

Where alternative methods of equipment identification are used for inspection in accordance with Clause 4.3 then additional documentation to support the traceability of the equipment shall be provided.

It shall be the responsibility of the person(s) having legal ownership of the installation or parts thereof to ensure that the relevant information is produced but the preparation of the document may be delegated to expert bodies/organizations. The dossier may be kept as hard copy or in electronic form.

1.7 QUALIFICATIONS OF PERSONNEL

The design, construction, maintenance, testing and inspection of installations covered by this Standard shall be carried out only by competent persons whose training has included instruction on the various types of protection and installation practices, relevant rules and regulations and on the general principles of area classification. The competency of the person shall be relevant to the type of work to be undertaken.

Appropriate continuing education or training should be undertaken by personnel on a regular basis.

Competency may be demonstrated in accordance with AS/NZS 4761, Competencies for working with electrical equipment for hazardous areas (EEHA), or equivalent training and assessment framework.

moxi / SKILL + LEARNING

This is a Statement that

Dan Williams

Has been assessed as having fulfilled the following requirements

UTE NES 010 A	Report on the integrity of explosion-protected equipment in hazardous areas
UTE NES 107 TA	Install explosion-protected equipment & wiring systems (Ex mixed)
UTE NES 107 WA	Install explosion-protected equipment & wiring systems (Ex n)
UTE NES 107 XA	Install explosion-protected equipment & wiring systems (Ex i)
UTE NES 107 YA	Install explosion-protected equipment & wiring systems (Ex e)
UTE NES 107 ZA	Install explosion-protected equipment & wiring systems (Ex d)
UTE NES 214 TA	Maintain equipment in hazardous areas (Ex mixed)
UTE NES 214 WA	Maintain equipment in hazardous areas (Ex n)
UTE NES 214 XA	Maintain equipment in hazardous areas (Ex i)
UTE NES 214 YA	Maintain equipment in hazardous areas (Ex e)
UTE NES 214 ZA	Maintain equipment in hazardous areas (Ex d)
UTE NES 408 TA	Test installations in hazardous areas (Ex mixed)
UTE NES 408 WA	Test installations in hazardous areas (Ex n)
UTE NES 408 XA	Test installations in hazardous areas (Ex i)
UTE NES 408 YA	Test installations in hazardous areas (Ex e)
UTE NES 408 ZA	Test installations in hazardous areas (Ex d)
UTE NES 409 TA	Inspect visually existing hazardous area installations (Ex mixed)
UTE NES 409 WA	Inspect visually existing hazardous area installations (Ex n)
UTE NES 409 XA	Inspect visually existing hazardous area installations (Ex i)
UTE NES 409 YA	Inspect visually existing hazardous area installations (Ex e)
UTE NES 409 ZA	Inspect visually existing hazardous area installations (Ex d)
UTE NES 410 TA	Inspect in detail hazardous area installations (Ex mixed)
UTE NES 410 WA	Inspect in detail hazardous area installations (Ex n)
UTE NES 410 XA	Inspect in detail hazardous area installations (Ex i)
UTE NES 410 YA	Inspect in detail hazardous area installations (Ex e)
UTE NES 410 ZA	Inspect in detail hazardous area installations (Ex d)

in partial completion of the following qualification

Certificate IV in Electrotechnology (Explosion-protection) UTE 4 07 99

Sarah Petrides

Prepared by
Sarah Petrides
Administration Assistant

Approved by
Michael Williams
Certified Trainer and Assessor

National Provider Code 51160

Date of Issue: 31 May 2007

THE INSTITUTION OF ENGINEERS AUSTRALIA

NATIONALLY RECOGNISED TRAINING

Training Accreditation Council WESTERN AUSTRALIA

This statement of attainment is recognised within the Australian Qualifications Framework

Certificate No.: 0737-1-07

moxi / SKILL + LEARNING

This is a Statement that

Neville Owain Green

has been assessed as having fulfilled the following requirements

UTE NES 010 A	Report on the integrity of explosion-protected equipment in hazardous areas
UTE NES 107 TA	Install explosion-protected equipment & wiring systems (Ex mixed)
UTE NES 107 WA	Install explosion-protected equipment & wiring systems (Ex n)
UTE NES 107 XA	Install explosion-protected equipment & wiring systems (Ex i)
UTE NES 107 YA	Install explosion-protected equipment & wiring systems (Ex e)
UTE NES 107 ZA	Install explosion-protected equipment & wiring systems (Ex d)
UTE NES 707 TA	Design electrical installations in hazardous areas (Ex mixed)
UTE NES 707 WA	Design electrical installations in hazardous areas (Ex n)
UTE NES 707 XA	Design electrical installations in hazardous areas (Ex i)
UTE NES 707 YA	Design electrical installations in hazardous areas (Ex e)
UTE NES 707 ZA	Design electrical installations in hazardous areas (Ex d)

in partial completion of the following qualification
Certificate IV in Electrotechnology (Explosion-protection) UTE 4 07 99

Sarah Petrides
Prepared by
Sarah Petrides
Administration Assistant

Approved by
Sam Zacha
Managing Director

National Provider Code 51160

Date of Issue: 5 December 2007

THE INSTITUTION OF ENGINEERS AUSTRALIA

NATIONALLY RECOGNISED TRAINING

Training Accreditation Council WESTERN AUSTRALIA

This statement of attainment is recognised within the Australian Qualifications Framework

Certificate No.: 1089-1-07

This is to certify that

Neville Green

of

GPA Engineering Pty Ltd

Completed the 3 day

Electrical Safety in Hazardous Areas

Training Course

26th to 28th February 2001

Signed: *C R Baker*

Colin Baker CEng, MIEE, MInstMC, FIICA
Partner, Principal Consultant & H-Class Electrical Inspector

Certificate Number: 2001.02.26-28/05

This 24 hour short course is recognised by
The Institution of Engineers, Australia, for Continuing Professional Development (CPD) purposes

Explosion Protection Technology, 8 Kirkfell Court, Berwick, Victoria 3806, Australia

Table of Contents

Revision History:

Rev.	Status	Date	Prepared	Reviewed	QA
A	Preliminary issue for client's review	26-Aug-2011	SNT	RDK	
0	Original Issue	20-Sep-2011	AZP	TCB	EZG

1 Site Information

An inspection on the Palm Valley Interconnect meter station site was performed on 3 August 2011 by Tony Bird, a senior process engineer from Fyfe and Daniel Williams, a sub-contract industrial/commercial electrician from Sitzler.

The Palm Valley Interconnect meter station is located at KP0000. Gas to the Palm Valley meter station comes from either the Magellan operated Palm Valley gas plant or from the ADP via the Palm Valley metering station.

The gas supply from the ADP is fed to a skid. The skid has recently been modified by APA, although no information is available. From the existing P&IDs and inspection; the pipe from the Palm Valley station is DN 100. The pipe decreases to DN 80 on the skid. At the inlet to the skid there is a pressure transmitter and indicator. The gas passes to a flow meter with pressure and temperature correction. Isolation valves and a manual bypass are provided. The skid is supplied with two pressure control valves, the main one is electro-pneumatic and the stand-by one is pneumatic controlled and actuated. Downstream of the control valves is an actuated valve fitted with pressure pilots and solenoids. The instrument gas for the control valves is conditioned from the transmission gas. The instrument gas is fitted with dual pressure regulators, knock out pot, filter, a PSV and high and low pressure pilots that close the actuated valve. The vents from all two valve instrument manifolds are tubed to a location at the edge of the skid roof.

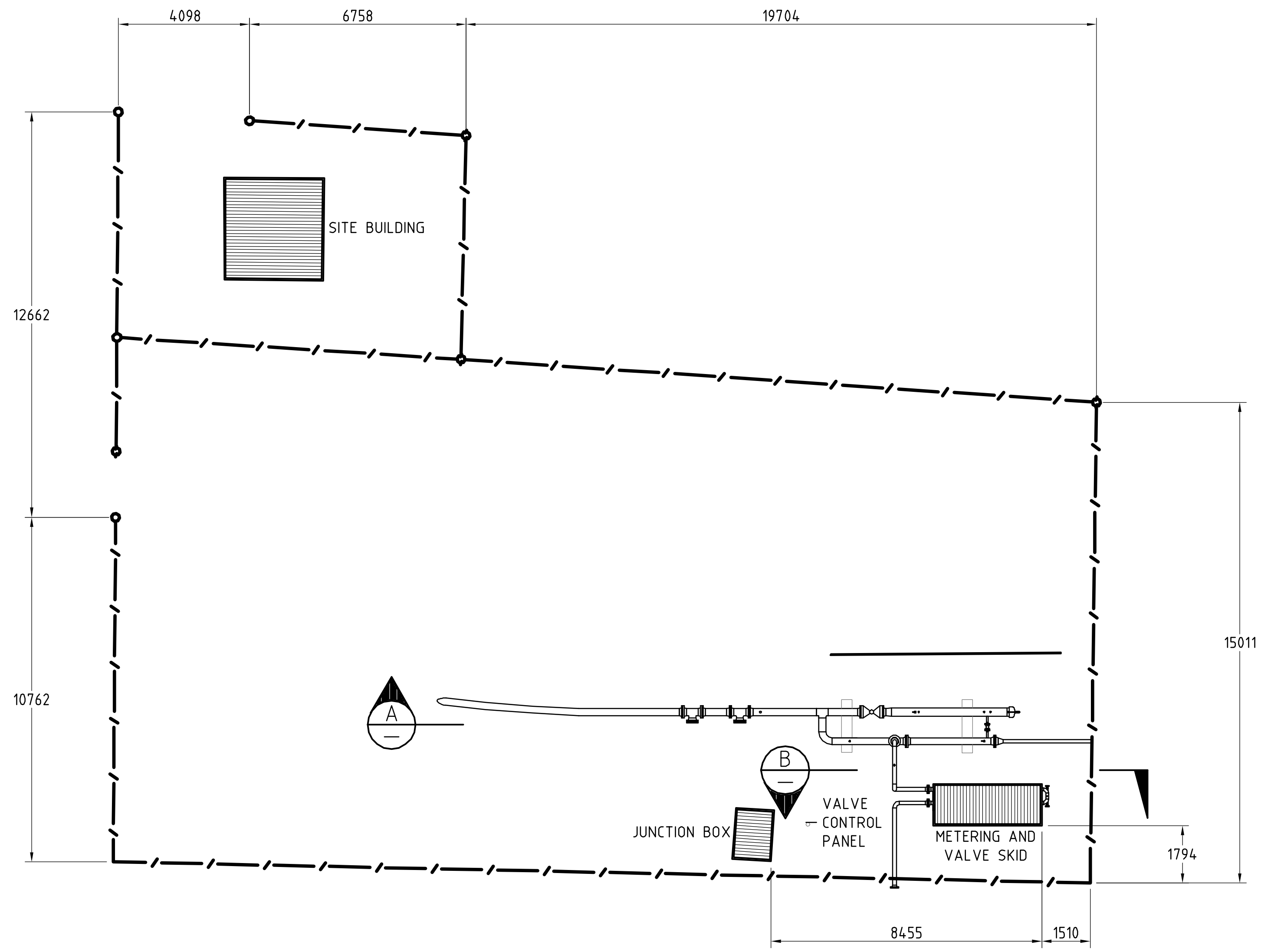
The line from the Palm Valley gas plant is DN 100 which increases to DN 200. The gas then passes to a restriction orifice (RO). Upstream of the RO is the DN 50 kicker line connection to the scraper launcher. Downstream of the RO is the connection from the ADP. Next there is a station limit valve (SLV) that isolates Palm Valley to Alice Springs pipeline from both gas feeds. The SLV is pneumatically actuated from instrument gas conditioned locally and closes when a low pressure is sensed in the pipeline.

The scraper launcher is fitted with a quick opening closure, a pressure indicator, pressure relief valve and valves to allow operation.

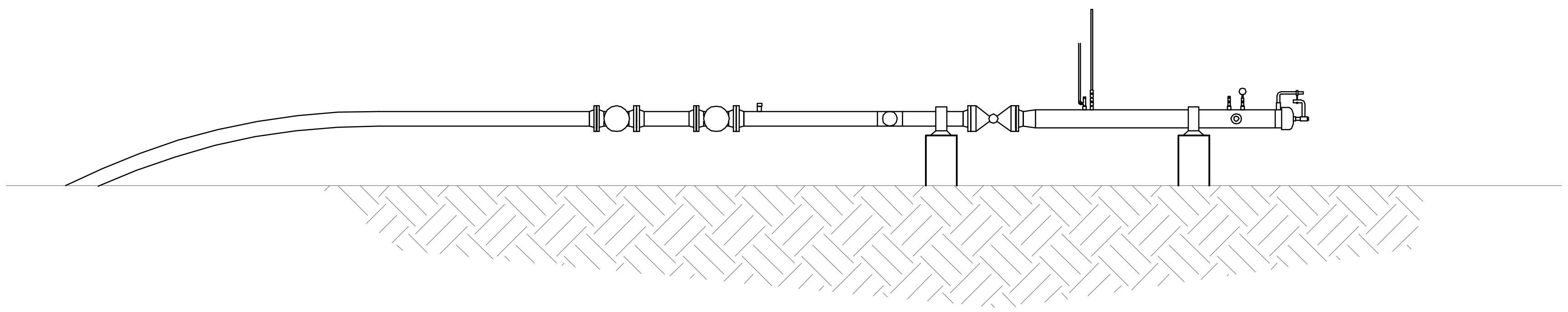
Parallel to the scraper launcher is a wall. The wall is 1.8 m away from the centre line of the scraper launcher. The impact of the wall on the hazardous zones will be to extend the size of the hazardous area zone (refer section 2.7.11).

The site arrangement drawings and P&IDs for the Palm Valley meter station can be found overleaf.

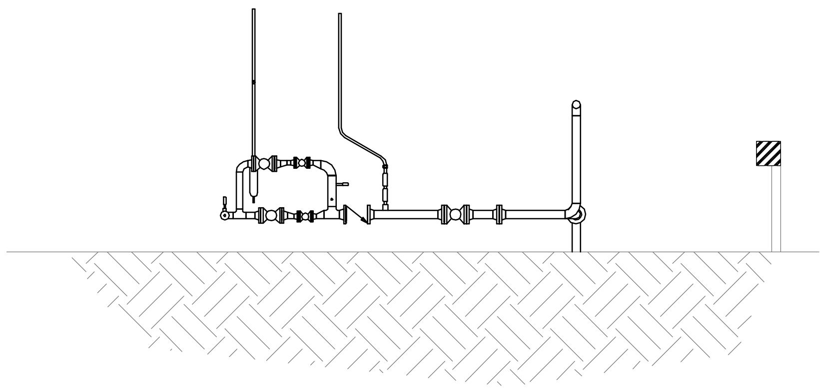
Drawing Number	Description	Revision
APA Group Arrangement Drawing		
Fyfe Updated Plot Plan		
AD 00-2-6003	Palm Valley Interconnect Meter Station Plot Plan	0
P&IDs		
AD 00-2-7004	Palm Valley Interconnect Metering and Valve Skid	0
AD 00-2-7009	Palm Valley Interconnect Envestra Scraper Station	0



PLAN VIEW 01
SCALE 1:100



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

0 1 2 3 4 5
SCALE 1:50 METRES

0 2.5 5.0 7.5 10
SCALE 1:100 METRES

NOTES:
1. LOCATION OF UNDERGROUND SERVICES NOT CONFIRMED AND NOT SHOWN ON THIS DRAWING, REFER TO DRAWING XXX-XX-XXX ALL FOR PIPING DETAILS.
2. ALL DIMENSIONS ARE BASED ON 3D SCAN DATA. ALL 3D DATA RETAINED BY FYFE

REV	REVISION DESCRIPTION	DATE	DRN.	CHD.	APP.	REFERENCE DRAWINGS	DRG.NO.

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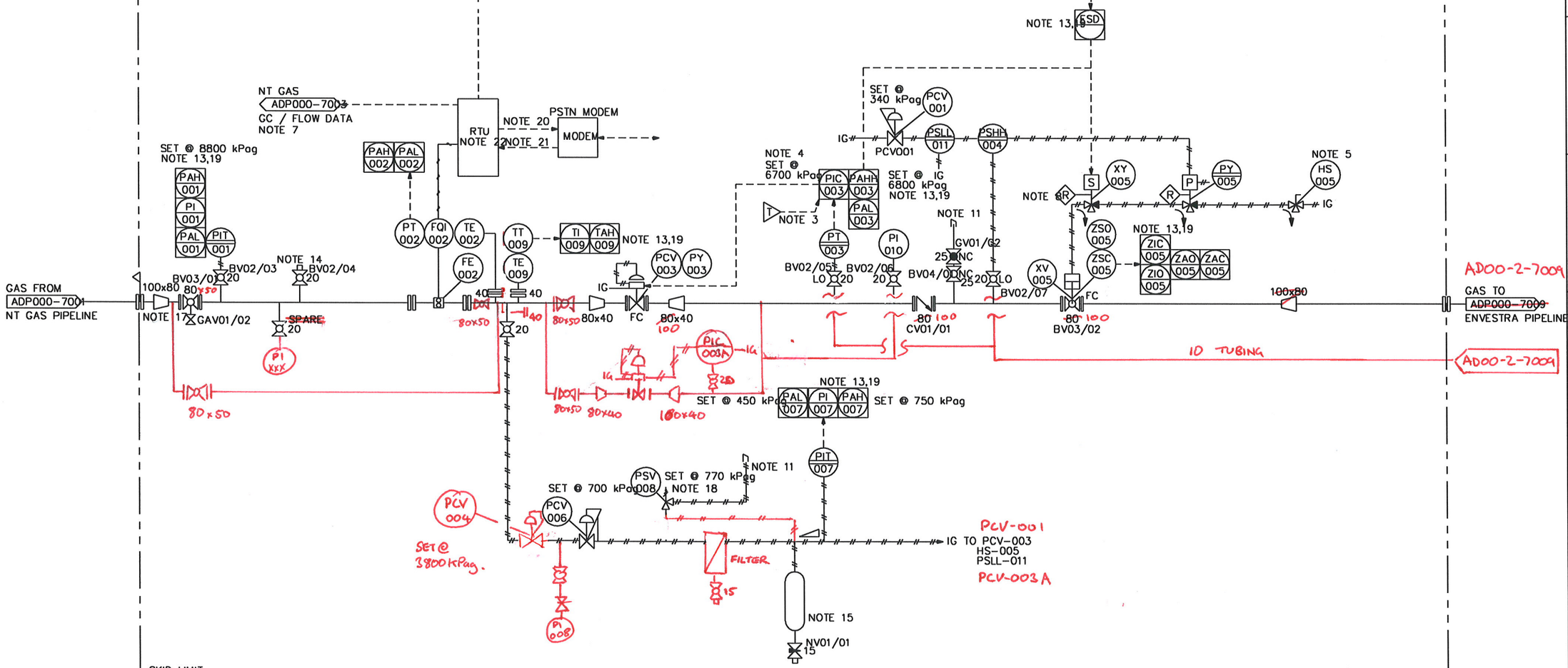
APA Group

SHEET NO.	SCALE AS SHOWN	PROJECT	AMADEUS BASIN TO DARWIN PIPELINE
LEVEL DATUM	FILENAME AD00-2-6003	TITLE	PALM VALLEY STATION (350NS) PLOT PLAN - PALM VALLEY INTERCONNECT PALM VALLEY PLOT PLAN
FIELD BOOK	DATE		
	DRAWN FYFE		
	CHECKED TCB		
DESIGN ENGINEER	APPROVING ENGINEER	PROJECT NO.	DRAWING NO. AD00-2-6003 REV 0



NOTES:

1. DELETED
2. DELETED.
3. SET TO 4500 kPag IN WINTER (1 MAY TO 1 SEPT) BY REMOTE SET-POINT CHANGE.
4. PCV-003 CLOSES FULLY ON DE-ACTIVATING BELOW 10%. RE-ACTIVATES WHEN PIT-003 = PIC-003 SET POINT MINUS 200kPa
5. HANDSWITCH LOCATED IN SAFE AREA.
6. DELETED.
7. GAS ANALYSIS: CO2, N2, SG & HV
8. MANUAL RESET
9. DELETED.
10. ALL VALVES ARE ANSI 600# EQUIVALENT
11. VENT AT 2 METRES ABOVE SKID PIPING
12. DELETED.
13. ALL ALARMS AUTOMATICALLY DIAL OUT VIA TELEMETRY TO BEAM ADELAIDE.
14. FOR FUTURE GC CONNECTION
15. 50 NS PIPE; NOMINAL 5 LITRES.
16. DELETED.
17. TEMPORARY CONE STRAINER TO BE REMOVED AFTER COMMISSIONING.
18. PSV-008 IS SUPPLIED WITH PCV-006
19. VIA MODEM TO BEAM ADELAIDE.
20. ALARM DIAL OUT BY EXCEPTION.
21. SYSTEM DIAL IN.
22. REFER TO DRG No.07287-JB-0001.

MARK UP TCB FYFE
2 AUG 2011
AS BUILT.

NOTES:

REF DRG	DESCRIPTION	REV	DATE	DESCRIPTION	PROJ	DRN	CHK'D	ENG	QA	APP'D
		0	10.06.08	NEW DRAWING NUMBER, REF PREVIOUS ADP000-7004 REV 10	DCH	BP	HD			

PREPARED FOR: POWER AND WATER AUTHORITY

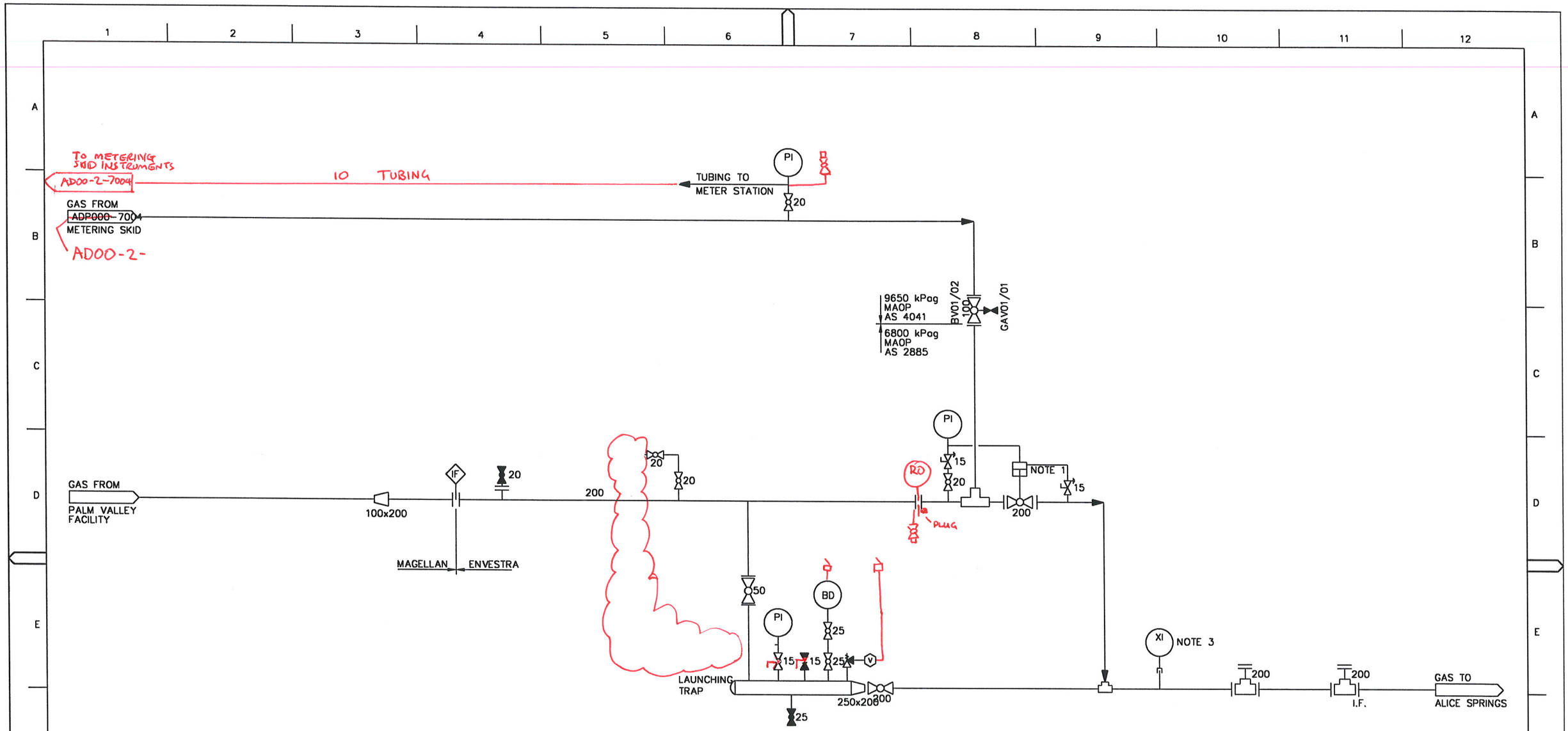
DRN	K.MILES
DATE	1/3/99
CHK'D	D.BELL
ENG	R.WOOD
Q.A.	B.BROOKS
APP'D	G.HOGARTH
SCALE	NTS

Worley

PALM VALLEY INTERCONNECT
METERING AND VALVE SKID
PIPING AND INSTRUMENTATION DIAGRAM

LOC No. 083 | DRG No. AD00-2-7004 | REV 0

A1 SHEET



NOTES:
1. LINE BREAK VALVE.
2. PIPELINE AND LAUNCHER DRAWN FROM GA.10-011 AND SITE OBSERVATION
3. PIG SIGNALLER

MARKUP TCB FYFE
3 AUG 2011
AS BUILT.

NOTES:

REF DRG	DESCRIPTION	REV	DATE	DESCRIPTION	PROJ	DRN	CHK'D	ENG	QA	APP'D
		0	10.06.08	NEW DRAWING NUMBER. REF PREV. ADP000-7009 REV 6		DCH	BP	HD		

PREPARED FOR: POWER AND WATER AUTHORITY

DRN	K.MILES
DATE	1/3/96
CHK'D	D.BELL
ENG	R.WOOD
Q.A.	B.BROOKS
APP'D	G.HOGARTH
SCALE	NTS

Worley

PALM VALLEY INTERCONNECT
ENVESTRA SCRAPER STATION
PIPING AND INSTRUMENTATION DIAGRAM

LOC No. 083 | DRG No. AD00-2-7009 | REV 0

A1 SHEET

2 Hazardous Area Classification Report

This section contains the hazardous area classification report written for the Amadeus Basin to Darwin pipeline facilities.

AMADEUS BASIN TO DARWIN PIPELINE
HAZARDOUS AREA CLASSIFICATION



FYFE REFERENCE: 18756-4-HAD-001

APA REFERENCE: HAD DATA REPOSITORY/ADP_18756_HADC

Prepared by: _____ Date: 24-Nov-2011
Tony Bird
Principal Process Engineer - Fyfe

Reviewed by: _____ Date: 24-Nov-2011
Rowan Kilsby
Manager, Mechanical Engineering - Fyfe

Client Accepted: _____ Date:
Anthony Comerford
Pipeline Engineer – APA Group

Manager: _____ Date:
Henry Dupal
Engineering Manager – APA Group Northern Territory

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Revision History:

Rev.	Status	Date	Prepared	Reviewed	QA
A	Preliminary Issue	30/08/2010	YZW	TCB	
B	Revised to Incorporate Information from 2011 Part 1 Site Inspection	24/08/2011	TCB	RDK	
C	Revised to Incorporate Comments from Client	19/09/2011	TCB	RDK	
D	Revised to following 2011 Part 3 and Part 4 site inspections	26/09/2011	TCB	RDK	
E	Revised following 2011 Part 2 site inspections	10/10/2011	TCB	RDK	
0	Original Issue	24/11/2011	TCB	RDK	EZG

2.1 INTRODUCTION

2.1.1 OBJECTIVE

The hazardous area classification covers the above ground gas regulating and metering stations, scraper stations and mainline valves in the Northern Territory Gas Network.

The pipeline and facilities were originally constructed in 1985 with the additional facilities added to supply new users and supply points. No hazardous area documentation was completed at the time of the construction as there were no Australian Standards for hazardous area classification in 1985. The selection, installation and maintenance of electrical equipment were covered by AS 1076 series (1977).

This report documents the results of a Hazardous Area Classification undertaken for the facilities mentioned in Section 2.4.

The interpretation and application of this classification should take into account that Hazardous Area Classifications are inherently “imprecise” and involve assumption based estimates, code interpretation and engineering judgement.

2.1.2 SCOPE OF STATIONS

The scope of stations covered by this hazardous area classification is shown below:

Station	Description	KP
Palm Valley	Meter Station	0000
Palm Valley Alice Springs	Meter Station	0000
Mereenie	Meter Station	0000*
Tylers Pass	Transfer Station	0045
Tanami Road	Scraper Station	0161
Aileron	Mainline valve	0241
Ti Tree	Scraper Station	0316
Barrow Creek	Mainline Valve	0401
Wauchope	Scraper Station	0458
Kelly Well	Mainline Valve	0546
Tennant Creek	Meter Station	0025†
Warrego	Scraper Station ONLY	0610
Morphett Creek	Mainline Valve	0660
Renner Springs	Scraper Station	0733
Fergusson	Mainline Valve	0791
Elliott Meter Station	Meter Station	0003‡
Daly Waters	Meter Station	0982
Newcastle Waters	Scraper Station	0844
Katherine Offtake	Scraper Station	0000**
Katherine	Meter Station	0005**
Larrimah	Mainline Valve	1053
Mataranka	Scraper Station ONLY	1108
Tindal	Mainline Valve	1209
Helling	Scraper Station	1243
Pine Creek	Meter Station	1317
Ban Ban Springs	Scraper Station	1378
Batchelor	Mainline Valve	1441
Acacia	Mainline Valve	1465
Berry Springs	Mainline Valve	1486
Darwin City Gate	Meter Station	1498
Channel Island	Meter Station	1510

* On Mereenie to Tylers Pass Pipeline

** On ADP to Katherine Pipeline

† On ADP to Tennant Creek Pipeline

‡ On ADP to Elliott Pipeline

2.1.3 EXCLUSIONS

The following stations are excluded from this hazardous area classification

- Alice Springs facilities (owned and operated by Envestra),
- McArthur River Mine pipeline lateral facilities,
- Warrego compression facilities (scraper facilities are included),
- Tenant Creek offtake,
- Helling scraper station training pipework,
- Cosmo Howley facilities,
- Mt Todd facilities,
- Weddell facilities,
- Mataranka meter station.

The hazardous area classification does not consider the hazardous area associated with equipment not included in the pipeline licence, e.g. gas plants at Mereenie and Palm Valley, and the gas reticulation facilities at Darwin.

2.1.4 REVISION HISTORY

2.1.4.1 Revision A

The hazardous area classification was raised and issued following the inspection of four sites on the Amadeus Basin to Darwin Pipeline in 2010, as listed below:

- Darwin City Gate Station
- Channel Island Station
- Helling Scraper Station
- Pine Creek Station

2.1.4.2 Revision B

Further inspection of sites was undertaken in August 2011 and the hazardous area classification updated to incorporate sources of hazardous release from the equipment at these sites. The additional sites inspected were:

- Mereenie Station
- Palm Valley Meter Station
- Palm Valley Interconnect / Alice Springs Meter Station
- Tylers Pass Station
- Tanami Road Scraper Station
- Aileron Valve Site
- Ti Tree Scraper Station

2.1.4.3 Revision C

The hazardous area classification updated to incorporate comments and recommendations from APA.

2.1.4.4 Revision D

Further inspection of sites was undertaken in September 2011 and the hazardous area classification updated to incorporate sources of hazardous release from the equipment at these sites. The additional sites inspected were:

- Katherine Meter Station
- Mataranka Scraper Station
- Ban Ban Springs Scraper Station
- Batchelor Valve Site
- Berry Springs Valve Site

In addition there were some revisions to site descriptions for the stations included at revision to ensure consistency.

2.1.4.5 Revision E

Further inspection of sites was undertaken in October 2011 and the hazardous area classification updated to incorporate sources of hazardous release from the equipment at these sites. The additional sites inspected were:

- Wauchope Scraper Station
- Tennant Creek Meter Station
- Warrego Springs Scraper Station
- Renner Springs Scraper Station
- Elliott Meter Stations
- Newcastle Waters Scraper Station
- Daly Waters Meter Station

2.1.4.6 Revision 0

- Original Issue for use.

2.2 METHODOLOGY

This Hazardous Area Classification has been carried out in accordance with the “source-by-source” guidance taken from AS/NZS 60079.10.1 (Standards Association of Australia and New Zealand), in association with IP Code Part 15 (Institute of Petroleum – UK) and API RP 505 (American Petroleum Institute – USA).

The potential leaks that can be anticipated in both normal and abnormal operations have been considered, such as the failure of a valve gland and the partial failure of a gasket flange. The application of explosion proof (Ex) equipment will make sure that ignition does not take place. The classification does not allow for catastrophic failure of pipework or equipment where the associated mechanical effects are almost certain to cause ignition.

The extent of Zone 0, 1 and 2 areas has been identified by investigating each relevant source or type of source.

Due to the imprecision inherent in hazardous area classification, the designation of small non-hazardous area within larger hazard areas has been avoided.

Natural boundaries have been used to define zone limits where reasonably practical. In some cases, where believed adequate, this has reduced the assigned area to some extent. In other cases, where there is no economic disadvantage, the zone areas have been extended to simplify their arrangement.

The equipment and pipework in the stations are installed in open outdoor (all sides of the compounds are open and the stations are not installed in natural depressions), therefore they are considered adequately ventilated. This classification assumes that all stations on the ADP covered by this report are well maintained at all times.

2.3 REFERENCES

2.3.1 AUSTRALIAN STANDARDS

AS/NZS 60079.10.1:2009	Explosive atmospheres Part 10.1: Classification of areas – Explosive gas atmospheres (IEC 60079-10-1, Ed.1.0(2008) MOD)
AS/NZS 60079.20:2000	Electrical apparatus for explosive gas atmospheres Part 20: Data for flammable gases and vapours, relating to the use of electrical apparatus

2.3.2 INTERNATIONAL STANDARDS

IP 15 Third Edition, 2005	Model code of safe practice Part 15: Area classification code for installations handling flammable fluids
API RP 505 First Edition, 1997	Classification of locations for electrical installations at petroleum facilities classified as Class I, Zone 0, Zone 1, and Zone 2

2.4 PROCESS DESCRIPTION AND OPERATIONS

2.4.1 PROCESS DESCRIPTION

2.4.1.1 Overview

The Amadeus Darwin Pipeline (ADP) was constructed to deliver gas from the Palm Valley and Mereenie gas plants in the south of the Northern Territory to Darwin in the north of the territory. Several offtakes have been added to supply users along the length of the pipeline. The pipeline is approximately 1,513 km long.

Currently, the majority of the gas is supplied to the ADP from Wadeye via the Bonaparte pipeline. The Bonaparte pipeline connects in to the ADP at Ban Ban Springs.

Typically drains and vents in the facilities are fitted with plugs or caps and therefore are not a source of release during normal operation. Drains are operated only when then the pipeline is depressured and do not require further consideration, vent points marked with BD on the P&IDs are assumed to be operated during routine operation and maintenance of the station and require consideration as a source of release.

2.4.1.2 Mereenie

Gas to the Mereenie station comes from the Santos operated Mereenie gas plant. Currently there is no contract for the supply of gas from Mereenie, however the station remains pressurised and can be returned to operation if required.

The station consists of DN 200 above ground connection to the Mereenie gas plant. Close to the connection point are temperature and pressure transmitters and high temperature and pressure trips and a station limit valve (SLV). The SLV is pneumatically actuated from instrument gas conditioned locally. The instrument gas system is provided with a local PSV that vents to atmosphere.

The gas then passes to two parallel filter separators. The filter separators are horizontal and fitted with quick opening closures to allow removal of the filter elements. The filter separators have been swapped with the filters originally installed at Palm Valley and this required some pipework modifications. The liquids removed from the gas are collected in a drain boot underneath the filter separator. The liquids are drained back to the Mereenie production facility. The filter separators are fitted with the following instrumentation; pressure indicator, differential pressure transmitter, level glasses, high level switches and a PSV.

From each filter separator the gas flows to a meter run. The flow meters are orifice meters that are fitted with flow conditioners, pressure transmitter, a low range and a high range differential pressure transmitter and a temperature transmitter. A blowdown point is provided on each meter run that can blow down the meter run and filter separator.

The pipework downstream of each meter run joins to a common line. There is a DN 20 blowdown point and an insertion sample probe installed to provide gas samples for the gas chromatograph and dew point analyser.

The gas then passes underground through a manual station limit valve to the Mereenie to Tylers Pass pipeline. There is a scraper launcher installed with quick opening closure, pressure indicator, blow down vent and associated valving for the launching of pigs.

2.4.1.3 Palm Valley

The Palm Valley metering station receives gas from the Magellan Petroleum operated Palm Valley gas plant.

The station consists of DN 300 above ground connection to the Palm Valley gas plant. Close to the connection point are temperature and pressure transmitters and high value trips and a station limit valve (SLV). The SLV is pneumatically actuated from instrument gas conditioned locally. The instrument gas system is provided with a local PSV that vents to atmosphere.

The gas then passes to two parallel filter separators. The filter separators are horizontal and fitted with quick opening closures to allow removal of the filter elements. The filter separators have been swapped with the filters originally installed at Mereenie; the filters are installed in the same location and have required minimal pipework modifications. The liquids removed from the gas are collected in a drain boot underneath the filter separator. Liquids are removed to temporary containers. The filter separators are fitted with the following instrumentation; pressure indicator, differential pressure transmitter, level glasses, high level switches and a PSV.

From each filter separator the gas passes to a meter run. The flow meters are orifice meters that are fitted with flow conditioners, pressure transmitter, a low range and a high range differential pressure transmitter and a temperature transmitter. A blowdown point is provided on each meter run that can blow down the meter run and filter separator.

The pipework downstream of each meter run joins to a common line. There is a DN 20 blowdown point and an insertion sample probe installed to provide gas samples for the gas chromatograph and dew point analyser.

The gas then passes underground through a manual station limit valve to the Palm Valley to Tylers Pass pipeline. The underground section of pipe is fitted with a blowdown point. A connection point and additional valve has been installed on the blowdown stack to provide gas to the Palm Valley to Alice Springs station. The connection point for the gas analyser has been relocated to this section of pipework to allow measurement of the gas that passes from the Amadeus Darwin Pipeline to the Alice Springs Pipeline. The pipework to the Palm Valley to Alice Springs Pipeline passes underground to a point adjacent to the Palm Valley to Alice Springs compound. There is a flanged connection to the compound fence line.

There is a scraper launcher installed with quick opening closure, pressure indicator, blow down vent and associated valving for the launching of pigs to the ADP.

2.4.1.4 Palm Valley Alice Springs

The Palm Valley Alice Springs site, also referred to as the Palm Valley Interconnect receives gas from either the Magellan operated Palm Valley gas plant or from the ADP via the Palm Valley metering station.

The gas supply from the ADP is fed to a skid. The skid has recently been modified by APA, although no information is available. From the existing P&IDs and inspection; the pipe from the Palm Valley station is DN 100. The pipe decreases to DN 80 on the skid. At the inlet to the skid there is a pressure transmitter and indicator. The gas passes to a flow meter with pressure and temperature correction. Isolation valves and a manual bypass are provided. The skid is supplied with two pressure control valves, the main one is electro-pneumatic and the stand-by one is pneumatic controlled and actuated. Downstream of the control valves is an actuated valve fitted with pressure pilots and solenoids. The instrument gas for the control valves is conditioned from the transmission gas. The instrument gas is fitted with dual pressure regulators, knock out pot, filter, a PSV and high and low pressure pilots that close the actuated valve. The vents from all two valve instrument manifolds are tubed to a location at the edge of the skid roof.

The line from the Palm Valley gas plant is DN 100 which increases to DN 200. The gas then passes to a restriction orifice (RO). Upstream of the RO is the DN 50 kicker line connection to the scraper launcher. Downstream of the RO is the connection from the ADP. Next there is a station limit valve (SLV) that isolates Palm Valley to Alice Springs pipeline from both gas feeds. The SLV is pneumatically actuated from instrument gas conditioned locally and closes when a low pressure is sensed in the pipeline.

The scraper launcher is fitted with a quick opening closure, a pressure indicator, pressure relief valve and valves to allow operation.

Parallel to the scraper launcher is a wall. The wall is 1.8 m away from the centre line of the scraper launcher. The impact of the wall on the hazardous zones will be to extend the size of the hazardous area zone (refer section 2.7.12).

2.4.1.5 Tylers Pass

At Tylers Pass the gas from Mereenie and Palm Valley are commingled and odorant is added. The DN 250 pipeline from Mereenie passes to an above ground scraper receiver, fitted with pig sig, vent, pressure indicator, quick opening closure and valving to allow operation. During normal operation the gas bypasses the scraper vessel via underground pipework. A pipeline riser is fitted with pressure transmitter, pressure indicator and high pressure trip. Downstream, there is a buried valve with above ground pneumatic actuator. The actuator is powered by instrument gas conditioned locally from the transmission gas.

The gas from Palm Valley is similar to the Mereenie connection but does not have a scraper receiver. The pipeline is DN 350 and includes a riser with pressure transmitter and pressure indicator upstream of a buried valve with above ground pneumatic actuator. The actuator is powered by instrument gas conditioned locally from the transmission gas.

There is a DN 200 vertical blowdown stack fitted with quick opening closure. The stack has buried connections and valves to the pipeline sections to Mereenie, Palm Valley and Tanami Road, as well as the scraper receiver.

Downstream of the two actuated valves the two pipeline sections join and are fitted with a temperature transmitter, pressure transmitter, pressure indicator, instrument gas offtake and odorant injection point.

The odorant injection package consists of an odorant storage pressure vessel, instrument gas conditioning and control and odorant dosing pumps. The storage vessel is fitted with a pressure relief valve, pressure indicator, two level glasses, a level transmitter and a continuous vent fitted with adsorption vapour filter. The vent from the tank is fitted with a cap so that the discharge point is vertically downwards. The instrument gas conditioning equipment comprises two regulators to reduce the pressure to 400 kPag. The tank blanket instrument gas is regulated to 15 kPag by a pressure regulator / over pressure shut off (OPSO) valve. The injection pump instrument gas is regulated to 400 kPag by a regulator. Control of the odorant injection pumps is by solenoid valves. The odorant dosing pumps suction is connected to the bottom of the odorant storage vessel. The discharge of each odorant dosing pump is fitted with a flow switch and pressure relief valve. The odorant injection point is fitted with an averaging chamber and a site flow indicator.

Note that there is no gas supply from Mereenie or Palm Valley and the gas flow through Tylers Pass is in the reverse direction. At the time of inspection the odorant plant was not operating.

2.4.1.6 Tennant Creek Metering Station

The Tennant Creek pressure reduction and metering station receives gas from ADP to Tennant Creek Pipeline, approximately 25 km long, and supplies the Tennant Creek power generation site. The Tennant Creek Station comprises of two filter separators, two water bath heaters, an atmospheric slop tank, control valves, pressure regulators, pressure relief valves, and the related pipework, instrumentation and valving.

The inlet to the station is DN 100 and consists of a scraper receiver vessel. The scraper vessel is fitted with local vent, PSV, pressure indicator and associated pipework and valving. The closure on the vessel is a blind flange.

The piping in parallel to the scraper receiver is fitted with a pressure transmitter, pressure gauge and a buried mainline valve. The valve has an aboveground gas over oil hydraulic actuator.

The gas then passes through two parallel filter separators. Upstream of both filter separators are temperature control valves that reduce the pressure to 5,200 kPag / 17°C [based on operating conditions at the time of the site visit]. The temperature control valves are provided with cascade control for pressure and temperature. The filter separators are fitted with a differential pressure transmitter, pressure indicator, high liquid level switches and high-high liquid level switches. The liquids are drained manually to an elevated slops tank. The slop tank is fitted with a liquid level glass and hose to allow emptying.

Gas from the filter separators is then heated by indirect fired water bath heaters to approximately 60 °C. The water bath heaters are operated as duty - standby, with the standby heater remaining ‘hot’ to allow quick change over, controlled by the actuated valves on the inlet to each heater.

The heated gases from heaters pass through two parallel regulator / meter runs. The regulator / meter runs are operated in duty - standby and each contains active - monitor pressure regulators. The meter skids are provided with two actuated valves that close on high pressure downstream of the regulators. Additional high pressure switches at the station outlet initiate a station ESD. Further over pressure protection is provided by a PSV at the station outlet. A meter is provided in each run. The meters are orifice meters with upstream flow conditioners, temperature transmitters, pressure transmitters and high and low range differential pressure transmitters. Each run is provided with a local blowdown point, pressure indicators and valving.

The station outlet is provided with a temperature indicator, temperature transmitter and low temperature switches. There is also provision for the installation of a future gas sampler. The connection to the Tennant Creek power generation site is DN 100.

Pipework downstream of the heater is fitted with insulation up to the station outlet.

Instrument gas is conditioned locally for each actuated valve and temperature control valve. Gas is conditioned at each water bath heater to provide fuel gas for the pilot and main burners. The fuel gas conditioning trains comprise of a pre-heat coil, strainer, primary pressure regulating valve, actuated ESD valves, secondary pressure regulating valve, meter and a temperature control valve.

A control system provides control and telemetry for the various process measurement parameters. The control system provides flow control and high pressure automatic shutdown functionality and allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.7 Elliott Meter Station

The Elliott Meter Station receives gas from a DN 50 lateral from the ADP. The lateral is approximately 4 km long and provides gas for the Elliott power generation site. The station consists of a scraper receiving vessel, dry gas filter, filter separator, knock out pot, two stages of pressure regulation, a catalytic heater, metering run, slop tank, atmospheric vent stack and the associated pipework, valves and instrumentation.

At the inlet to the station is a scraper receiving vessel. The scraper vessel is fitted with local vent, PSV, pressure indicator and associated pipework and valving. The closure on the vessel is a blind flange.

The main gas flow to the skid passes to an actuated valve. The gas is then filtered in a dry gas filter. The filter is horizontal and fitted with a quick opening closure, differential pressure gauge, PSV and vent.

The gas then passes to a temperature gauge and then two parallel pressure regulators that operate in duty and standby that reduce the gas pressure to 3,000 kPag.

The gas passes to a filter separator fitted with a differential pressure gauge with inductive high differential pressure switch, level gauge, pneumatic liquid level controller and control valve and high liquid level switch, pressure relief valve.

The gas from the filter separator passes to a knock out pot and then to a catalytic heater. The catalytic heater is decommissioned and has not operated for some time.

From the heater the gas passes to the second stage pressure regulators. The gas is reduced in pressure to 500 kPag in the parallel pressure regulators, operating in a duty-standby arrangement.

The gas is then metered in a rotary positive displacement meter that is corrected for temperature and pressure. Upstream of the meter is a second pressure relief valve.

Instrument gas for the site instrumentation and fuel gas for the catalytic heater are conditioned in an offtake from the outlet of the skid and distributed as required.

A control system provides control and telemetry for the various process measurement parameters. The control system provides flow control and high pressure automatic shutdown functionality and allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.8 Daly Waters Scraper and Meter Station

The Daly Waters Scraper and Meter Station is located at KP 0982 on the ADP and consists of a scraper receiver, scraper launcher and a filter, meter and pressure regulator station. The scraper part of the station is on the ADP and is the same as the scraper stations described in section 2.4.14. The meter part of station provides filtration and metering for the McArthur Mine River Pipeline. The meter station consists of gas over oil hydraulically actuated mainline, filter separators, metering, pressure regulation, a scraper launcher and associated pipework, valving and instrumentation.

The connection to the meter station is from the underground future compressor connection on the southern side (nominally upstream) of the scraper station. An above ground DN 350 blank flange has been provided for future connections. The connection to the meter station is DN 150 and consists of a ball valve with pressurising bypass and a downstream blank flange. The connection to the meter skid is by approximately 50 m of DN 150 welded pipe across the station.

The metering station is installed on two skid frames. The first comprises of an actuated valve, two dry gas filters, two meters, pressure control valves, instrument gas conditioning system and a scraper launcher.

The actuated valve is gas over oil actuated. Downstream of the actuated valve are two dry gas filters. Each dry gas filter is fitted with a differential pressure transmitter, manual vent and a drain. The gas from each filter passes to a meter run that comprises of a flow conditioner, orifice plate and thermowells. One of the meter runs is not fitted with instruments. The other is fitted with pressure transmitter, differential pressure transmitter and temperature transmitter.

2.4.1.9 Katherine Offtake

The Katherine Offtake is installed on the ADP at approximately KP 1,221. The site consists of a take-off from the mainline. The offtake is fitted with a DN 100 buried valve. The valve is manual operated and has above ground gear box, maintenance ports and a cavity bleed. The valve has DN 50 risers either side of the valve, fitted with manual valves. A scraper launcher is installed at the site. The scraper vessel is fitted with pressure indicator, PSV and local vent. An above ground DN 100 valve with DN 50 bypass is also provided at the station. The valve may be a plug valve, a ball valve or a globe valve in accordance with the P&ID, details drawing or site photographs respectively.

2.4.1.10 Katherine Meter / Regulating Station

The Katherine Meter/Regulating Station includes two filter separator, two water bath heaters, a slop tank, main line valve, control valves, pressure relief valves and the related pipework, instrumentation and valving.

The inlet to the station is DN 100 and consists of a buried station limit valve (MLV 11) with above ground actuator, maintenance ports and cavity bleed. A scraper receiver vessel is installed in parallel to MLV 11. The scraper vessel is fitted with a local vent, PSV, pressure indicator and associated pipework and valving. The closure on the vessel is a blind flange.

The following instrumentation is installed at the inlet; pressure indicator, a pressure transmitter and a temperature indicator.

The gas then passes through two parallel filter separators. Upstream of both filter separators are temperature control valves that reduce the pressure to 4,400 kPag / 16°C [based on operating conditions at the site visit]. The temperature control valves are provided with cascade control for pressure and temperature. One valve is fitted with a pneumatic controller to continue supply during outage of the electronic control system. The filter separators are fitted with differential pressure transmitter, pressure indicator, high liquid level switches and high-high liquid level switches. The liquids are drained manually to an elevated slops tank. The slop tank is fitted with a liquid level glass and a hose to allow emptying. Gas from filter separators is then heated by indirect fired water bath heaters up to approximately 60 °C. The water bath heaters are operated as duty - standby, with the standby heater remaining ‘hot’ to allow quick change over of the that is controlled by actuated valves on the inlet to each heater.

The heated gases from the heaters pass through two parallel regulator / meter runs. The regulator / meter runs are operated in duty - standby and each contains active - monitor pressure regulators. The meter skids are provided with two actuated valves that close on high pressure downstream of the regulators. Additional high pressure switches at the station outlet provide a station ESD. Further over pressure protection is provided by a PSV at the station outlet. A meter is provided in each run. The meters are orifice meters with upstream flow conditioners, temperature transmitters, pressure transmitters and high and low range differential pressure transmitters. Each run is provided with a local blowdown point, pressure indicators and valving.

The station outlet is provided with a temperature indicator, temperature transmitter and low temperature switches. There is also provision for the installation of a future gas sampler. The connection to the Katherine power generation site is DN 100.

Instrument gas is conditioned locally for each actuated valve and temperature control valve. Gas is conditioned at each water bath heater to provide fuel gas for the pilot and main burners. The fuel gas conditioning trains comprise of pre-heat coil, strainer, primary pressure regulating valve, actuated ESD valves, secondary pressure regulating valve, meter and temperature control valve.

The gas released in emergency directs to the vent stack that discharges to atmosphere and the liquid removed from the gas flows to the slop tank. The maximum PSV set point is 3,200 kPag and the temperature limit is set at 60 °C in the station.

A control system provides control and telemetry for the various process measurement parameters. The control system provides flow control and high pressure automatic shutdown functionality and allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.11 Pine Creek

The Pine Creek pressure reduction and metering station receives gas from ADP to supply the Pine Creek power generation site. The Pine Creek Station comprises of a dry gas filter vessel, a filter separator, a knockout pot, two water bath heaters, an atmospheric slop tank, control valves, pressure relief valves, and the related pipework, instrumentation and valving.

The Pine Creek station is located close to the ADP and a mainline valve is located within the station. The inlet connection to the station has two DN 80 manual valves. One valve is fitted with an insulation flange and a surge arrestor, the second is fitted with a pressurising bypass. Downstream of the manual valves is an actuated valve that is also fitted with a pressurising bypass. The gas then passes to a dry filter vessel that is fitted with a pressure indicator, PSV, a vent valve, pressurising line and a bypass line to allow maintenance of the filter. From the filter, the gas passes to a duty standby temperature control valve that drops the gas pressure from 7,800 to 4,200 kPag and a temperature of 16°C [based on observations during the site visit]. The gas then passes to a filter separator that is fitted with level gauge, level controller, level control valve, high level switch, pressure indicator, PSV, vent valve and differential pressure transmitter. In parallel to the filter separator is a knock out pot to allow maintenance on the filter separator. The knock out pot is fitted with level gauge, pressure indicator, PSV, vent valve and drain valve.

Gas from filter separator / knock out pot is then heated by indirect fired water bath heaters up to approximately 60 °C. The water bath heaters are operated as duty - standby, with the standby heater remaining "hot" to allow quick change over of the that is controlled by actuated valves on the inlet to each heater.

The heated gas then passes to parallel pressure control valves. The valves are operated as duty and standby. The valves are pneumatically controlled. Over pressure protection is provided by a PSV downstream of the pressure control valves. Gas metering is by a single orifice meter fitted with a pressure transmitter; high and low range differential pressure transmitters and a temperature transmitter. A bypass is provided around the meter for maintenance.

Metered gas then passes to a second knock out pot fitted with a drain valve, PSV and level gauge. The piping from the knock out pot contains a temperature transmitter, temperature indicator, high pressure switches and a pressure transmitter. A double block and bleed valving arrangement is provided. The connection to the Pine Creek power generation site is via an underground pipework and the above ground flange is provided with an insulation

gasket. A spare flange is provided at the connection point for a future connection to the Pine Creek power generation site, the flange is fitted with a blind flange, insulation gasket and a surge arrestor.

Liquids collected from the dry filter, filter separator and knock out pots is sent to an elevated slops tank. The slops tank is fitted with a safety relief valve (SRV, pressure vacuum vent valve, flame arrestor, pressure indicator, high liquid level switch and hose for emptying.

Vents and PSV discharges from the dry filter, filter separator and knock out pots and vents from instrument manifolds and pneumatic controllers are sent to a local vent stack. The vent stack is fitted with a flame arrestor.

Instrument gas is conditioned centrally for the site from a connection from the outlet knock out pot.

Gas is conditioned at each water bath heater to provide fuel gas for the pilot and main burners. The fuel gas conditioning trains comprise of pre-heat coil, strainer, primary pressure regulating valve, actuated ESD valves, secondary pressure regulating valve, meter and temperature control valve. A control system provides control and telemetry for the various process measurement parameters. The control system provides flow control and high pressure automatic shutdown functionality and allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.12 Darwin City Gate

Darwin City Gate receives gas from the ADP. Gas flows to three locations, Wickham Point, Channel Island and Trunk Package Offtake Station (TPOTS). The Wickham Point (Corroco Philips, Darwin LNG plant) pipeline can be reversed to ensure gas supply to Darwin/Channel Island. The gas supply to Wickham point is fitted with an actuated valve. The gas supply to Channel Island and TPOTS is filtered, reduced in pressure to 5,800 kPag and the gas composition and moisture dew point is analysed. The gas to TPOTS is regulated to a 850 kPag and metered.

The Darwin City Gate Station comprises of scraper vessels, a multicyclone, two filter separators, an atmospheric slop tank, gas chromatograph system, moisture analyser, control valves, pressure regulator, pressure relief valves, blowdown stack and the related pipework. Liquids (condensate, water and compressor lube oil) removed from the gas is stored in the slop tank for batch treatment.

The station consists of DN 300 above ground connection. A scraper receiver is installed with buried hydraulically actuated valve. The actuated valve includes electric solenoids to allow remote operation. During normal operation gas bypasses the scrapers and flows through the actuated valve, the scraper vessels are closed and isolated from the pipeline. At the station inlet, the pipeline divides in two, with one supplying gas to Weddell interconnect and one supplying to the City Gate station. The main line is installed with DN20 blowdown, temperature transmitter and pressure transmitter. The line then divides in to two, the normal flow is through the multi-cyclone to remove solids. The multicyclone is fitted with a PSV with a set point of 9,650 kPag. Both parallel streams include a temperature control valve and a filter separator. The filter separators are horizontal and fitted with quick opening closures to allow removal of the filter elements. The liquids removed from the gas are collected in a drain boot underneath the filter separator and flow under level control to a slop tank. The filter separators are fitted with the following instrumentation and connections; pressure indicator, differential pressure transmitter, level glasses, high level switches, high high level switches, local drains and level controllers. The

temperature and level control valves are pneumatically controlled and actuated. Local instrument gas conditioning skid is provided with PSV to provide over pressure protection.

Common line of the outlet from the filter separators is installed with temperature indicators, temperature transmitter, pressure indicators, and pressure transmitters. The connection point for the gas chromatograph and dew point analyser has been installed to this section of pipework to allow analysis of the gas. The gas chromatograph and dew point analyser are installed in a shelter adjacent to the filter skid. The chromatograph receives a sample of the transmission gas at a pressure of approximately 140 kPag from an insertion regulator installed in the pipe. The carrier and calibration gases are stored in gas bottles and regulated for use at 140 kPag. The chromatograph vents gas to exhaust vents above the analyser shelter roof. The mainline then passes through a mainline valve. Downstream of the mainline valve is installed with pressure indicator and transmitter before the pipeline directed to Channel Island meter station.

A separate offtake to TPOTS passes gas to a DN 50 pressure regulation and metering skid. The skid has duty and standby arrangement with each containing active and monitor pressure regulators and turbine meters. A high pressure trip is provided that closes an actuated valve at the inlet. The meter runs, with one serving as duty run and other as standby run. The gas is then directed to Berrimah Road.

A control system provides measurement and telemetry for the various process instruments. The control system allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.13 Channel Island

Channel Island regulating and metering station receives gas from Darwin City Gate meter station. The Channel Island Regulating Meter Station consists of two water bath heaters, solids filter, four filter separators, slam shut valves, active and monitor regulators, meters, pressure relief valves, local vent points and the associated valving and pipework.

The gas passes to a solids filter. The filter is fitted with a pressure indicator, differential pressure transmitter, local vent point and local drain. The filter has a quick opening closure and a bypass, with manual valving. The filtered gas is then heated to approximately 60°C in two parallel water bath heaters. One water bath heater is operating and the other is in hot-standby. Actuated valves at the heater inlets control the gas flow.

The combined outlet line from the water heaters as a high temperature switch, temperature indicator and temperature transmitter. The line then passes to one of two filter, regulation and metering runs to supply gas to either Unit 1 or Unit 7 at the Channel Island Power Generation Site.

The Unit 1 filter, regulation and metering run comprises of two parallel runs each containing actuated valve, active-monitor pressure regulators, filter separators and meters. The actuated valves are both normally open and are closed on either signal from the control system or high pressure downstream of the regulators. The pressure regulators are self acting and externally sensed. The gas of each regulator pair flows to the corresponding filter separator. The filter separators are horizontal and fitted with quick opening closures to allow removal of the filter elements. The liquids removed from the gas are collected in a drain boot underneath the filter separator. No slops tank is installed at site at liquids are drained from the filter separators manually. The filter separators are fitted with the following instrumentation and connections; pressure indicator, differential pressure transmitter, level glasses, high-high level switches, local drains and level controllers. The filtered gas is metered in orifice meters, each meter is fitted with flow conditioner, pressure transmitter, high and low range differential pressure transmitters and temperature transmitters. Additional overpressure protection is provided by a PSV. The combined outlet from the Unit

1 regulation, filter and metering runs is fitted with low pressure switch and high pressure switches that all initiate an ESD, and a pressure transmitter, pressure indicator, temperature transmitter, temperature indicator, low temperature switch connection for future gas analysis and an isolation valve.

The Unit 7 filter, regulation and metering run comprises of two parallel runs each consisting of filter separator, pressure regulators, metering and associated instrumentation and valving. There is an actuated valve at the inlet before a split to two filters. The filters are fitted with pressure indicator and differential pressure transmitter. Downstream of each filter is an actuated valve. The valves are normally open and are closed on signal from the control system or high pressure downstream of the pressure regulators. Metering is provided by a Coriolis meter and a AVT turbine meter. The primary duty meter is the Coriolis meter, but the turbine meter can be operated in series or parallel. Both meters are provided with temperature and pressure correction. Downstream of the meters the combined outlet has a PSV, local manual vent, temperature transmitter and pressure transmitter.

Instrument gas is conditioned locally for each actuated valve.

A control system provides measurement and telemetry for the various process instruments. The control system allows remote operator shutdown. The control system is powered by single phase 230 VAC power supply, with back up batteries.

2.4.1.14 Scraper Stations

The scraper stations are provided along the length of the pipeline to allow cleaning and inspection of the pipeline. The scrapers stations are installed at Tanami Road, Ti Tree, Wauchope, Renner Springs, Newcastle Waters, Helling and Ban Ban Springs. Additionally scraper vessels are included at some of the stations along the pipeline. A scraper receiver and launcher are installed at each site along with a buried hydraulically actuated valve. The actuated valve includes electric solenoids to allow remote operation. During normal operation gas bypasses the scrapers and flows through the actuated valve, the scraper vessels are closed, isolated from the pipeline and depressured.

The pipeline is provided with buried isolation valves. A pressure transmitter and indicator are installed on a pipe riser either side of the actuated valve. A temperature transmitter is installed downstream of the actuated valve.

The scraper vessels are fitted with quick opening closures, a DN 25 local vent, a pressure gauge and connections with valves to allow operation. The vessels also include connections for pressure relief valves that have been removed on some / all scraper vessels. Pig passage indicators are installed on the pipeline and scraper vessels.

There is also a pipeline vent installed at the site within a separate compound. During normal operation the vent is closed with a quick opening closure.

2.4.1.15 Ban Ban Springs Scraper Station

The scraper station at Ban Ban Springs also includes an off take connection to Cosmo-Howley and a supply connection from the Wadeye pipeline. The off take to Cosmo Howley is a blind flange on a pipeline riser. The pipeline is decommissioned and the meter station has been removed. The connection from the Wadeye pipeline is underground pipework from the Ban Ban Springs meter station. The pipeline connections is to the upstream connection for a future compressor. There is an above ground valve with bypass installed adjacent to the connection.

At the Helling scraper station there are pipework and vents that are used for training The training pipework is not connected to the station pipework during normal operation of the pipeline and the training pipework is unpressurised. No records have been provided for the training pipework and it is not included in the hazardous area classification.

2.4.1.16 Warrego Scraper Station

The scraper station at Warrego is also the site of a compressor. The compressor is connected to underground connections either side of the mainline valve. An actuated valve with manual bypass / pressuring line is installed at each connection. The actuated valves are provided with an instrument gas connection from the Warrego compressor site.

The remainder of the Warrego compressor site is not considered within this hazardous area classification.

2.4.1.17 Mainline Valves

There are several mainline valve sites located at Aileron, Barrow Creek, Kelly Well, Morphett Creek, Fergusson, Larrimah, Tindal, Acacia and Berry Springs. The data used for classifying the mainline valves' hazardous area is obtained solely from the Aileron site. Each of the sites is assumed to be identical and comprises of a buried valve with an above ground bypass and vent points with no instrumentation installed on the mainline valve. The buried valve has a manual actuator and gear box, injection ports and cavity bleed extended above ground. This is shown in the photograph below.

2.4.1.18 Bachelor Mainline Valve

The Batchelor mainline valve site is located at KP 1441 between Ban Ban Springs and Darwin City Gate. The Batchelor Mainline valve site is similar to other mainline valve sites but the mainline valve has an actuator, similar to the scraper stations. The mainline valve consists of a DN300 underground valve with an above ground actuator, maintenance ports and cavity bleed. The valve has an above ground DN100 bypass. Pressure transmitters are fitted either side of the valve. The site also has a control room.

2.4.2 OPERATING CONDITIONS

The maximum operating pressures and temperatures at the stations are summarised in Table 1.

Table 1 Operating pressures and temperatures

Temperature	Pressure (Process)	Pressure (Fuel gas)	Pressure (Instrument gas)
Max. (°C)	Max. (kPag)	Max. (kPag)	Max. (kPag)
60	9,650	≤ 650	770

2.4.3 VENTILATION

Each of the sites is in the open air and is considered to have good ventilation. Some equipment is installed in open-sided shelters. These are not considered to have any impact on ventilation.

2.5 PROPERTIES OF HAZARDOUS MATERIALS

2.5.1 GASES HANDLED

The gas processed through the regulating and metering stations contains mainly methane (typically 87 mol%) and nitrogen (about 8 mol%), along with small quantities of hydrocarbons (C2+) and carbon dioxide (totally < 5 mol%). The specific gravity of the gas is 0.62, which is lighter than air (SG=1.0). It is classified as a Category G(i) fluid in accordance with IP15 Section 1 (Table 1.2 – fluid categories) and as a Group IIA in accordance to AS/NZS 60079.20 section 4.6. The composition of the gas is shown in Table 2.

Note that the gas composition in the pipeline can vary from the typical figures shown in Table 2. However, methane will remain the predominant component and the properties of the gas will remain the same and will be the same as methane. Australian standard AS 4564 (AG 865) Specification for general purpose natural gas, provides information of the allowable properties of natural gas. Similarly, APA will have a Sales / Shippping Agreement for the injection of gas into the pipeline that should be observed.The limitations are summarised in Table 3.

Note that on release from high pressure, the gas will be cooled due to Joule-Thomson cooling. At lower temperatures the gas is less dense and the dispersion in air will be slightly impacted, but the flammable range is reduced. Similarly, for higher temperatures the flammable range is increased, but the dispersion is increased. At the dilute concentrations at the lower explosive limit, the gas-air mixture temperature will be close to ambient temperature therefore, there will be no additional consideration for temperature effects.

Table 2 Typical Gas Composition

Component	Symbol	mol%
Methane	CH_4	87.0
Ethane	C_2H_6	2.6
Propane	C_3H_8	0.8
i-Butane	C_4H_{10}	0.1
n-Butane	C_4H_{10}	0.2
i-Pentane	C_5H_{12}	0.07
n-Pentane	C_5H_{12}	0.05
n-Hexane	C_6H_{14}	0.07
n-Heptane	C_7H_{16}	0.02
n-Octane	C_8H_{18}	0.004
n-Nonane	C_9H_{20}	0.004
Carbon Dioxide	CO_2	0.95
Nitrogen	N_2	8.2
Total		**100**
Specific Gravity (mixture)		**0.62**

Table 3 Gas specification limits

Characteristic	APA Schedule 4 Limits	AS 5654 Limits
HHV	Minimum 33.0 MJ/Sm^3 Maximum 42.0 MJ/Sm^3	-
Wobbe Index	Minimum 44.0 MJ/Sm^3 Maximum 51.0 MJ/Sm^3	Minimum 46.0 MJ/m^3 Maximum 52.0 MJ/^{m3}
Oxygen	Maximum 0.2 mol%	Maximum 0.2 mol%
Hydrogen Sulphide	Maximum 10.0 ppmw	Maximum 5.7 mg/m^3
Total Sulphur	Maximum 50 mg/Sm^3	Maximum 50 mg/^{m3}
Water Content	Maximum 80 mg/Sm^3	Maximum – Dewpoint 0°C at the highest MAOP in the relevant transmission system (in any case, no more than 112.0 mg/m^3)
Cricondentherm	Maximum 10.0°C	
Hydrocarbon Dewpoint		Maximum 2.0°C at 3,500 kPa
Total inert gases	Maximum 12.0 mol%	Maximum 7.0 mol%
Nitrogen	Maximum 11.0 mol%	-
CO_2	Maximum 7.5 mol%	-
Mercury	Maximum 0.2 mg/Sm^3	
Methanol	Maximum 1.0 mg/Sm^3	
Glycols	Maximum 1.0 mg/Sm^3	
Radioactivity	Maximum 8,000 Bq/Sm^3	
Notes		m^3 refers to dry gas at standard conditions (15°C and 101.325 kPa)

The chromatograph used for gas composition analysis requires carrier and calibration gases. The carrier gas (helium) is not flammable, while the calibration gas (mainly methane) is classified as a Category G(i) fluid with similar compositions as process gas.

2.5.2 LIQUIDS HANDLED

2.5.2.1 Filter Separator Drains

The liquids handled at the facilities may consists of condensate, compressor lubrication oil or water, which is removed from the gas by the filter separators. The condensate is considered to be flammable liquid and based on hexane is considered to be a group IIA liquid in accordance to AS/NZS 60079.20. The compressor lube oil used in the stations is combustible, but not flammable, with a typical flash point (closed cup) over 60 °C. Therefore, it is treated as a non-hazardous material for the purpose of the hazardous area classification. Water is considered to be non-hazardous liquid.

2.5.2.2 Odorant

Odorant is injected into the pipeline at Tylers Pass. The odorant is SpotLeak 1005 and is a flammable liquid. It consists of Thiophene, Propanethiol and methyl as per the product specification. The odorant is classified as group IIA in accordance to AS/NZS 60079.20 and category C fluid in accordance with IP15 Section 1 (Table 1.2 – fluid categories).

2.6 EQUIPMENT SELECTION

The general requirements for selection, installation and maintenance of explosion proof (Ex) electrical equipment are described in AS/NZS 2381.1:2005.

To ensure the Ex electrical equipment performs satisfactorily, without the risk of ignition, the data shown in Table 3 must be used as area specification requirements.

Table 4 Gas Group and Temperature Class

Performance Criterion	Requirement	Reference
Ambient temperature	0 - 50 °C	Bureau of Meteorology
Auto-ignition temperature (Methane)	537 °C	AS/NZS 60079.20
Apparatus Group	IIA	AS/NZS 60079.20
Temperature Class	T1 / T3	AS/NZS 60079.20

The recommendations on equipment group and temperature class should be regarded as ***minimum*** requirements. Equipment selection must take into account local conditions, such as the presence of hot surfaces close by and electrical equipment design.

2.7 CLASSIFICATION

2.7.1 PIPING

2.7.1.1 Process Piping

Welded piping at the stations is designed and constructed to ANSI/ASME B 31.3 and is not considered as a source of release. However, the possible release of flammable material occurs at flanges, valves and fittings due to the possible leakage from a gasket or seal. A majority of process gas service pipework installed in the stations is flanged. The screwed connections are limited to the small bore piping with a nominal size less than DN25. The screwed piping has tapered threads with similar leakage integrity to the flanged connections. The piping in the facilities is a permanent fixture and not subject to vibration.

All flanges and infrequently used valves are considered to be well maintained and located in an adequately ventilated area in the gas regulating and metering stations. Leakage of the flammable material at connection points is considered abnormal and the quantity of the hazardous material released is considered minor. Consequently, they are regarded as sources of *Secondary* grade release and a hazardous Zone 2 within a sphere area with 2 m radius from the potential leakage points is claimed around the piping with flanges or threaded joints, meters or regulators and valves other than relief valve in accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.4 for high pressure gas transmission system.

As a worst case the liquid piping is assumed to carry condensate which is a flammable liquid in accordance with AS/AZS 60079.10.1 clause ZA 5.2.8 that claims a hazardous area of Zone 2 of 1.5m in all directions of potential release points. However the liquid drain lines may contain sufficient quantities of dissolved and entrained. Since this hazardous area classification must account for a number of installations with a range of process conditions, liquid piping is classified as gas piping.

All process drains and vents used infrequently for maintenance or start-ups are normally plugged. Similarly, the sample points are taken on an infrequent or as required basis (maximum once every six months). To simplify hazardous area management, the classification for process gas piping will be assigned to the uncommonly operated process drains, vents and sample points, meaning a Zone 2 area of radius 2 m is declared around those potential leakage points.

The hazard zones adopted for the process piping, flanges, joints, valves and fittings are summarised below:

Zone 2 2 m radius from the edge of the process piping routes, including infrequently used process drains, vents and sample points

2.7.1.2 Instrument Gas Piping

The instrument gas pipework is fabricated from screwed pipe and tube with compression fittings. Similar to process gas piping, the instrument gas piping has potential leakage points at connection points. The leakage is considered abnormal with minor quantities of flammable material. Hence, they are regarded as sources of *Secondary* grade release and the associated hazardous area zone will be classified as Zone 2.

According to AS/NZS 60079.10.1 Clause ZA.6.4.2.3c, for the lighter-than-air flammable gas operating with a pressure between 700 and 2,000 kPag, a hazardous Zone 2 within a sphere area with 1 m radius from the potential leakage points is assigned to the piping with flanged and screwed joints.

The hazard zone adopted for instrument gas piping is summarised below:

Zone 2 1 m radius from the edge of the instrument gas piping routes

2.7.1.3 Fuel Gas Piping

Fuel gas piping is fabricated with screwed connections, except those pipes with a nominal diameter less than DN25 and with flanges for larger diameters. The screwed piping has tapered threads with similar leakage integrity to flanged connections. The leakage is considered abnormal with the presence of minor quantities of flammable material. Hence, they are regarded as sources of *Secondary* grade release and the associated hazardous area zone will be classified as Zone 2.

According to AS/NZS 60079.10.1 Clause ZA.6.4.2.3c, for the lighter-than-air flammable gas operating with a pressure between 100 and 700 kPag, a hazardous Zone 2 within a sphere area with 0.5 m radius from the potential leakage points is declaimed around the piping with flanged and screwed connections.

The hazard zone adopted for fuel gas piping is summarised below:

Zone 2 0.5 m radius from the edge of the fuel gas piping routes

2.7.1.4 Control Valves

There are several shut down valves, pressure / temperature control valves and level control valves installed in the stations. Similar to process piping, the process connections of control and actuated valves are considered well maintained and leakage is considered abnormal. Therefore connection points are considered the same as process pining as described in Sections 2.7.1.1, 2.7.1.2 and 2.7.1.3.

In addition, the control valves are in regular use and leakage is more likely due to wear on the packing. An additional *Primary* grade of release (Zone 1) with a nominal hazard radius of 0.3 m around the glands is claimed in accordance with IP15 Section 5.4.5.1.

Control valves will release minor amounts of flammable gas with a small continuous bleed from the positioners or exhausts at a low discharge velocity in normal operation. It contributes a *Continuous* grade of release and in accordance with AS/NZS 60079.10.1 clause ZA 6.6.2.5, a Zone 1 area with a 0.5m radius will be claimed. A larger region that represents infrequent higher gas velocities that may exist surrounding the Zone 1 area due to abnormal operation or failure of the valves. A Zone 2 area within 1 m radius in all directions is assigned to the low velocity vents.

The additional hazard zones adopted for the control valves are summarised below:

Zone 1 0.5 m radius around the control valve positioners and exhausts

0.3 m radius around the control and actuated valve glands

Zone 2 1 m radius around the control valve positioners and exhausts

2.7.1.5 Pressure Relief and Safety Relief Valves

Pressure relief valves (PSVs) and safety relief valves (SRVs) are mounted on the multi-cyclone, filters, process gas piping, fuel gas and instrument pipework to provide the protection against operational overpressure for the piping and equipment.

Note that SRVs in Pine Creek Station piped to the vent stack do not contribute to the extent of the hazardous classification except as discussed under Section 2.7.1.1 for process piping.

PSVs and SRVs venting directly to atmosphere are normally treated as a *Secondary* grade of release due to no action on normal operating conditions, and as a result the associated hazard zone will be classified as Zone 2. In accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.9, a Zone 2 area is assigned within 6 m diameter cylinder with its axis on the line

of discharge from 1 m behind the points of discharge to a distance 8 m in front of the points of discharge.

The seats on the PSVs and SRVs will be metal to metal and tight shut-off, which will contribute to a small leakage at the vent tips during the normal operation. In line with the specification described in IP15 Section 5.4.4.5, a Zone 2 area of nominal 1 m radius should be placed around the end of the discharge point to account for any small leakages. It is recommended to upgrade the *Secondary* grade of release to a *Primary* grade of release accounting for the presence of the flammable material in the normal operating. Hence, an additional Zone 1 area with a nominal hazard radius of 1 m is claimed around the PSV and SRV discharge points to account for the minor leak through the valve seats.

The hazard zones of the PSVs and RSVs are considered to be the same due to lack of the discharge rates, which actually affect the extending zone of hazardous area.

The hazard zones adopted for the PSVs and RSVs are summarised below:

Zone 1 1 m radius from the vent tips

Zone 2 6 m laterally, 8 m above and 1 m below the discharge points

2.7.1.6 Mainline Valves

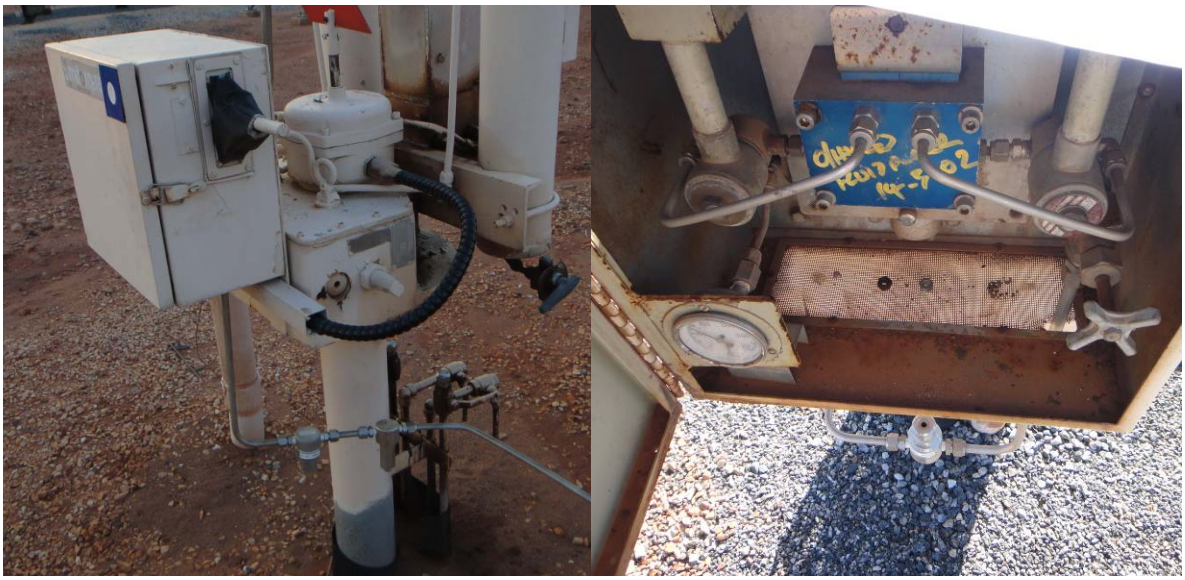
Some of the actuated mainline valves (MLV) installed at the scraper stations as shown in the following photographs include an enclosure containing the solenoids and a hand pump for the valve. The solenoids vent to a location outside of the enclosure, however the tubing connections to the solenoid are a *Secondary* source of release. The enclosure has minimal ventilation and released gas can accumulate within the enclosure. Therefore a Zone 1 hazardous area is claimed within the enclosure.

Body bleeds valves maintenance ports and instrument gas connections from the buried valve are brought above grade. These provide potential leak sources and are treated the same as process piping connections as per section 2.7.1.1.

The hazard zone adopted for the actuated valve enclosures is summarised below:

Zone 1 Within the solenoid valve enclosure

Zone 2 2m radius from point of discharge



2.7.1.7 Local Vent Point

There are several local vent points installed in the facilities to allow the purging of gas from the stations following isolation. Each manual vent generally consists of a ball valve to control blow down rate. The ball valve provides high integrity isolation and wear is not considered on the valves. Hence, no leak is taken into account during the normal operation.

The hazardous area classification for those points is considered to be the same as PSVs and RSVs due to the similar operation which happens only during the period of system depressurisation. Therefore, they are treated as a *Secondary* grade of release and a Zone 2 area within 6 m diameter cylinder with its axis on the line of discharge from 1 m behind the points of discharge to a distance 8 m in front of the points of discharge are declared in accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.9.

Note: Majority of the vents are fitted with a cap and have a hole drilled in the vent pipe.

The hazard zone adopted for the local vent points is summarised below:

Zone 2 6 m laterally, 8 m above and 1 m below the discharge points

2.7.1.8 Pine Creek Vent Stack

There is a vent stack installed in the Pine Creek Station. Gas released from the PSVs, instrument manifold vents and vented instrument gas from the pneumatic controllers is sent to the vent stack. During normal operation, there is minimal flow from the vent stack from the pneumatic controllers. The vent stack is fitted with a flame arrester that offers protection against fire and explosion from outside sources of ignition. The flame arrestor is fitted with a cover to prevent rain ingress but also acts to direct gas downwards. and will increase the diameter of the hazardous area.

The hazardous area is increased to a Zone 2 area within 12 m diameter cylinder and 6 m below the discharge point is claimed, compared with 8 m distance stated for vertical up discharge.

Furthermore, minor leakage of flammable mixture may occur through the PSV seats under normal operation as analysed in Section 2.7.1.5. As a result, it contributes to a *Primary* grade of release and an additional Zone 1 hazardous area with a nominal radius of 1 m is claimed around the vent stack discharge point to account for any small leakages from safety relief valve seats.

The continuous bleed from the pneumatic controllers also vents through the vent stack. As per Section 2.7.1.4, a 0.5 m Zone 1 hazardous area is claimed. This is within the hazardous area claimed for leakage through PSV seats.

The pipework to the vent stack is flanged and will generally be at close to atmospheric pressure. However for continuity the claimed hazardous area will be claimed to be as for process pipework, refer section 2.7.1.2.

The hazard zones adopted for the vent stack are summarised below:

Zone 1 1 m radius from the vent tip

Zone 2 12 m laterally, 6 m below and 8 m above the vent tip

2.7.1.9 Pipeline Blowdown

There are pipeline blowdown points at the scraper stations and meter stations. The vents are approximately 2.4 m tall, discharge vertically upwards and are fitted with quick opening closures. Pipeline blowdowns have the potential to release large volumes of gas to atmosphere and to obtain a representative hazardous area zone it would be required to

undertake plume analysis based on the blowdown conditions. An estimate of the extent of the plume from previous experience for pipeline blowdown vents is a cylinder with a radius of 15 m and a length of 30 m extending in the direction of the discharge and 1 m below the discharge point to account for the localised turbulence at the vent tip. Pipeline blowdowns are a done infrequently and therefore a *Secondary* release that results in a Zone 2 hazardous area. The discharge is vertically upwards and therefore no ground effect would occur.

During normal operation a quick opening closure in the closed position is considered to provide similar containment as a pipe flange or fitting. Therefore the associated release would be *Secondary* providing a Zone 2 hazardous area of 2 m as per AS/NZS 60079.10.1 Clause ZA.6.4.2.4.

Zone 2 A cylinder of radius 15 m extending 30 m vertically upwards and 1 m downwards from the point of discharge

HOLD The exact shape of the hazardous area zone should be determined using plume dispersion modelling based on the blowdown operation and conditions.

2.7.1.10 Low Velocity Vents

There are numerous pressure relief valves installed on instrument gas systems, for example on the station limit valves. The relief from these pressure relief valves are similar to low velocity vents in accordance with AS/NZS 60079.10.1 ZA.6.6.2.8 that has an associated Zone 1 hazardous area of 0.5 m in all directions surrounded by a Zone 2 hazardous area of 1.0 m from the point of discharge. The pressure relief valves will not typically be relieving gas and the release will be *Secondary,* therefore the Zone 1 area is not appropriate. Therefore a Zone 2 hazardous area of 1 m radius from the point of discharge is claimed.

The hazard zone adopted for the instrument gas relief and vent points is summarised below:

Zone 2 Radius of 1 m extending in all directions from the point of discharge

2.7.2 SCRAPER VESSELS

The scraper vessels shall be operated such that it is normally isolated from the pipeline. There are no regular pigging operations. It is expected that the scraper vessels are opened at approximately yearly intervals and the small quantities of flammable gas may occur at the closures. Accordingly, they are treated as sources of *Secondary* grade release and a hazardous Zone 2 within a radius of 3 m centred at the closure is claimed as indentified in AS/NZS 60079.10.1 ZA.6.6.2.2b for the equipment located at an adequately ventilated area.

The scraper vessels are enclosed vessels containing nozzle connections with piping, valves and fittings, which are also potential release sources. These are classified as piping as per section 2.7.1.1.

The hazard zone adopted for the pig receivers and launchers is summarised below:

Zone 2 3 m radius in all directions from quick opening closure

As per section 2.7.1.1 for piping for remainder of the vessel

2.7.3 MULTICYCLONE AND FILTER SEPARATORS

Similar to receiving traps, the multicyclone and filter separators have quick opening closures that are operated at approximately yearly intervals under normal operation. The hazard zone assigned to the receiving traps in accordance with AS/NZS 60079.10.1 ZA.6.6.2.2b is also applicable to the filter coalescers, resulting in a hazardous Zone 2 area within 3 m radius around the discharge points is claimed.

Since the multicyclone and filter coalescers are enclosed vessels which handle process gas and liquids removed from the gas, the nozzle connections with piping, valves and fittings are also potential release points. To simplify hazardous area management, the classification for process gas piping will be applied to the vessels meaning a Zone 2 area of radius 2 m will be declared from the shell of the vessels.

The hazard zone adopted for the multicyclone and filter coalescers is summarised below:

Zone 2 3 m radius around the quick opening closures and 2 m radius from the edge of the vessels

2.7.4 SLOP TANKS

The slop tank installed at some stations are above ground storage tank used to collect condensate, compressor lube oil and water from the filter separators. The liquids in the tank are treated as a flammable fluid. The capacity of the tanks are approximately 1 kL. The tanks are provided with a vent that discharges to atmosphere. During the short period of the drainage from the filter coalescers to slop tank, the liquids may form a flammable mist and additionally the gas may break through into the drain tank. The freely vented tank allows vapour/air mixtures to be released during the normal operation.

Therefore, the slop tank will contain flammable vapours and a range of hazard zones is required. As such, it is likely that a small amount of flammable gas mixture would continuously exist in the tank and within close proximity of the tank vent, surrounded by a larger region that may sometimes exist due to occasional higher gas quantities and an even larger region that represents very infrequent high gas quantities.

The slop tank installed at the Pine Creek Station has a pressure vacuum vent set at 2 kPa pressure / vacuum. The vapour or released gas is directed to atmosphere though the vent that installed in conjunction with an inline flame arrester and a cap. The flame arrester is required to provide protection against internal fire and explosion from outside sources of ignition. The vented gas will be discharged vertical downwards to the surrounding equipment or pipework due to the installation of the cap. However, the additional extent zones are not claimed considering the relatively low operating pressure in the tank.

In accordance with API RP 505 Section 8.2.1, a Zone 0 area within 0.5 m radius, a Zone 1 area within 1.5 m radius and a Zone 2 area within 3 m radius of the vent point are declared. It is also stated in API RP 505 Section 8.2.1, a Zone 0 area should be claimed inside the tank above the liquid level due to the possibility of the continuous presence of the flammable mixture and a Zone 2 area with radius of 3 m should be placed around the shell of the equipment.

The hazard zones adopted for the slop tanks in the stations are summarised below:

Zone 0 Inside the tanks above the liquid level and 0.5 m radius from the tank discharge points

Zone 1 1.5 m radius from the tank discharge points

Zone 2 3 m radius around the shell of the tanks and from the tank discharge points

2.7.5 WATER BATH HEATERS

The indirect fired water bath heaters are fitted in some stations to heat the high pressure gas up to a temperature of 60 °C prior to pressure reduction, which prevents hydrate formation that may occur due to the Joule-Thomson effect when the temperature drops. The water bath heater consists of an insulated shell, removable process coils, removable fire tubes, stack burners, fuel gas conditioning train and control system.

During normal operation, a flame is projected into a submerged "fire-tube" located at the bottom of a horizontal cylindrical shelf. Energy is transferred through the tube wall to the surrounding bath fluid water. By means of natural convection, the water then transfers the required amount of energy into a series of process coils located at the top of the heater shell.

The water bath burners are continuously flaming and provided with burner elements to ensure that the flame is maintained. On loss of flame the fuel gas supply is shut down. Therefore it no hazardous area zones are claimed from the stacks.

The process tube within the water bath is fully welded with no potential points for release and would not normally provide a hazardous area. If there was a history of failure of the process coils leading to corrosion or erosion of the tubes, then a hazardous area should be claimed on the vent of the water bath heater. APA has not indicated that there have been failures of the process coils. Further, the maximum operating temperature of the water bath heaters is 95°C, the pH and the nitrate content of the water in the baths is checked frequently and APA has confirmed that the water bath heaters are treated with oxygen scavenger. Therefore no hazardous area is claimed from the water bath vent.

The potential release points on the vessels are process connections to the heaters. The classification for process piping will be applied to the process connections resulting in a *Secondary* grade of release and a related Zone 2 area with 2 m radius from the connection points in accordance with AS/NZS 60079.10.1 Clause ZA.6.4.2.4.

The hazard zone adopted for the water bath heaters is summarised below:

Zone 2 2 m radius from the high pressure gas connections of the vessel.

2.7.6 CATALYTIC HEATER

A catalytic heater is installed at the Elliott meter station. The heater consists of a section of pipe contained in a compartment. The inside of the compartment is surrounded by heating elements that heat the gas by radiant heat. The heat is generated by the combustion of gas in catalytic elements. The manufacturer’s information indicates that the catalytic elements ensure that the gas is combusted at a lower temperature. The heating unit is approved for installation in hazardous areas and has Factory Mutual certification.

The pipework has no additional source of release and will be classified the same as the process pipework as described in section 2.7.1.1 and a 2 m Zone 2 hazardous area is claimed from the outside of the of the heater.

Additionally, there is a possibility of fuel gas not being combusted inside the heater. The manufacturer’s literature indicates that there is a protection to prevent uncombusted gas being released. However the configuration of the heater is not well defined and to be conservative a primary grade of release is claimed. There is minimal ventilation in the compartment and the claimed zone is increased from Zone 1 to Zone 0 within the compartment.

The heater compartment is not considered to be gas tight and an additional hazardous area zone is claimed that will surround the heater compartment. The release will be a primary grade of release. The heater has good ventilation and a Zone 1 hazardous area is claimed. The released gas will be fuel gas and will be close to atmospheric pressure. In accordance with section 2.7.1.3 the extent of the hazardous area will be 0.5 m from the outside of the box.

The hazard zone adopted for the catalytic heater is summarised below:

Zone 0 Inside the heater compartment

Zone 1 0.5 m from the edges of the heater box

Zone 2 2 m radius from the high pressure gas connections of the vessel

2.7.7 KNOCKOUT POTS

The knockout pots are enclosed vessels which do not contribute to the hazardous area classification. However, the nozzle connections with piping, valves and fittings on the vessels are potential release points where small amounts of flammable mixture may present. To simplify hazardous area management, the classification for process gas piping will be applied to the vessels meaning a Zone 2 area of radius 2 m will be declared from the shell of the vessels.

The hazard zone adopted for the knockout pots is summarised below:

Zone 2 2 m radius from the edge of the vessels

2.7.8 GAS CHROMATOGRAPH SYSTEM

Gas chromatograph (GC) system is a specific analyser to determine natural gas stream composition and anticipated concentration of the selected components.

The chromatograph system comprises of several components: the analyser, sample tubing, process vents, pressure control valve, pressure safety valve, carrier gas cylinders and tubing, calibration gas cylinder and tubing. The chromatograph system is located under a shelter with open sides, therefore it is considered as being adequately ventilated.

The process tubing and analyser contain gas at approximately 140 kPag. The tubing will be well maintained and minor release of the flammable gas may occur at the connections due to leakage, and as a result the grade of release is considered to be *Secondary*. Therefore, a Zone 2 hazardous area with 0.5 m radius is assigned around the whole chromatography system to cover the process tubing potential leakage points according to AS/NZS 60079.10.1 Clause ZA.6.4.2.3c, for the lighter-than-air flammable gas operating at a pressure between 100 and 700 kPag.

The carrier gas is helium that is a non-hazardous material and therefore the carrier gas cylinders and tubing do not contribute to the hazardous zone.

The calibration gas comprises mainly methane and stores in a gas cylinder with an approximate volume of less than 10 L. AS/NZS 60079.10.1 Clause ZA.6.4.2.6d states that cylinder located in ventilated area, whether in storage or installed for use, is not associated with a hazardous zone when the gas capacity is less than 30 m^3. Therefore, no hazardous zone is claimed around the calibration gas cylinder. The calibration gas tubing is at the same operating pressure as the process tubing and will have the same Zone 2 hazardous with 0.5 m radius around the calibration gas tubing connections.

The chromatograph system has several vent points that release the sample line contents at low velocity during the normal operation. The amount of the released gas will be small and the discharge rate will be slow and readily dispersed. Consequently, they are regarded as sources of *Primary* grade release and a hazard Zone 1 within a sphere area with 0.5 m

radius is declared from the vent tips in accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.8 for the low velocity vents in adequately ventilated area.

In addition, a larger region that represents infrequent higher gas quantities may exist surrounded the Zone 1 area due to the failure of pressure regulator or PSV. It results a *Secondary* grade of release and an additional Zone 2 area with 1 m radius is considered around the vents in accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.8.

The pressure relief valve will be activated in emergency. To simplify the hazardous area arrangement, it is treated the same as a vent as described above.

The hazard zones adopted for the chromatograph system are summarised below:

Zone 1 0.5 m radius from the vent tips

Zone 2 0.5 m radius around the gas chromatograph system, excluding the cylinders

1.0 m radius around the vent tips

2.7.9 WATER DEW POINT ANALYSER / GAS SAMPLER

The water dew point analyser uses a chilled mirror to determine the dew point of the gas. The analysers receive gas from the sampler as shown in the photographs below. The gas sampler consists of an insertion regulator installed in the pipework, a heated capillary tube a sample cylinder, solenoid valve, further regulators and pressure relief valves. A solenoid valve is installed inside a box with a removable cover. The box prevents ventilation and therefore the declared hazardous area zone is increased to Zone 1 for the interior of the box.

The water dew point analyser comprises of several components: the analyser, sample tubing, process vents, pressure control valve, pressure safety valve, gas cylinders and tubing, calibration gas cylinder and tubing. The analyser system is located under a shelter with open sides, therefore it is considered as being adequately ventilated.

The process tubing and analyser contain gas at approximately 140 kPag. The tubing will be well maintained and minor release of the flammable gas may occur at the connections due to leakage, and as a result the grade of release is considered to be *Secondary*. Therefore, a Zone 2 hazardous area with 0.5 m radius is assigned around the whole analyser system to cover the process tubing potential leakage points according to AS/NZS 60079.10.1 Clause ZA.6.4.2.3c, for the lighter-than-air flammable gas operating at a pressure between 100 and 700 kPag.

The water dew point analyser and gas sampler have local vents that will frequently vent gas at low velocity to atmosphere during the normal operation. The amount of the released gas will be small and the discharge rate will be slow due to the characterisation of the systems. Consequently, they are regarded as sources of *Primary* grade release and a hazard Zone 1 within a sphere area with 0.5 m radius is declared from the vent tips in accordance with AS/NZS 60079.10.1 Clause ZA.6.6.2.8 for the low velocity vents in adequately ventilated area.


The hazard zone adopted for the water dew point analyser / gas sampler is summarised below:

Zone 1 0.5 m radius from the vent tips

Inside the sampler box

Zone 2 0.5 m radius around the water dew point analyser system

1.0 m radius around the vent tips

2.7.10 ODORANT INJECTION SYSTEM

2.7.10.1 Odorant Pipework

A majority of the odorant pipework is tubing fitted with compression fittings, these are considered to be well maintained and infrequently operated. This provides a *Secondary* source of release and a Zone 2 hazardous area. In accordance with AS/NZS 60079.10.1 Clause ZA.5.2.8 the associated hazardous area is 1.5 m in all directions down to ground level.

Zone 2 1.5 m in all directions extending down to ground level

2.7.10.2 Odorant Storage Tank

The odorant storage tank is a pressure vessel supplied with a natural gas blanket and a pressure relief valve.

AS/NZS 60079.10.1 Clause ZA.5.2.1.2c describes the hazardous area associated with the above ground vent on a storage tank as Zone 1 within 1.5 m radius in all directions from point of discharge and Zone 2 within the cylindrical volume below the Zone 1 area. This is applicable for a vent on a storage vessel. There will be a constant release from the vent however the volume of release is small and is considered to be a *Primary* and a Zone 1 area is claimed.

The connections on the pressure vessel will have the same Zone 2 hazardous area as the odorant pipework.

The tank pressure relief valve will provide a *Secondary* release. This will result in a Zone 2 hazardous area. The extent of the hazardous area will be as the Zone 1 area for the vent, but without the additional Zone 2 area.

Zone 1 1.5 m in all directions from vent tip

Zone 2 Cylindrical volume below the Zone 1 area

1.5 m in all directions extending down to ground level for tank connections

2.7.10.3 Odorant Injection Pumps

The odorant injection pumps are pneumatically powered from instrument gas that is derived from the transmission gas. During operation of pumps there will be a continuous vent of gas. There will be a *Continuous* release from the pump discharge through a bug screen located on the pump, refer photograph below. The minimum diameter of the instrument gas is small. It is reasonable to assume that the solenoid valve has a reduced bore, and a typical size is 1/8” (3.2 mm). Based on Table C9(a) from IP15 for a G(i) gas, a pressure of 5 bar(a) (400 kPag) and a 5 mm hole the hazard radius is <1 m. Therefore a hazardous radius of 0.5 m is claimed around the pump.

The pump is a high integrity positive displacement pump capable of developing high discharge pressures to the odorant, therefore it is assumed that any hazardous area associated with leakage from the pump seals would be small and within the hazardous zone associated with the gas vent.

Zone 1 0.5 m radius from the pump

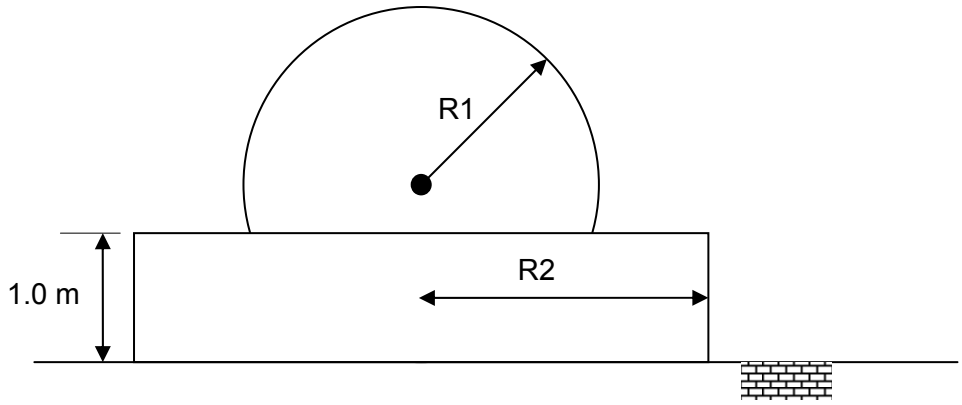
2.7.11 GROUND EFFECT

IP 15 Section 5.5 states that the determination of the full three dimensional envelope of the hazardous area zone shall consider the location of the release. The shape factor depends on height and orientation of the release. The key factors are:

1. For sources of release that are higher from grade than the hazardous radius, there is no impact due to ground effect.
2. For sources of release that are higher than 1 m from grade but less than the hazardous radius, there is a ground effect, up to 1 m above grade.
3. For sources of release that are 1 m or less from grade, there is a ground effect up to 1 m above grade.

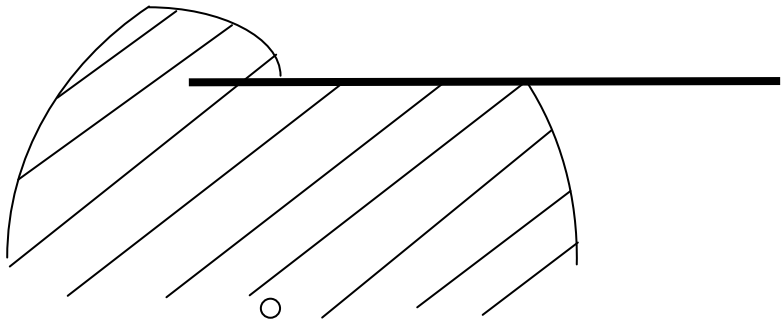
The main process pipework has a hazardous area of radius 2 m, and is located less than 2 m above grade. The direction of release from flanged joints and screwed fittings could be in any direction, therefore ground effects are to be considered. Other hazardous area zones will be sufficiently above grade so that there is no ground effect, or the direction of release will be upwards and therefore ground effect is negligible.

The ground effect increases the hazardous radius in accordance with IP 15 Table C9(b). A majority of the pipework in the facilities is to be located less than 1 m above grade. Interpolation of IP 15 Table C9(b) shows that the hazardous area for ground effect is 0.5 m larger than the hazardous area radius defined above, from the figure below, R2 = R1 + 0.5. Therefore the hazardous area at grade for gas pipework at transmission pressure will be 2.5 m to a height of 1 m.



2.7.12 VAPOUR BARRIERS

At Palm Valley Alice Springs and Mereenie the hazardous area zone impacts on a wall and the control hut, respectively. At these locations the hazardous area zone will extend around the barrier as shown in the diagram below. This is in accordance with AS/NZS 60079.10.1 Clause ZA.2 for measurements of distances.



Source of release

APPENDIX A HAZARDOUS AREA CLASSIFICATION DATA SHEET

Part I : Flammable material list and characteristics
Part II : List of sources of release

Part I – Sheet 1 of 1	**Revision:**	0					
Flammable material list and characteristics	**Author:**	TCB					
Amadeus Basin to Darwin Pipeline	**Checked:**	RDK					
Surface facilities	**QA:**	EZG					
	Date:	24/11/2011					

Material	Phase	ADG Class	IP 15 Fluid Category	Boiling Point °C	ASTM D86 5%(vol) Point of Stabilised Liquid at Atmospheric Pressure	Relative Density Of Fluid Vapour (Air SG=1) Liquid (Water SG=1)	Flash Point of Stabilised Liquid at Atmospheric Pressure °C	Vapour LEL (Vol %) In Air	Vapour UEL (Vol %) In Air	Ignition Temperature °C	Temperature Class	Equipment Group	Source Of Data
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Process gas and calibration gas (mixture)	Vapour	2.1	G(i)	-162	-	0.62	Gas	4.4 (Methane)	17 (Methane)	537 (Methane)	T1	IIA	AS/NZS 60079.20
Odorant (tetrahydrothiophene and tertiary butyl mercaptan)	Liquid	3	C	82	-	0.939 (liquid) 3.06 (vapour)	-8	1.1*	12.1*	224	T3*	IIA	AS/NZS 60079.20 MSDS
Condensate	Liquid	3	C	69†	-	2.97†	-21†	1.0†	8.4†	233†	T3†	IIA	AS/NZS 60079.20

* Values obtained for Tetrahydrothiophene

† Based on Hexane

Part II – Sheet 1 of 4

List of sources of release

Amadeus Basin to Darwin Pipeline

Surface facilities

Revision:	0					
Author:	TCB					
Checked:	RDK					
QA:	EZG					
Date:	24/11/2011					

Process Equipment Item			Flammable Material	Operating Conditions Pressure and Temperature	Description of Flammable Material Containment	Ventilation	Source Of Release		Distance From Source To			Equipment Group and Temperature Class	Section
No.	Description	Location					Description	Grade*	Boundary of Zone 0	Boundary of Zone 1	Boundary of Zone 2		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Process piping	Amadeus Basin to Darwin Pipeline surface facilities	Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	2 m radius from the edge of piping routes	IIA, T1	2.7.1.1
2	Instrument gas piping		Vap. Cat "G(i)"	≤ 770 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	1 m radius from the edge of piping routes	IIA, T1	2.7.1.2
3	Fuel gas piping		Vap. Cat "G(i)"	≤ 700 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	0.5 m radius from the edge of piping routes	IIA, T1	2.7.1.3
4	Control valves		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Valves with packed gland / positioner / exhaust	Natural (open air)	Valve glands, positioners and connections	C & P & S	N/A	0.5 m radius around control valve positioners and exhaust	1 m radius around control valve positioners and exhausts;	IIA, T1	2.7.1.4
5	Pressure relief and safety relief valves		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Valves and piping discharging vertically upwards	Natural (open air)	Pipe vent to atmosphere	C & P	N/A	1 m radius from vent tips	6 m laterally, 8 m above and 1 m below discharge points	IIA, T1	2.7.1.5
6	Mainline valves		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Connections and valve seals	S	N/A	Within solenoid valve enclosure	As Piping	IIA, T1	2.7.1.6
7	Local Vent Points		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Valves and piping discharging vertically upwards	Natural (open air)	Pipe vent to atmosphere	S	N/A	N/A	6 m laterally, 8 m above and 1 m below discharge points	IIA, T1	2.7.1.7

* C – Continuous; S – Secondary; P – Primary

Part II – Sheet 2 of 4						**Revision:**	0						
List of sources of release						**Author:**	TCB						
Amadeus Basin to Darwin Pipeline						**Checked:**	RDK						
Surface facilities						**QA:**	EZG						
						Date:	24/11/2011						

Process Equipment Item			**Flammable Material**	**Operating Conditions Pressure and Temperature**	**Description of Flammable Material Containment**	**Ventilation**	**Source Of Release**		**Distance From Source To**			**Equipment Group and Temperature Class**	**Section**
No.	**Description**	**Location**					**Description**	**Grade***	**Boundary of Zone 0**	**Boundary of Zone 1**	**Boundary of Zone 2**		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
8	Pine Creek vent stack	Pine Creek	Vap. Cat "G(i)"	Atmospheric pressure Ambient temperature	Valves and piping discharging vertically upwards	Natural (open air)	Pipe vent to atmosphere	P & S	N/A	1 m radius from the vent tip	12 m laterally, 6 m below and 8 m above vent tip	IIA, T1	2.7.1.8
9	Pipeline blowdown	Amadeus Basin to Darwin Pipeline surface facilities	Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Valves and piping discharging vertically upwards	Natural (open air)	Pipe vent to atmosphere	S	N/A	N/A	A cylinder of radius 15 m extending 30 m vertically upwards and 1 m downwards from discharge point **HOLD – To be confirmed**	IIA, T1	2.7.1.9
10	Low velocity vents		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Valves and piping discharging vertically upwards	Natural (open air)	Pipe vent to atmosphere	S	N/A	N/A	Radius of 1 m extending in all directions from the point of discharge	IIA, T1	2.7.1.10
11	Scraper vessels		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Enclosed system with closures	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	3 radius in all directions from quick opening closure As per section 2.7.1.1 for piping for remainder of the vessel	IIA, T1	2.7.2
12	Multicyclone and filter separators		Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Enclosed vessels with quick opening closures	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	3 m radius around the closures and 2 m radius from the edge of the vessels	IIA, T1	2.7.3
			Liq. Cat "C"	≤ 9,650 kPag ≤ 60 °C	Liquid drain pipework	Natural (open air)	Piping connections	S	N/A	N/A	2 m in all directions down to ground level	IIA, T3	2.7.1.1

* C – Continuous; S – Secondary; P – Primary

Part II – Sheet 3 of 4		Revision:	0					
List of sources of release		**Author:**	TCB					
Amadeus Basin to Darwin Pipeline		**Checked:**	RDK					
Surface facilities		**QA:**	EZG					
		Date:	24/11/2011					

Process Equipment Item			Flammable Material	Operating Conditions Pressure and Temperature	Description of Flammable Material Containment	Ventilation	Source Of Release		Distance From Source To			Equipment Group and Temperature Class	Section
No.	Description	Location					Description	Grade*	Boundary of Zone 0	Boundary of Zone 1	Boundary of Zone 2		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
13	Slop tanks	Amadeus Basin to Darwin Pipeline surface facilities	Vap. Cat "G(i)"	Atmospheric pressure Ambient temperature	Open vessels	Natural (open air)	Piping connections and vents	C & P & S	Inside the tank above liquid level and 0.5 m radius from tank discharge points	1.5 m radius from tank discharge points	3 m radius from around shell of tanks and from tank discharge points	IIA, T1	2.7.4
14	Water bath heaters		Vap. Cat "G(i)"	≤ 9,900 kPag ≤ 60 °C	Enclosed vessels	Natural (open air)	Piping connections	S	N/A	N/A	2 m radius from high pressure gas connections of vessel	IIA, T1	2.7.5
15	Catalytic heater		Vap. Cat "G(i)"	≤ 9,900 kPag ≤ 60 °C	Enclosed vessels	Natural (open air)	Piping connections	S	Inside the heater compartment	0.5 m from the edge of the heater compartment	2 m radius from high pressure gas connections of vessel	IIA, T1	2.7.6
16	Knockout pots		Vap. Cat "G(i)"	≤ 9,900 kPag ≤ 38 °C	Enclosed vessels	Natural (open air)	Piping connections	S	N/A	N/A	2 m radius from edge of vessels	IIA, T1	2.7.7
17	Gas chromatograph systems		Vap. Cat "G(i)"	≤ 140 kPag ≤ 60 °C	Closed tubing systems with joints and vents	Shelter with open sides (open air)	Tubing joints, drains and vents	P & S	N/A	0.5 m radius from vent tips	0.5 m radius around system, excluding cylinders 1.0 m radius around vent tips	IIA, T1	2.7.8
18	Water dew point analysers / gas samplers		Vap. Cat "G(i)"	≤ 140 kPag ≤ 60 °C	Closed tubing systems with joints and vents	Shelter with open sides (open air)	Tubing joints, drains and vents	P & S	N/A	0.5 m radius from vent tips Inside sampler box	0.5 m radius around the system, 1.0 m radius around vent tips	IIA, T1	2.7.9

* C – Continuous; S – Secondary; P – Primary

Part II – Sheet 4 of 4

List of sources of release

Amadeus Basin to Darwin Pipeline

Surface facilities

Revision:	0					
Author:	TCB					
Checked:	RDK					
QA:	EZG					
Date:	24/11/2011					

Process Equipment Item			Flammable Material	Operating Conditions Pressure and Temperature	Description of Flammable Material Containment	Ventilation	Source Of Release		Distance From Source To			Equipment Group and Temperature Class	Section
No.	Description	Location					Description	Grade*	Boundary of Zone 0	Boundary of Zone 1	Boundary of Zone 2		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
19	Odorant injection system pipework	Tylers Pass odorant injection station	Vap. Cat "C"	≤ 9,650 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	1.5 m in all directions down to ground level	IIA, T3	2.7.10.1
20	Odorant injection system storage tanks		Vap. Cat "C"	15 kPag ≤ 60 °C	Enclosed vessel	Shelter with open sides (open air)	Connections	S	N/A	N/A	1.5 m in all directions down to ground level	IIA, T3	2.7.10.2
					Blanket gas vent		Pipe vent to atmosphere	P		Radius of 1.5 m in all directions from vent tip	Within cylindrical volume below Zone 1		
					Pressure relief valve and piping discharging vertically upwards		Pipe vent to atmosphere	S		N/A	Radius of 1.5 m in all directions from vent tip		
21	Odorant injection system pumps		Vap. Cat "G(i)"	≤ 400 kPag ≤ 60 °C	Pneumatic pump instrument gas exhaust	Shelter with open sides (open air)	Piping connections and vents	C	N/A	N/A	Radius of 0.5 m	IIA, T1	2.7.10.3
22	Ground effect	Amadeus Basin to Darwin Pipeline surface facilities	Vap. Cat "G(i)"	≤ 9,650 kPag ≤ 60 °C	Closed system with flanges, piping joints and valves	Natural (open air)	Flanges, joints, valve seals, drains and vents	S	N/A	N/A	2.5 m laterally and extending to 1 m above grade for all process piping less than 2 m above grade	N/A	2.7.12

* C – Continuous; S – Secondary; P – Primary

APPENDIX B HAZARDOUS AREA MAPPING DRAWINGS

For hazardous area mapping drawings, refer to Section 4 of the Hazardous Area Dossiers for each site.

3 Observation for Improvement (OFI)

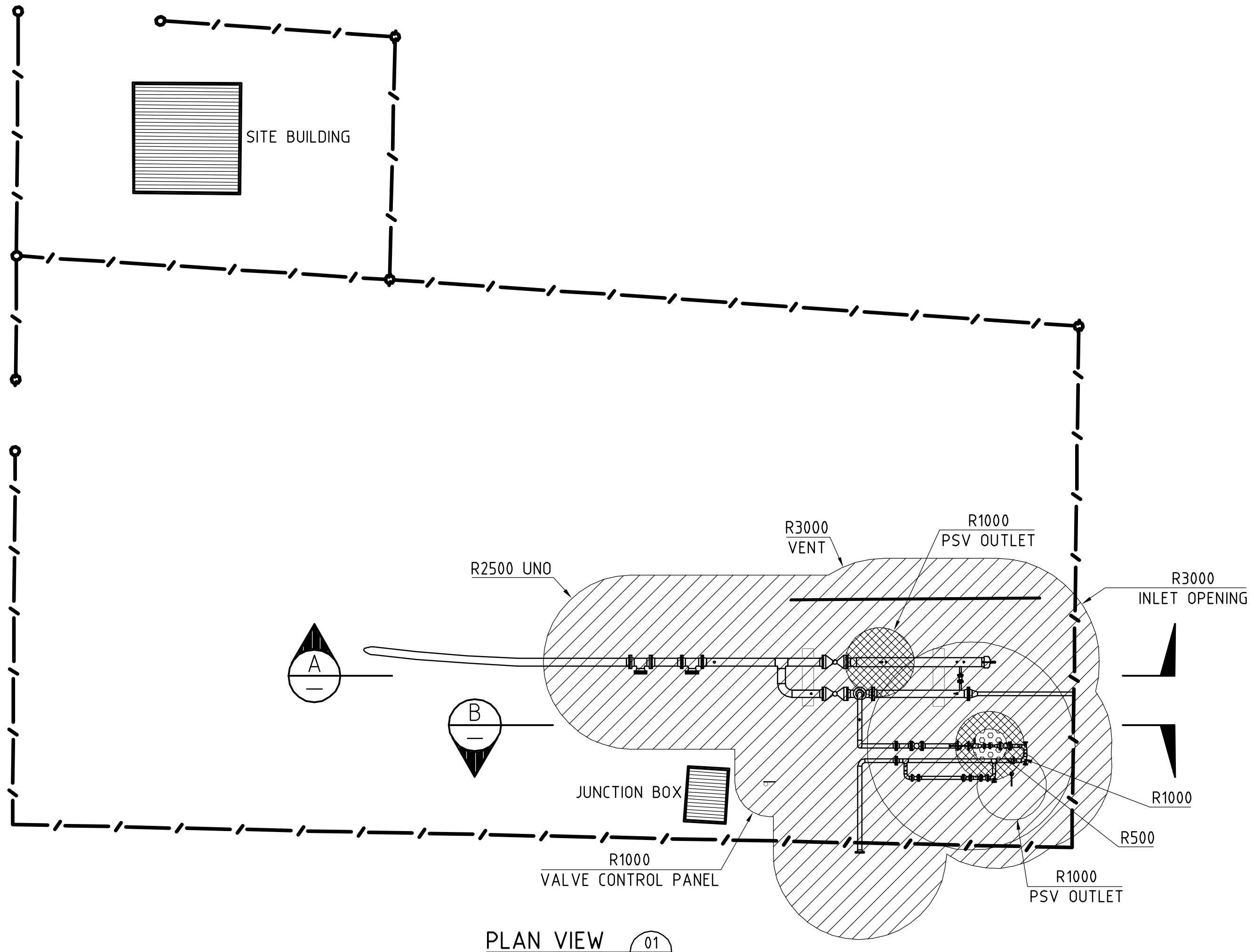
OFI No.	Description	Proposed Remedy
AD 002-OFI-1 Junction Box AD00-JB-001	Equipment ID required and IS label to door.	Fit equipment ID and IS label
	Two cables entering Junction box require blue sheath and cable labels.	Fit blue sheath and cable labels.
AD 002-OFI-2 Flow computer/Volume data system AD00-FE/FQ/PT/TE-002	Blue sheath or IS label to cable.	Fit the cable with a blue sheath or IS label.
	Cable ID required.	Fit Cable ID.
AD 002-OFI-3 Temperature Transmitter AD00-TT-009	Re-terminate cabling at gland entry.	Repair as per description.
	Change device ID/cable tag from TT to TE.	
AD 002-OFI-4 Valve limit switch AD00-ZSO/ZSC -005	Equipment ID Required.	Fit equipment ID.
	Hazardous area certification is ATEX, which is not suitable for equipment to be used in Australia.	Replace switch or obtain conformity assessment as per Australian certification.
AD 002-OFI-5 Emergency shutdown solenoid valve AD00-XY-005	Equipment ID required.	Fit equipment ID.
	"Red" coloured screw indicates modification works. Review manufacturer's literature to ensure nil issues.	Review as per description.
AD 002-OFI-6 Pulse transmitter AD00-PLT-	Blue sheath or IS label to cable.	Fit the cable with a blue sheath or IS label.
	Cable ID required.	Fit Cable ID.
AD 002-OFI-7 P&IDs	The P&IDs require modification to include mark-ups identified during the hazardous area inspection.	Update drawings.
AD 002-OFI-8 Information	The Palm Valley Alice Springs station has been recently modified. No information has been forwarded for inclusion in the hazardous area dossier.	APA to obtain information from the installation contractor and add to dossier

OFI No.	Description	Proposed Remedy
AD 002-OFI-9 Data Manual	Data manuals were not available for review at site or at Alice Springs depot or on site. It is not known if the manuals are current with the equipment installed at site.	Review manuals and update to reflect current equipment at that site.
AD 002-OFI-10 PSV discharge points	The PSV discharge points have been fitted with "flappers" to prevent rain ingress. The flappers can stick and may redirect the plume from vertically upwards and have been known to come off during discharge. Other operators install canvas caps on the discharge pipe secured by rope. These have the advantage of preventing rain ingress, and during a large discharge will fly off the discharge pipe providing indication to the operators that there has been a discharge.	Review recommendation and implement as required by APA
AD 002-OFI-11 Access and Egress	Only one gate is provided in the station. Additional egress routes may be required.	Review access and egress. Include Additional gates as required.
AD 002-OFI-12 Extent of hazardous area	The hazardous area extends outside of the Palm Valley Interconnect compound fence in to the Palm Valley Metering Station and Palm Valley Gas Plant. These are (currently) managed sites and there are minimal implications. Modifications to the gas plant in the future will need to be addressed.	Confirm the requirements as per description. Review if the modifications will be carried out to the gas station.

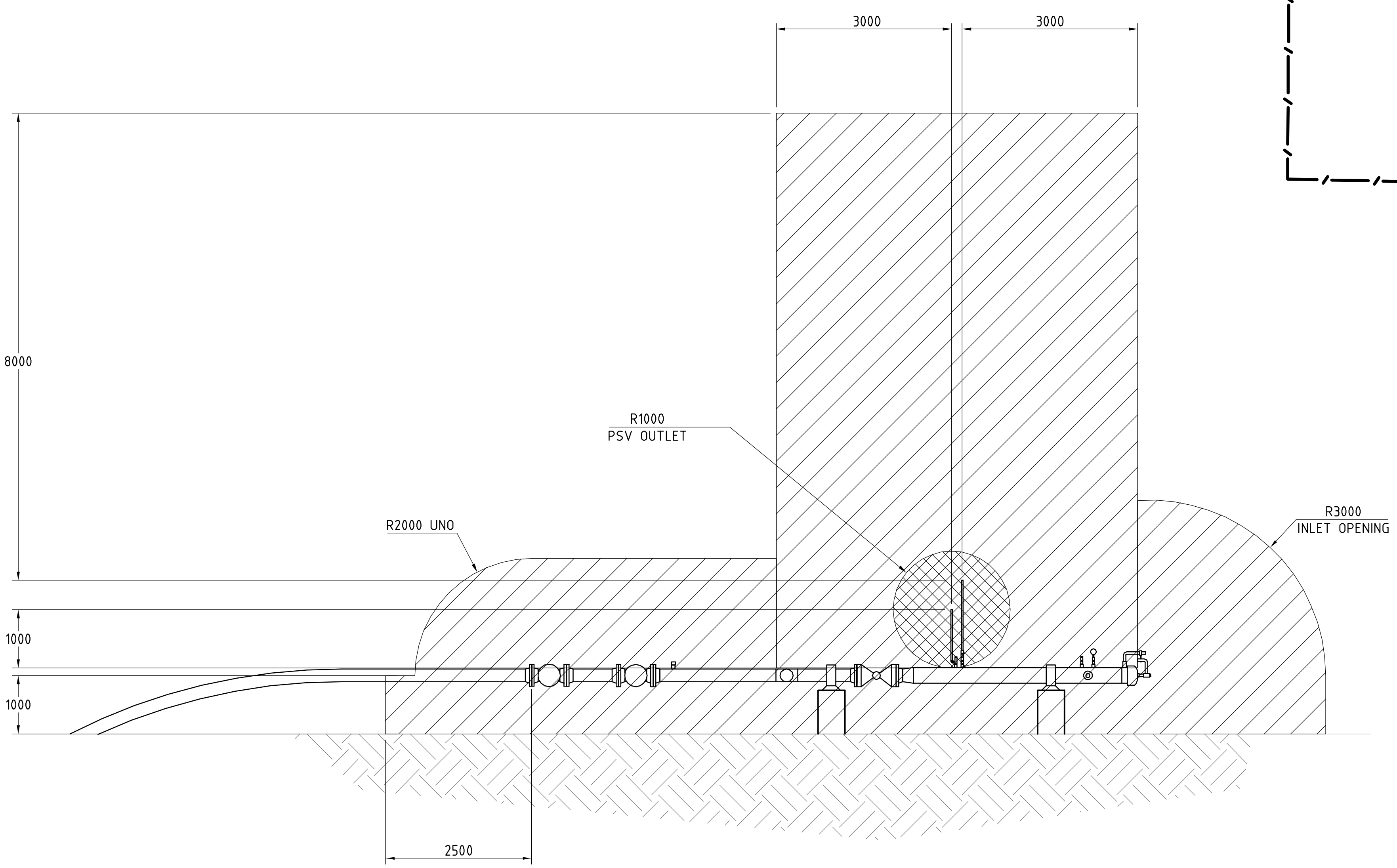
4 Hazardous Area Mapping Drawings

This section contains the hazardous area mapping drawings.

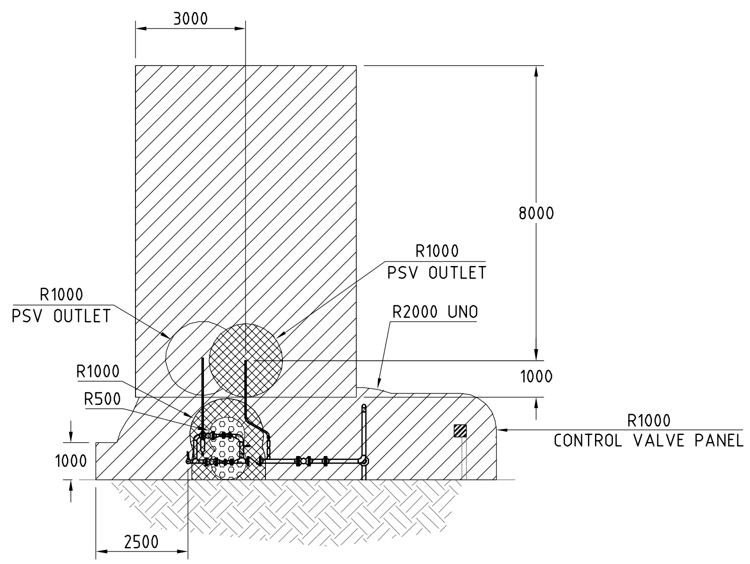
Drawing Number	Description	Revision
AD 00-2-5002	Palm Valley Interconnect Meter Station Hazardous Area	0



PLAN VIEW 01
SCALE 1:100



SECTION A
SCALE 1:50



SECTION B
SCALE 1:100

CLASSIFICATION LEGEND

- ZONE 0
- ZONE 1
- ZONE 2

GAS IIA T1

0 1 2 3 4 5
SCALE 1:50 METRES

0 2.5 5.0 7.5 10
SCALE 1:100 METRES

NOTES:
1. ALL BELOW GRADE PIPING AND EQUIPMENT NOT SHOWN FOR CLARITY OF DRAWINGS

HOLDS:

REV	REVISION DESCRIPTION	DATE	DRN.	CKD.	APP.	REFERENCE DRAWINGS	DRG.NO.
0	ORIGINAL ISSUE AS PER FYFE 3D SCAN DATA	[illegible]	FYFE	TCB		P & ID DIAGRAM	AD00-2-7004

FYFE Earth Partners
ACN 008 115 130
LEVEL 3, 80 FLINDERS STREET, ADELAIDE, SA, 5000
TEL (08) 8201 9600
FAX (08) 8201 9650
E-mail info@fyfe.com.au

APA Group

SHEET NO.
LEVEL DATUM
FIELD BOOK
DESIGN ENGINEER
SCALE AS SHOWN
FILE NAME AD00-2-5002
DATE [illegible]
DRAWN FYFE
CHECKED TCB
APPROVING ENGINEER

PROJECT AMADEUS BASIN TO DARWIN PIPELINE
TITLE PALM VALLEY STATION (350NS)
HAZARDOUS - PALM VALLEY INTERCONNECT
PALM VALLEY HAZARDOUS

PROJECT NO.
DRAWING NO. AD00-2-5002
REV 0

5 Hazardous Area Equipment Register and Certificates of Conformity

This section contains the hazardous area equipment register and associated certificates of conformity.

FYFE
Earth Partners
ENVIRONMENT
DEVELOPMENT
RESOURCES

Palm Valley Interconnect
Hazardous Area Equipment Register

APA Group

Doc No.	**18756-4-70-002**
Rev.	**0**
Date	**7-Dec-11**

Tag	P&ID No.	Location	Instrument Type	Manufacturer	Model	Serial No.	Hazard Area Drawing No.	Haz Area Classification			Ex Protection	Certification
								Zone	Gas Group	Temp.		
METERING AND VALVE SKID P&ID (AD00-2-7004-0)												
AD00-PIT-001	AD00-2-7004-0	Flow meter and Pressure control skid	Pressure indicator & transmitter	Rosemount	3051-TF4A2B21BB4I7M5Q4	R50600691	AD00-2-5002	2	IIA	T1	Ex ia, IIC T5	AUS Ex 1249x
AD00-JB-001	AD00-2-7004-0	Flow meter and Pressure control skid	Junction box	Clipsal EX	E542/5027		AD00-2-5002	2	IIA	T1	Ex e, i IIC T6	AUS Ex 2344x
AD00-FE/FQI/PT/TE-002	AD00-2-7004-0	Flow meter and Pressure control skid	Flow computer/ Volume data system	Landis & Gyr	INLINE VDS	8450884	AD00-2-5002	2	IIA	T1	Ex ia IIC T6	AUS Ex 843x
AD00-TT-009	AD00-2-7004-0	Flow meter and Pressure control skid	Temperature transmitter	Rosemount	644HA17XA	1343011	AD00-2-5002	2	IIA	T1	Ex ia IIC T4	IEC Ex BAS 07.0053X
AD00-PCV-003	AD00-2-7004-0	Flow meter and Pressure control skid	Pressure control valve	Flowserve	NT3000-05		AD00-2-5002	0	IIA	T1	Ex ia, IIC T5	AUS Ex 1461X
AD00-PT-003	AD00-2-7004-0	Flow meter and Pressure control skid	Pressure transmitter	Rosemount	3051-T64A2B21BB4I704	R50600690	AD00-2-5002	2	IIA	T1	Ex ia IIC T5	AUS Ex 1249x
AD00-PIT-007	AD00-2-7004-0	Flow meter and Pressure control skid	Pressure indicator & transmitter	Yokogawa	ESX 530A	EB84N-014NF/S02	AD00-2-5002	2	IIA	T1	Ex ia IIC T4	IECEx CSA 05.0005
AD00-XV-005	AD00-2-7004-0	Flow meter and Pressure control skid	Emergency shutdown valve	Flowserve	517551	224836	AD00-2-5002	2	IIA	T1	N/A	N/A
AD00-ZSO / ZSC -005	AD00-2-7004-0	Flow meter and Pressure control skid	Valve limit switch (open)	Flowserve	WOBO101201		AD00-2-5002	2	IIA	T1	Eex me II T6	Demko 02 Atex 130948X
AD00-XY-005	AD00-2-7004-0	Flow meter and Pressure control skid	Emergency shutdown solenoid valve	RGS Electro Pneumatics	EP000/1A/S/SAA	AV63602AHB	AD00-2-5002	2	IIA	T1	Ex ia IIC T6	AUS Ex 484/X-1
AD00-PLT-	AD00-2-7004-0	Flow meter and Pressure control skid	Pulse transmitter	Elster	G1600 N80ANS1600	80044501/99	AD00-2-5002					
ENVESTRA SCRAPPER STATION P&ID (AD00-2-7009-0)												
Nil												

FYFE Earth Partners
ENVIRONMENT
DEVELOPMENT
RESOURCES

Palm Valley Interconnect
Hazardous Area Equipment Register

Doc No.	**18756-4-70-002**
Rev.	**0**
Date	**7-Dec-11**

APA Group

Tag	P&ID No.	Location	Instrument Type	Manufacturer	Model	Serial No.	Hazard Area Drawing No.	Haz Area Classification			Ex Protection	Certification
								Zone	Gas Group	Temp.		

Notes (in order of highlighted rows):	
Tag no.	**Remarks**
AD00-ZSO / ZSC -005	Certification Details was obtained from Manufacturer. Serial Number on the inspection sheet was wrong according to pictures from site.
AD00-PLT-	Certification and Ex protection details are not available

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Certificate of Conformity

Certificate No: AUS Ex 1249X

Issue 0: Original Issue 17/7/1991
Issue 5: 30/05/2003 (Revalidation)

Date of Expiry: 30/05/2013

Certificate Holder: Fisher-Rosemount Pty Ltd
471 Mountain Highway
BAYSWATER Victoria 3153

Electrical Equipment: Model 3051-series Pressure Transmitter and Model 3001-series Hydrostatic Pressure Transmitter, including optional Fieldbus/Profibus outputs, LCD indicator and T1 Transient-protection Terminal Board.

Type of Protection: Ex ia
Ex n

Marking Code: Ex ia IIC T4 (T_{amb} = 70 °C) / T5 IP66 (for non-Fieldbus)
Ex ia IIC T4 (T_{amb} = 60 °C) / T5 IP66 (for Foundation Fieldbus/Profibus)
Ex n IIC T4(T_{amb} = 70 °C) / T5 IP66
AUS Ex 1249X

Manufactured By: Rosemount Inc
8200 Market Boulevard
Chanhassen MN 55317 USA

Emerson Process Management
Document Control
PDC No.: 4-7053856I-001 Rev: 0 Date: 31/7/03
ORDER NUMBERS
Customer: 626923
Emerson: 7053856I

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
Phone: (02) 4724 4900 Fax: (02) 4724 4999

JAS-ANZ
Accreditation by the Joint Accreditation System of Australia and New Zealand, Acc No. Z2221100AS

STANDARDS AUSTRALIA

Standards Australia Quality Assurance Services Pty Limited A.B.N. 67 050 611 642

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP 69 and the Procedures (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1-1989	Electrical equipment for explosive atmospheres - Explosion-protection techniques - General requirements (incorporating Amendment 1)
AS 2380.7-1987	Electrical Equipment for explosive atmospheres - Explosion-protection techniques - Intrinsic safety 'i'
AS 2380.9-1991	Electrical Equipment for Explosive atmospheres - Explosion-protection Techniques - Non-sparking Apparatus - Type of protection 'n'
AS 1939-1990	Degrees of protection provided by enclosures of electrical equipment (IP Code)

This certificate does not ensure compliance with electrical safety requirements and performance other than those included in the Standards listed above.

The equipment listed has successfully met the examination and test requirements as recorded in

Test Report No: LOSC 11812; 16864; 16910 and TestSafe 20320, 21599 and 22468

File Reference: TestSafe 94/5985-TSA 0007

Signed for and on behalf of issuing authority
Laboratory Systems Manager
TestSafe Australia

Position
30/05/2003

Date of issue

Ex 1249X-5

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of Standards Australia Quality Assurance Services and must be returned in the event of its being revoked or not renewed.

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
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JAS-ANZ

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Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Schedule

Certificate No: AUS Ex 1249X **Issue:** 5 **Date of Issue:** 30/05/2003

Certified Equipment: The range of transmitters is designed to convert signals from a pressure transducer into an electrical signal. The electronics provide an analogue 4-20 mA output with HART, or optionally a d.c. output for low power applications or Foundation Fieldbus, or Profibus output for Fieldbus applications. The transmitter is intended for connection to separately certified apparatus having a source of potential not exceeding 30 Volts d.c. and a short circuit current not exceeding 200 mA for the low power and analog/HART output or 300 mA for the Fieldbus output.

The equipment may be manufactured in a number of combinations from the ranges of optional boards according to the configurations, and they are tabulated in the following tables.

(a) Foundation Fieldbus/Profibus Transmitter Configuration		
Ref.	**Description**	**Drawing No.**
Any one of the following terminal boards:		
Ter.e	Standard 3051 Fieldbus	03031-0467
Ter.f	Transient Protection 3051 Fieldbus (T1 Option)	03031-0486
Micro-board assembly:		
Micro.a1	3051 Fieldbus Analog	03031-0477
Micro.a2	3051 Fieldbus Digital	03031-0481
Optional LCD Indicator assembly:		
Dis.c	CCA, Vortex Shrouded, LCD Board, 2 Line	08800-7611
Any one of the sensor boards can be used: (Refer to Sensor Board List below)		

Issued by:

Test Safe AUSTRALIA

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Phone: (02) 4724 4900 Fax: (02) 4724 4999

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Accreditation by the Joint Accreditation System of Australia and New Zealand, Acc No. Z2221100AS

STANDARDS AUSTRALIA

Standards Australia Quality Assurance Services Pty Limited A.B.N. 67 050 611 642

Certified Equipment: (Continued)

(b) Low Power Transmitter Configuration		
Ref.	**Description**	**Drawing No.**
Any one of the following terminal boards can be used:		
Ter.a	Potted Low Power Terminal Block Assembly	03031-0607
Ter.b	Transient Protection Terminal Brd, 3-Wire (T1 Option)	03031-0506
Microboard assembly:		
Micro.b	Low Power Microboard Conformal Coated	03031-0275
Optional LCD Indicator assembly:		
Dis.a	Coated CCA Meter/LCD Board	03031-0162
Any one of the sensor boards can be used: (Refer to Sensor Board List below)		

(c) Analog/HART Transmitter Configuration		
Ref.	**Description**	**Drawing No.**
Any one of the following terminal boards can be used:		
Ter.c	4-20mA Standard Terminal Block Assembly	03031-0657
Ter.d	Standard Transient Protection Terminal Block Assembly (T1 Option)	03031-0665
Microboard Assembly:		
Micro.c	Micro Brd 5, Coated & Spot Potted, 3051/3001 & Probar	03031-0584
Optional LCD Indicator assembly:		
Dis.b	Shrouded/Spot-Potted/Labelled LCD Board, 2 Line	03031-0591
Any one of the sensor boards can be used: (Refer to Sensor Board List below)		

Sensor Boards List		
Ref.	**Description**	**Drawing No.**
Sen.a	Low Cost Sensor Card Conformal Coated	03031-0283
Sen.b	Sensor Board 3, Uncoated, 3051C	03031-0587
Sen.c	Sensor Board IV Coated, 3051C	03031-0817
Sen.d	AP Sensor Card Conformal Coated	03031-2011
Sen.e	Sensor Board, Coated, 3051T	03031-0923
Sen.f	Sensor Taconite, Coated, 3051/2088	03031-0929

Addendum to Certificate No....Ex 1249X-5

Variations Permitted By Issue 5:

1. The complete range of the equipment has been classified as documented in the Certified Equipment.

Conditions of Certification relating to Variations Permitted by Issue 5:

1. It is a condition of manufacture that the 3051 or 3001 pressure transmitters that do not include the transient protection on the terminal board assembly must be capable of withstanding a test voltage of not less than 500 Volts, 48 Hz to 62 Hz applied between input terminals and case for a period not less than 1 minute.

2. It is a condition of safe use that the following parameters are to be taken into account for Intrinsic Safety applications:

(a) Foundation Fieldbus/Profibus Transmitter Configuration	
Entity Parameters	**With or without transient protected T1 option**
Ui	30 V
Ii	300 mA
Pi	1.3 W
Ci	0 µF
Li	0 µH

(b) Low Power Transmitter Configuration		
Entity Parameters	**Without transient protected T1 option**	**With transient protected T1 option**
Ui	30 V	30 V
Ii	200 mA	200 mA
Pi	0.9 W	0.9 W
Ci	0.042 µF	0.042 µF
Li	10 µH	0.75 mH

(c) Analog/HART Transmitter Configuration		
Entity Parameters	**Without transient protected T1 option**	**With transient protected T1 option**
Ui	30 V	30 V
Ii	200 mA	160 mA
Pi	0.9 W	0.9 W
Ci	0.01 µF	0.01 µF
Li	10 µH	1.05 mH

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
Phone: (02) 4724 4900 Fax: (02) 4724 4999

Addendum to Certificate No. Ex 1249X-5

Conditions of Certification relating to Variations Permitted by Issue 5: (continued)

3. It is a condition of safe use that the apparatus may only be used with a passive current limited power source for Intrinsic Safety applications. The power source parameters must be such that $Po \leq (Uo \times Io) / 4$.

4. It is a condition of safe use that for models using transient protection in the terminal assembly (T1 transient protection models) the apparatus enclosure is to be electrically bonded to the protective earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm^2 minimum cross-sectional area.

5. It is a condition of safe use that the Fieldbus option is to be supplied from a voltage source not exceeding 35.0 V dc for Non-Sparking applications. The Low Power and Analog/HART options are to be supplied from a voltage source not exceeding 55 V dc for Non-sparking applications

6. It is a condition of safe use that where the equipment is installed such that there is an unused conduit entry, the entry must be sealed with a suitable blanking plug to maintain the minimum degree of protection of IP66 for Non-Sparking applications.

7. It is a condition of safe use that upon completion of commissioning the apparatus with a label plate with more than one marking on it, the irrelevant marking code(s) shall be permanently scribed off.

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No. Ex 1249X-5

Drawings Relating to Variations Permitted by Issue 5

Document No.	Document Title	Sheets	Issue	Date
00268-0031	Index of I.S. Barrier System for MOD.268 Smart Family Interface	1 to 7	M	08/04/1993
03031-0059	Label, Nameplate / Customer Tag	1 to 16	AY	17/12/2001
03031-0060	Label, Approvals, 3051C	1 to 8	BG	04/04/2002
03031-0087	Schematic Diagram, 3051/3001 CENELEC I.S. Approval	1 of 1	AC	10/10/1997
03031-0160	Schematic Diagram, Meter/LCD Board	1 of 1	H	07/05/1990
03031-0161	Printed Wiring Board LCD/Meter Board	1 to 4	U	05/08/1996
03031-0162	Coated CCA Meter/LCD Board	1 of 1	AC	22/11/1999
03031-0272	Schematic Diagram 3051C Low Power	1 of 2	AA	17/02/1999
03031-0273	Printed Wiring Board Low Power Microboard	1 to 4	J	06/08/1996
03031-0275	Circuit Card Assy Low Power Microboard Conformal Coated	1 to 3	AB	10/11/1999
03031-0280	Schematic Diagram Low Cost Sensor BRD	1 of 1	F	12/01/1995
03031-0281	Printed Wiring Board Low Cost Sensor Card	1 to 4	G	06/08/1996
03031-0283	Circuit Card Assy Low Cost Sensor Card Conformal Coated	1 of 1	F	21/03/1991
03031-0464	Schematic Drawing Standard Terminal Block, 3051 Fieldbus	1 of 1	AA	20/03/1998
03031-0467	Terminal Block Assy, Standard 3051 Fieldbus	1 to 2	AC	12/1998
03031-0475	3051 Fieldbus Analog Electronics	1 to 2	AC	12/1998
03031-0476	Printed Wiring Board - Fieldbus Analog	1 to 3	AC	10/06/1998
03031-0477	Circuit Card Assy 3051 Fieldbus Analog	1 to 2	AH	29/05/2001
03031-0479	3051 Fieldbus Digital Electronics	1 of 1	AB	12/1998
03031-0480	Printed Wiring Board - 3051 Fieldbus Digital	1 to 3	AC	12/1998
03031-0481	Circuit Card Assy - 3051 Fieldbus Digital	1 to 3	AD	01/2000
03031-0483	Schematic Drawing Transient Terminal Block, 3051 Fieldbus	1 of 1	AB	22/02/2001
03031-0484	Printed Wiring Board Transient Protection 3051 Fieldbus	1 to 3	AC	22/02/2001
03031-0486	Terminal Block Assy, Transient Protection, 3051 Fieldbus	1 to 2	AC	12/1998
03031-0488	Ass'y Output Electronics, Fieldbus	1 of 1	AG	29/05/2001
03031-0504	Schematic Diagram Terminal Block 3-wire Configuration	1 of 1	C	21/05/1991
03031-0505	Printed Wiring Board Terminal Board, 3-Wire Configuration	1 to 2	E	23/06/1995
03031-0506	Circuit Card Assy, Transient Protection Terminal BRD, 3-Wire	1 to 3	AA	24/08/1998

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
Phone: (02) 4724 4900 Fax: (02) 4724 4999

Addendum to Certificate No....Ex 1249X-5

Drawings Relating to Variations Permitted by Issue 5 (Continued)

Document No.	Document Title	Sheets	Issue	Date
03031-0519	3051P Label, Nameplate / Customer Tag	1 to 8	AG	10/08/2001
03031-0520	Label, Approvals, 3051P	1 to 8	AJ	06/01/2000
03031-0521	Label, Nameplate / Customer Tag 3051C-Low Power	1 to 7	AH	15/02/2001
03031-0535	Label, Nameplate / Customer Tag 3051P-Low Power	1 to 3	F	19/05/1995
03031-0581	Schematic Drawing Micro Board #5 3051C	1 to 3	AD	01/03/2002
03031-0582	Printed Wiring Board, Micro BRD 5, 3051C	1 to 3	AD	17/07/2000
03031-0584	Shrouded Assembly Micro BRD 5, Coated & Spot Potted, 3051/3001 & Probar	1 to 4	AK	04/03/2002
03031-0585	Schematic Sensor Board 3	1 to 2	B	13/11/1995
03031-0586	Printed Wiring Board Sensor Board 3 3051C	1 to 4	AA	08/10/1997
03031-0587	Circuit Card Assy Sensor Board 3, Uncoated, 3051C	1 to 2	AC	25/06/1998
03031-0589	Schematic Diagram 160 Segment LCD Board	1 to 1	A	31/01/1995
03031-0590	Printed Wiring Board LCD Board, 2 Line	1 to 4	AA	30/11/1998
03031-0591	Circuit Card Assembly Shrouded/Spot-Potted/labeled LCD Board, 2 Line	1 to 3	AF	19/06/2000
03031-0604	Schematic Diagram 3051C Low Power Terminal Block	1 of 1	A	12/02/1996
03031-0605	Printed Wiring Board, Low Power, Terminal, Block, 3051C	1 to 3	A	12/02/1996
03031-0607	Potted Low Power Terminal Block Assembly	1 of 1	AC	15/11/2001
03031-0655	Schematic Diagram 4-20mA Standard Terminal Block	1 of 1	AB	15/10/2001
03031-0656	Printed Wiring Board, Standard 4-20mA, Terminal Block, 3051C	1 to 3	AD	20/06/2000
03031-0657	4-20mA Standard Terminal Block Assembly	1 to 2	AF	15/11/2001
03031-0663	Schematic Diagram Standard Trans. Protection Terminal Block	1 of 1	AB	10/2001
03031-0664	Printed Wiring Board, Transient Protection Standard, Term. Block, 3051C	1 to 3	AC	07/08/1997
03031-0665	Standard Transient Protection Terminal Block Assembly	1 to 2	AD	15/11/2001
03031-0687	Schematic Diagram, 3051 Fieldbus CENELEC I.S. Approval	1 of 1	AB	16/08/2001
03031-0815	Schematic Sensor Board IV	1 to 2	AE	13/01/1999
03031-0816	Printed Wiring Board Sensor Board IV, 3051C	1 to 3	AE	11/06/1998

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No. Ex 1249X-5

Drawings Relating to Variations Permitted by Issue 5 (Continued)

Document No.	Document Title	Sheets	Issue	Date
03031-0817	Circuit Card Assy Sensor Board IV Coated, 3051C	1 to 2	AH	13/01/1999
03031-0920	Schematic Sensor, 3051T	1 to 2	G	13/12/1995
03031-0921	Printed Wiring Board, Sensor Board 3051T	1 to 3	C	25/02/1997
03031-0923	Circuit Card Assy Sensor Board Coated, 3051T	1 of 1	AA	07/10/1997
03031-0926	Schematic Sensor, 3051TAC	1 to 3	AE	01/04/2001
03031-0927	Printed Wiring Board Sensor Taconite, 3051/2088	1 to 3	AF	25/05/2001
03031-0929	Circuit Card Assembly Sensor Taconite, Coated, 3051/2088	1 of 1	AJ	01/04/2001
03031-1017	Approval Drawing For Module Housing Ass'y, Intrinsically Safe	1 to 6	AH	30/11/2000
03031-1022	Model 3051C/L/P/H, 3001C/S Intrinsically Safe and Type N Configuration, SAA	1 to 10	AG	28/05/2003
03031-1026	SAA I.S. Index For 3051 and 3001	1 to 4	AB	26/04/1999
03031-2008	Schematic Diagram AP Sensor Brd	1 of 1	L	23/09/1996
03031-2009	Printed Wiring Board AP Sensor Card	1 to 4	K	23/09/1996
03031-2011	Circuit Card Assy AP Sensor Card Conformal Coated	1 of 1	AA	07/10/1997
03031-2041	3051T Sensor Board Standoff	1 of 1	AC	05/09/2000
08800-7609	Schematic Diagram, Vortex LCD Board	1 of 1	AA	15/10/1997
08800-7610	Printed Wiring Board, LCD 2 Line	1 to 3	AA	15/10/1997
08800-7611	CCA, Vortex, Shrouded, LCD Board, 2 Line	1 to 2	AE	06/07/2000

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA	UPDATE ENTITY PARAMETERS	RTC1002910	J.D.J.	12/2/97
AB	ADD FIELDBUS AND PROFIBUS	RTC1006448	J.D.J.	4/26/99

TestSafe Australia
This drawing forms part of certification documents under Certificate Number AUS Ex 1249X - 5
Amendments require Supplementary Certification

SAA ENTITY CONCEPT APPROVALS

3051C 3001C
3051L 3001CL
3051P 3001CH
3051H 3001S
3051CA
3051T

OUTPUT CODE A (4-20 mA HART) SEE SHEETS 2
OUTPUT CODE M (LOW POWER) SEE SHEETS 3
OUTPUT CODE F / W (FIELDBUS, PROFIBUS) SEE SHEETS 4

THE ROSEMOUNT PRESSURE TRANSMITTERS LISTED ABOVE ARE INTRINSICALLY SAFE WHEN USED IN THE CURCUIT WITH SAA APPROVED BARRIERS WHICH MEET THE LIST ENTITY PERAMETERS.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.

CAD Maintained, (MICROSTATION)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES, MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.
DR. Mike Debe 12/30/91
CHK'D
APP'D. GLEN MONZO 5/8/92
APP'D. GOVT.

ROSEMOUNT® MEASUREMENT
FISHER-ROSEMOUNT

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

TITLE SAA I.S. INDEX FOR 3051 & 3001

SIZE A | FSCM NO | DWG NO. 03031-1026

SCALE N/A | WT. ——— | SHEET 1 OF 4

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1006448		

OUTPUT CODE "A" (4–20MA / HART)
SAA ENTITY CONCEPT APPROVALS

THE ROSEMOUNT PRESSURE TRANSMITTERS LISTED BELOW ARE INTRINSICALLY SAFE WHEN USED IN THE CIRCUIT WITH SAA APPROVED BARRIERS WHICH MEET THE LISTED ENTITY PARAMETERS.

APPROVED TRANSMITTERS

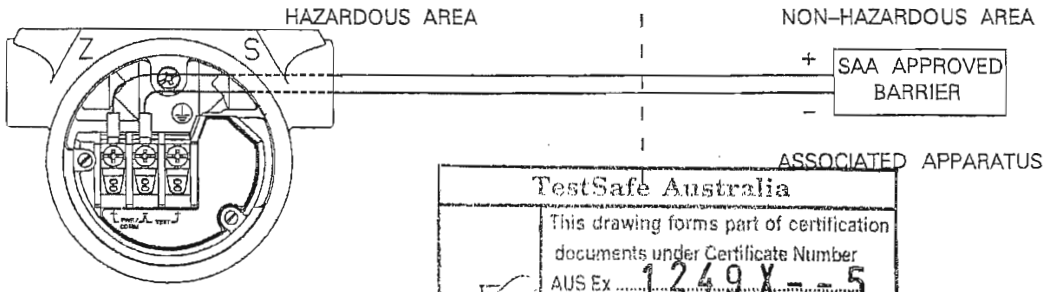
3051C	3051H	3001C	3001S
3051L	3051T	3001CL	
3051P	3051CA	3001CH	

ENTITY PARAMETER FOR Ex ia IIC T5 CLASS I, ZONE 0 PROTECTION:

APPARATUS PARAMETER	BARRIER PARAMETER
Vmax = 30V	Voc IS LESS THAN OR EQUAL TO 30V
Imax = 200mA	Isc IS LESS THAN OR EQUAL TO 200mA
Pmax = 0.9W	$\frac{Voc * Isc}{4}$ IS LESS THAN OR EQUAL TO 0.9W
Ci = 0.01μF	Ca IS GREATER THAN 0.01 MICROFARADS
Li = 10μH	La IS GREATER THAN 10 MICROHENRIES
FOR T1 OPTION ONLY	
Imax = 160mA	Isc IS LESS THAN OR EQUAL TO 160mA
Li = 1.05mH	La IS GREATER THAN 1.05 MILLIHENRIES

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURERS FIELD WIRING INSTRUCTIONS AND THE CIRCUIT DIAGRAM SHOWN BELOW.



TestSafe Australia
This drawing forms part of certification documents under Certificate Number AUS Ex 1249X – 5
Amendments require Supplementary Certification

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

CAD Maintained, (MICROSTATION)

DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1026
ISSUED	SCALE N/A	WT.	SHEET 2 OF 4

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1006448		

OUTPUT CODE "M" (LOW POWER)
SAA ENTITY CONCEPT APPROVALS

THE ROSEMOUNT LOW POWER CONFIGURED PRESSURE TRANSMITTERS LISTED BELOW ARE SAA APPROVED AS INTRINSICALLY SAFE WHEN USED IN THE CIRCUIT WITH SAA APPROVED BARRIERS WHICH MEET THE LISTED ENTITY PARAMETERS.

APPROVED TRANSMITTERS WITH LOW POWER CONFIGURATION

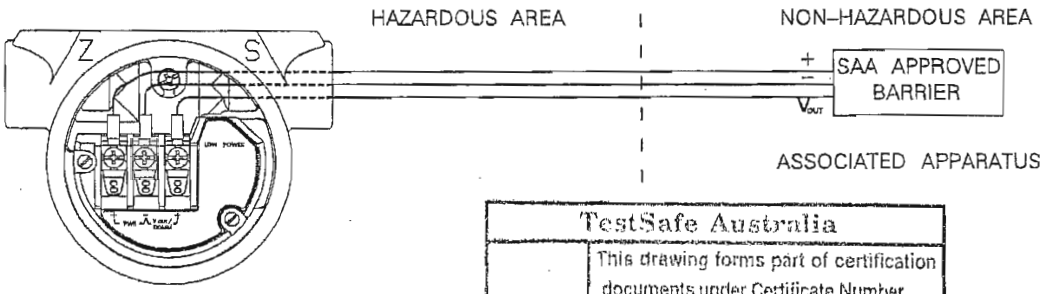
3051C	3051T
3051L	3051CA
3051P	
3051H	

ENTITY PARAMETER FOR Ex ia IIC T5 CLASS I, ZONE 0 PROTECTION:

APPARATUS PARAMETER	BARRIER PARAMETER
Vmax = 30V	Voc IS LESS THAN OR EQUAL TO 30V
Imax = 200mA	Isc IS LESS THAN OR EQUAL TO 200mA
Pmax = 0.9W	$\frac{Voc * Isc}{4}$ IS LESS THAN OR EQUAL TO 0.9W
Ci = 0.042μF	Ca IS GREATER THAN 0.042 MICROFARADS
Li = 10μH	La IS GREATER THAN 10 MICROHENRIES
FOR T1 OPTION ONLY	
Li = 0.75mH	La IS GREATER THAN 0.75 MILLIHENRIES

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURERS FIELD WIRING INSTRUCTIONS AND THE CIRCUIT DIAGRAM SHOWN BELOW.



TestSafe Australia
This drawing forms part of certification documents under Certificate Number AUS Ex 1249X - - 5
Amendments require Supplementary Certification

CAD Maintained (MICROSTATION)

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1026
ISSUED	SCALE N/A	WT. ———	SHEET 3 OF 4

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB		RTC1006448		

OUTPUT CODE F /W (FIELDBUS, PROFIBUS)
SAA ENTITY CONCEPT APPROVALS

THE ROSEMOUNT PRESSURE TRANSMITTERS LISTED BELOW ARE INTRINSICALLY SAFE WHEN USED IN THE CIRCUIT WITH SAA APPROVED BARRIERS WHICH MEET THE LISTED ENTITY PARAMETERS.

APPROVED TRANSMITTERS

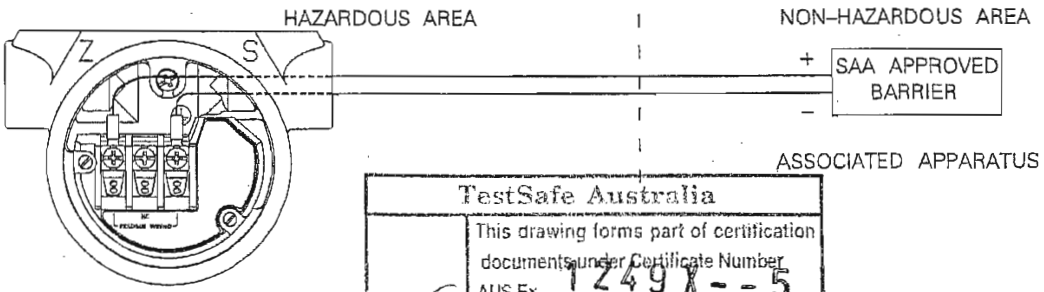
3051C	3051H	3001C	3001S
3051L	3051T	3001CL	
3051P	3051CA	3001CH	

ENTITY PARAMETER FOR Ex ia IIC T5 CLASS I, ZONE 0 PROTECTION:

APPARATUS PARAMETER	BARRIER PARAMETER
Vmax = 30V Imax = 300mA Pmax = 1.3W Ci = 0 μF Li = 0μH	Voc IS LESS THAN OR EQUAL TO 30V Isc IS LESS THAN OR EQUAL TO 300mA $\frac{Voc * Isc}{4}$ IS LESS THAN OR EQUAL TO 1.3W Ca IS GREATER THAN 0 MICROFARADS La IS GREATER THAN 0 MICROHENRIES

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURERS FIELD WIRING INSTRUCTIONS AND THE CIRCUIT DIAGRAM SHOWN BELOW.



TestSafe Australia
This drawing forms part of certification documents under Certificate Number AUS Ex 1249X - - 5
Amendments require Supplementary Certification

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

CAD Maintained, (MICROSTATION)

DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1026
ISSUED	SCALE N/A	WT.	SHEET 4 OF 4

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Certificate of Conformity

Certificate No.: Ex 2344X

Issue 0: 24 April 1998 Original Issue
Issue 1: 22 June 2000 Additions/Modifications

Date of expiry: 24 April 2008

Certificate Holder: **Gerard Industries Pty Ltd**
12 Short Street
BANKSTOWN NSW 2200

Electrical Equipment: **EB Range of Enclosures**

Type of Protection and Marking Code: **Ex i IIC T6 IP66***
Ex e IIC T6 IP66*
DIP T6 IP66*

* Enclosures are IP66 unless push buttons, indicating lights and rotary switches are fitted. If these components are fitted the degree of protection shall be as per Table 2.
Note: Enclosures fitted with series 7 switches are suitable for DIP applications only.

AUS Ex 2344X

Manufactured by: **Clipsal Stahl Ex Pty Ltd**
12 Short Street
BANKSTOWN NSW 2200

VERIFIED COPY
OF
ORIGINAL CERTIFICATE

Issued by:

Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 *Fax: + 61 7 3810 6366*

SIMTARS
Committed to Safety
Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP 69 and the Procedures (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1 - 1989	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 1 : General requirements (Amdt 1, 5 September 1998)**
AS 2380.6 - 1988	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 6 : Increased safety**
AS 2380.7 - 1987	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 7 : Intrinsic safety i**
AS 2236 - 1994	**Electrical equipment for explosive atmospheres - Dust-excluding ignition-proof (DIP) enclosure (Amdt 1, 5 March 1999)**

This certificate does not ensure compliance with electrical safety and performance requirements other than those included in the standards listed above.

: equipment listed has successfully met the examination and test requirements as recorded in

Test Report No: **E99/0042**

File Reference: **98/0323** **(P80770)**

Signed for and on behalf of issuing authority

Senior Engineer - Certification
Engineering, Testing and Certification Centre

Position

22 June 2000

Date of issue

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of Standards Australia Quality Assurance Services and must be returned in the event of its being revoked or not renewed.

Certificate No.: Ex 2344X **Issue: 1**

Issued by:

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SIMTARS Committed to Safety

Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Schedule

Equipment:

The enclosures in the EB range of enclosures are made from 316 stainless steel or powder coated mild steel. Table 1 lists the enclosures covered by this certificate. The enclosures may be fitted with appropriately certified control and indicating devices or terminals.

This supplementary certificate covers the addition of a new size enclosure catalogue number EB443 to the EB range. The enclosure dimensions are 400mm x 400mm x 300mm.

The following options for the complete range are also covered by this supplementary certificate:

- Fitting a toughened glass or polycarbonate windows on the cover.
- Fitting of the Clipsal 6 Series push button operators and indicating lamps.
- Fitting of the 7 Series rotary cam switches as listed in Table 2 to be mounted on the cover for DIP applications only.

This supplementary certificate does not cover the associated contact assemblies for the operators listed in Table 2. The enclosures may be fitted with appropriately certified control and indicating devices or terminals.

Table 1: EB Enclosure Details

Enclosure Catalogue Number	Dimensions		
	Height	Width	Depth
EB#321	300	200	150
EB#332	300	300	200
EB#443	400	400	300
EB#542	500	400	200
EB#752	700	500	200
EB#963	900	600	300

D = DIP, E = Ex e, I = Ex i

Certificate No.: Ex 2344X Issue: 1 Date of Issue: 22 June 2000

Issued by:

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STANDARDS AUSTRALIA

Addendum to Certificate No.: **Ex 2344X**

Issue: **1**

Date of Issue: **22 June 2000**

Table 2: Operator Type and Associated IP Rating

OPERATOR TYPE	PART NO.	IP RATING	OPERATOR TYPE	PART NO.	IP RATING
Rotary Cam Switch	7GN12H/90/U/51/06	66	Illuminated Extended Pushbutton Actuator	6PNE20..	65
Rotary Cam Switch	7GN32/90/U/51	66	Flush Pushbutton Actuator	6PBMFB10..	65
Rotary Cam Switch	7GN32 /90/U/51/06	66	Illuminated Mushroomhead Pushbutton Actuator	6PNM40..	65
Rotary Cam Switch	7GN12/90/U/51	66	Mushroomhead Pushbutton Actuator	6PBMM60..	66
Rotary Cam Switch	7GN12/90/U/51/56	65	Mushroomhead Pushbutton Actuator	6PBMM40..	66
Extended Pushbutton Actuator	6PBMEB20..	66	Mushroomhead Latched Pushbutton Actuator	6PBMML40	65
Illuminated Flush Pushbutton Actuator	6PNF10..	65	Mushroomhead Latched Pushbutton Actuator	6PBMMLSO	66

Drawings:

Drawings associated with this supplementary certificate:

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106	ENCLOSURE. GENERAL ASSEMBLY.	3	10.01.00
X-106-1	GASKET, LID.	3	10.01.00
X-106-2	GASKET, GLAND PLATE.	2	10.01.00
X-106-3	GLAND PLATE.	2	10.01.00
X-106-4	RATING-LOGO, LABEL.	3	13.04.00
X-106-5	ENCLOSURE. COMPONENT INSTALLATION DETAILS.	3	11.01.00

DRAWINGS CONTINUED NEXT PAGE

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SIMTARS Committed to Safety
Quality System Certified to AS/NZS ISO 9001 Certification No 6039

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: Ex 2344X

Issue: 1

Date of Issue: 22 June 2000

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106-6	WINDOW DETAILS.	3	2.06.99
X-106-7	SWITCH MOUNTING DETAILS.	1	18.06.99
W-667	CERTIFICATION DRAWING DMPB SERIES CONTROL MODULES	A	22.9.97
C1532	LABEL, CLEANING.	3	30.01
EB-0001Z	EB. SERIES 6, SWITCH MOUNTING DETAILS.	1	10.04.00
EB-0002Z	EB. SERIES 7, SWITCH MOUNTING DETAILS.	1	10.04.00
EB-4	LID SUBASSEMBLY.	6	31.05.99
OPTION 06/51 AO	OPTION 06/51 (AO)	1	2/9/99
600789	BRTVLJENJE OSOVINE	A	6.94

Drawings associated with the original issue of this certificate:

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106	ENCLOSURE. GENERAL ASSEMBLY.	2	09,02,98
X-106-1	GASKET, LID.	2	11.09.97
X-106-2	GASKET, GLAND PLATE.	1	8.08.97
X-106-3	GLAND PLATE.	1	8.08.97
X-106-4	RATING-LOGO, LABEL.	2	16.02.98
X-106-5	ENCLOSURE. COMPONENT INSTALLATION DETAILS.	2	15.09.97
W-600	CERTIFICATION DRAWING ACTUATORS AND BEZELS	A	12.12.95

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STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: **Ex 2344X**

Issue: **1**

Date of Issue: **22 June 2000**

Conditions of Certification:

Maximum Allowable Power Dissipation

The maximum power dissipation per enclosure shall not exceed the values given in Table 3 based on an even distribution throughout the enclosure.

The total number of terminals shall not exceed the number of terminals as specified on drawing X-106-5.

The maximum number of terminals in an enclosure may be calculated by determining the terminal resistance, cable resistance, cable current and the maximum allowable power dissipation per enclosure type (refer Table 3).

Table 3 : Maximum Allowable Power Dissipation

ENCLOSURE	MAXIMUM ALLOWABLE POWER DISSIPATION (WATTS) FOR T6 TEMPERATURE CLASSIFICATION#
EB*321	20
EB*332	40
EB*443	107
EB*542	80
EB*752	98
EB*963	128

V75 cable may be used with these power dissipation figures.

Issued by:

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Quality System Certified to AS/NZS ISO 9001 Certification No 6039

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: **Ex 2344X**

Issue: **1**

Date of Issue: **22 June 2000**

The power dissipation of the enclosure may be calculated using the following equation for each terminal type and conductor size used in the enclosure. Calculated power dissipations for each terminal type and conductor size are to be summated.

$$P = I^2 (n.R_t + L.R_c)$$

Where P = Power dissipation per terminal type & conductor size used in an enclosure in Watts
n = Number of terminals
I = Current in Amperes through terminal and conductor (Maximum permissible constant current)
L = Total length of conductor in metres
R_c = Conductor resistance in ohms per metre
R_t = Internal resistance of terminal in ohms

Terminals

Terminals installed in the Ex e enclosures shall be of a certified type Ex e and grouped for an even distribution of heat dissipation throughout the enclosure.

Terminals installed within the intrinsically safe boxes shall be Ex i certified and all creepage and clearance distances shall not be less than those specified in Table 2.3 of AS2380.7.

Conductor Looms

For looms containing from 7 to 15 conductors and looms containing more than 15 conductors, the maximum allowable conductor current shall be derated by a factor of 0.8 or 0.7 respectively.

Degree of Protection

When the enclosure is fitted with the operators listed in Table 2 the enclosure will take on the lowest IP rating of those components mounted to the enclosure. To maintain the degree of protection of the enclosure, cable glands and other separately certified components shall be certified for the applicable protection technique and have a degree of protection of IP66.

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STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Certificate of Conformity

Certificate No.: Ex 2344X Issue 0: 24 April 1998 Original Issue

Date of expiry: 24 April 2008

Certificate Holder: **Clipsal Stahl Ex Pty Ltd**
12 Short Street
BANKSTOWN NSW 2200

Electrical Equipment: **EB Range of Enclosures (See Table 1)**

Type of Protection and Marking Code: Ex i IIC T6 IP66 Class I Zone 0
Ex e IIC T6 IP66 Class I Zone 1
DIP T6 IP66 Class II
AUS Ex 2344X

Manufactured by: **Clipsal Stahl Ex Pty Ltd**

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OF
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Issued by:

SIMTARS

Engineering, Testing and Certification Centre

2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: (07) 3810 6370 Fax: (617) 3810 6366

INTERNATIONAL QUALITY MANAGEMENT SYSTEM

Quality System Certified to AS/NZS ISO9002 Registration No 6039

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP 69 and the Procedures (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1 - 1989	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 1 : General requirements**
AS 2380.6 - 1988	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 6 : Increased safety**
AS 2380.7 - 1987	**Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 7 : Intrinsic safety i**
AS 2236 - 1994	**Electrical equipment for explosive atmospheres - Dust-excluding ignition-proof (DIP) enclosure**

This Certificate does not ensure compliance with electrical safety and performance requirements other than those included in the standards listed above.

equipment listed has successfully met the examination and test requirements as recorded in

Test Report No: **E98/0004**

File Reference: **97/0250** **(P80626)**

Signed for and on behalf of issuing authority

Senior Engineer - Certification
Engineering, Testing and Certification Centre

Position

24 April 1998

Date of issue

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of Standards Australia Quality Assurance Services and must be returned in the event of its being revoked or not renewed.

Certificate No.: Ex 2344X **Issue: 0**

Issued by:

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Phone: (07) 3810 6370 *Fax: (617) 3810 6366*

INTERNATIONAL QUALITY MANAGEMENT SYSTEM

Quality System Certified to AS/NZS ISO9002 Registration No 6039

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Schedule

Equipment:

The EB range of enclosures are made from 316 stainless steel or powder coated mild steel. Table 1 lists the enclosures covered by this certificate. The enclosures may be fitted with appropriately certified control and indicating devices or terminals.

Table 1: EB Enclosure Details

Enclosure Catalogue Number	Dimensions		
	Height	Width	Depth
EB*321	300	200	150
EB*332	300	300	200
EB*542	500	400	200
EB*752	700	500	200
EB*963	900	600	300

Certificate No.: Ex 2344X Issue: 0 Date of Issue: 24 April 1998

Issued by:

SIMTARS

Engineering, Testing and Certification Centre

2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: (07) 3810 6370 Fax: (617) 3810 6366

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

: Ex 2344X
Addendum to Certificate No.....
Issue: 0

Date of Issue: 24 April 1998

Drawings:

Drawing No.	Drawing Title	Revision No.	Drawn/ Revision Date
X-106	ENCLOSURE. GENERAL ASSEMBLY.	2	09,02,98
X-106-1	GASKET, LID.	2	11.09.97
X-106-2	GASKET, GLAND PLATE.	1	8.08.97
X-106-3	GLAND PLATE.	1	8.08.97
X-106-4	RATING-LOGO, LABEL.	2	16.02.98
X-106-5	ENCLOSURE. COMPONENT INSTALLATION DETAILS.	2	15.09.97
W-600	CERTIFICATION DRAWING ACTUATORS AND BEZELS	A	12.12.95

Conditions of Certification:

Maximum allowable power dissipation

The maximum power dissipation per enclosure shall not exceed the values given in Table 2 based on an even distribution throughout the enclosure.

The total number of terminals shall not exceed the number of terminals as specified on drawing X-106-5.

The maximum number of terminals in an enclosure may be calculated by determining the terminal resistance, cable resistance, cable current and the maximum allowable power dissipation per enclosure type. (refer Table 2).

Issued by:

SIMTARS
Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: (07) 3810 6370 Fax: (617) 3810 6366

Conditions of Certification (Continued):

Table 2 - Maximum Allowable Power Dissipation

Enclosure	Maximum Allowable Power Dissipation (Watts) for Temperature Class T6
EB*321	20
EB*332	40
EB*542	80
EB*752	98
EB*963	128

The power dissipation of the enclosure may be calculated using the following equation for each terminal type and conductor size used in the enclosure. Calculated power dissipations for each terminal type and conductor size are to be summated.

$$P = I^2 (n.R_t + L.R_c)$$

Where P = Power dissipation per terminal type & conductor size used in an enclosure in Watts
n = Number of terminals
I = Current in Amperes through terminal and conductor (Maximum permissible constant current)
L = Total length of conductor in metres
R_c =Conductor resistance in ohms per metre
R_t = Internal resistance of terminal in ohms

Issued by:

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Phone: (07) 3810 6370 Fax: (617) 3810 6366

Quality System Certified to AS/NZS ISO9002 Registration No 6039

: Ex 2344X
Addendum to Certificate No.....
Issue: 0

Date of Issue: **24 April 1998**

Conditions of Certification (Continued):

Terminals

Terminals installed in the Ex e enclosures shall be of a certified type Ex e and grouped for an even distribution of heat dissipation throughout the enclosure.

Terminals installed within the intrinsically safe boxes shall be Ex i certified and all creepage and clearance distances shall not be less than those specified in Table 2.3 of AS2380.7.

Conductor Looms

For looms containing from 7 to 15 conductors and looms containing more than 15 conductors, the maximum allowable conductor current shall be derated by a factor of 0.8 or 0.7 respectively.

IP Rating

To maintain the degree of protection of the enclosure, cable glands and other separately certified components shall be certified for the applicable protection technique and have a degree of protection of IP66.

Issued by:

SIMTARS

Engineering, Testing and Certification Centre

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Phone: (07) 3810 6370 Fax: (617) 3810 6366

Item #8

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Certificate of Conformity

Certificate No.: **Ex 2344X**

Issue 0: 24 April 1998 Original Issue
Issue 1: 22 June 2000 Additions/Modifications

Date of expiry: **24 April 2008**

Certificate Holder: **Gerard Industries Pty Ltd**
12 Short Street
BANKSTOWN NSW 2200

VERIFIED COPY OF ORIGINAL CERTIFICATE
Date 12.2.02
Issued By

Electrical Equipment: **EB Range of Enclosures**

Type of Protection and Marking Code: **Ex i IIC T6 IP66***
Ex e IIC T6 IP66*
DIP T6 IP66*

* Enclosures are IP66 unless push buttons, indicating lights and rotary switches are fitted. If these components are fitted the degree of protection shall be as per Table 2.
Note: Enclosures fitted with series 7 switches are suitable for DIP applications only.

AUS Ex 2344X

Manufactured by: **Clipsal Stahl Ex Pty Ltd**
12 Short Street
BANKSTOWN NSW 2200

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Issued by:

Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
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Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

8/2

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP 69 and the Procedures (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1 - 1989	Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 1 : General requirements (Amdt 1, 6 September 1998)
AS 2380.6 - 1988	Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 6 : Increased safety
AS 2380.7 - 1987	Electrical equipment for explosive atmospheres - Explosion-protection techniques - Part 7 : Intrinsic safety i
AS 2236 - 1994	Electrical equipment for explosive atmospheres - Dust-excluding ignition-proof (DIP) enclosure (Amdt 1, 5 March 1999)

This certificate does not ensure compliance with electrical safety and performance requirements other than those included in the standards listed above.

The equipment listed has successfully met the examination and test requirements as recorded in

Test Report No: **E99/0042**

File Reference: **98/0323** **(P80770)**

Signed for and on behalf of issuing authority

Senior Engineer - Certification
Engineering, Testing and Certification Centre

Position

22 June 2000

Date of issue

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of Standards Australia Quality Assurance Services and must be returned in the event of its being revoked or not renewed.

Certificate No.: Ex 2344X **Issue: 1**

Issued by:

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Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

8/2

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Schedule

Equipment:

The enclosures in the EB range of enclosures are made from 316 stainless steel or powder coated mild steel. Table 1 lists the enclosures covered by this certificate. The enclosures may be fitted with appropriately certified control and indicating devices or terminals.

This supplementary certificate covers the addition of a new size enclosure catalogue number EB443 to the EB range. The enclosure dimensions are 400mm x 400mm x 300mm.

The following options for the complete range are also covered by this supplementary certificate:

- Fitting a toughened glass or polycarbonate windows on the cover.
- Fitting of the Clipsal 6 Series push button operators and indicating lamps.
- Fitting of the 7 Series rotary cam switches as listed in Table 2 to be mounted on the cover for DIP applications only.

This supplementary certificate does not cover the associated contact assemblies for the operators listed in Table 2. The enclosures may be fitted with appropriately certified control and indicating devices or terminals.

Table 1: EB Enclosure Details

Enclosure Catalogue Number	Dimensions		
	Height	Width	Depth
EB#321	300	200	150
EB#332	300	300	200
EB#443	400	400	300
EB#542	500	400	200
EB#752	700	500	200
EB#963	900	600	300
# D = DIP, E = Ex e, I = Ex i			

Certificate No.: Ex 2344X Issue: 1 Date of Issue: 22 June 2000

Issued by:

Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 *Fax: + 61 7 3810 6366*

Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

8/4

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: **Ex 2344X**

Issue: 1

Date of Issue: **22 June 2000**

Table 2: Operator Type and Associated IP Rating

OPERATOR TYPE	PART NO.	IP RATING	OPERATOR TYPE	PART NO.	IP RATING
Rotary Cam Switch	7GN12H/90/U/51/06	66	Illuminated Extended Pushbutton Actuator	6PNE20..	65
Rotary Cam Switch	7GN32/90/U/51	66	Flush Pushbutton Actuator	6PBMFB10..	65
Rotary Cam Switch	7GN32 /90/U/51/06	66	Illuminated Mushroomhead Pushbutton Actuator	6PNM40..	65
Rotary Cam Switch	7GN12/90/U/51	66	Mushroomhead Pushbutton Actuator	6PBMM60..	66
Rotary Cam Switch	7GN12/90/U/51/66	65	Mushroomhead Pushbutton Actuator	6PBMM40..	66
Extended Pushbutton Actuator	6PBMEB20..	66	Mushroomhead Latched Pushbutton Actuator	6PBMML40	65
Illuminated Flush Pushbutton Actuator	6PNF10..	65	Mushroomhead Latched Pushbutton Actuator	6PBMMLSO	66

Drawings:

Drawings associated with this supplementary certificate:

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106	ENCLOSURE. GENERAL ASSEMBLY.	3	10.01.00
X-106-1	GASKET, LID.	3	10.01.00
X-106-2	GASKET, GLAND PLATE.	2	10.01.00
X-106-3	GLAND PLATE.	2	10.01.00
X-106-4	RATING-LOGO. LABEL.	3	13.04.00
X-106-5	ENCLOSURE. COMPONENT INSTALLATION DETAILS.	3	11.01.00

DRAWINGS CONTINUED NEXT PAGE

Signed by:

Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 Fax: + 61 7 3810 6366

Quality System Certified to AS/NZS ISO 9001 Certification No 6039

STANDARDS AUSTRALIA

8/5

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: Ex 2344X

Issue: 1

Date of Issue: 22 June 2000

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106-6	WINDOW DETAILS.	3	2.06.99
X-106-7	SWITCH MOUNTING DETAILS.	1	18.06.99
W-667	CERTIFICATION DRAWING DMPB SERIES CONTROL MODULES	A	22.9.97
C1532	LABEL, CLEANING.	3	30.01
EB-0001Z	EB. SERIES 6, SWITCH MOUNTING DETAILS.	1	10.04.00
EB-0002Z	EB. SERIES 7, SWITCH MOUNTING DETAILS.	1	10.04.00
EB-4	LID SUBASSEMBLY.	6	31.05.99
OPTION 06/51 AO	OPTION 06/51 (AO)	1	2/9/99
600789	BRTVLJENJE OSOVINE	A	6.94

Drawings associated with the original issue of this certificate:

DRAWING NO.	DRAWING TITLE	REVISION NO.	DRAWN/ REVISION DATE
X-106	ENCLOSURE, GENERAL ASSEMBLY.	2	09.02.98
X-106-1	GASKET, LID.	2	11.09.97
X-106-2	GASKET, GLAND PLATE.	1	8.08.97
X-106-3	GLAND PLATE.	1	8.08.97
X-106-4	RATING-LOGO, LABEL.	2	16.02.98
X-106-5	ENCLOSURE, COMPONENT INSTALLATION DETAILS.	2	15.09.97
W-600	CERTIFICATION DRAWING ACTUATORS AND BEZELS	A	12.12.96

Issued by:

Engineering, Testing and Certification Centre
2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 *Fax: + 61 7 3810 6366*

STANDARDS AUSTRALIA

8/6

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: **Ex 2344X**

Issue: **1**

Date of Issue: **22 June 2000**

Conditions of Certification:

Maximum Allowable Power Dissipation

The maximum power dissipation per enclosure shall not exceed the values given in Table 3 based on an even distribution throughout the enclosure.

The total number of terminals shall not exceed the number of terminals as specified on drawing X-106-5.

The maximum number of terminals in an enclosure may be calculated by determining the terminal resistance, cable resistance, cable current and the maximum allowable power dissipation per enclosure type (refer Table 3).

Table 3 : Maximum Allowable Power Dissipation

ENCLOSURE	MAXIMUM ALLOWABLE POWER DISSIPATION (WATTS) FOR T6 TEMPERATURE CLASSIFICATION*
EB*321	20
EB*332	40
EB*443	107
EB*542	80
EB*752	98
EB*963	128

* V75 cable may be used with these power dissipation figures.

Issued by:

Engineering, Testing and Certification Centre

2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 *Fax: + 61 7 3810 6366*

Quality System Certified to AS/NZS ISO 9001 Certification No 8039

STANDARDS AUSTRALIA

8/7

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No.: **Ex 2344X**

Issue: **1**

Date of Issue: **22 June 2000**

The power dissipation of the enclosure may be calculated using the following equation for each terminal type and conductor size used in the enclosure. Calculated power dissipations for each terminal type and conductor size are to be summated.

$$P = I^2 (n.R_t + L.R_c)$$

Where P = **Power dissipation per terminal type & conductor size used in an enclosure in Watts**

n = **Number of terminals**

I = **Current in Amperes through terminal and conductor (Maximum permissible constant current)**

L = **Total length of conductor in metres**

R_c = **Conductor resistance in ohms per metre**

R_t = **Internal resistance of terminal in ohms**

Terminals

Terminals installed in the Ex e enclosures shall be of a certified type Ex e and grouped for an even distribution of heat dissipation throughout the enclosure.

Terminals installed within the intrinsically safe boxes shall be Ex i certified and all creepage and clearance distances shall not be less than those specified in Table 2.3 of AS2380.7.

Conductor Looms

For looms containing from 7 to 15 conductors and looms containing more than 15 conductors, the maximum allowable conductor current shall be derated by a factor of 0.8 or 0.7 respectively.

Degree of Protection

When the enclosure is fitted with the operators listed in Table 2 the enclosure will take on the lowest IP rating of those components mounted to the enclosure. To maintain the degree of protection of the enclosure, cable glands and other separately certified components shall be certified for the applicable protection technique and have a degree of protection of IP66.

Issued by:

Engineering, Testing and Certification Centre

2 Smith Street, REDBANK, QLD 4301, Australia
Postal Address: PO Box 467, GOODNA, QLD 4300, Australia
Phone: + 61 7 3810 6381 *Fax: + 61 7 3810 6366*

STANDARDS AUSTRALIA

AUSEx_843X

Price: $27.50 (incl 10 % GST)

Certificate #:	AUSEx_843X	**Issue Date:**	8/07/1994
Issue #:	3	**Expiry Date:**	30/04/2004
		Status:	EXPIRED

Certificate Holder:	International Measurement systems Pty Ltd
Address:	5B Wilmette Place Mona Vale New South Wales 2103 Australia
Manufacturer:	Amalgamated Instrument Co Pty Ltd
Product Description:	Series 800 | In-line gas volume data system.
Equipment Category:	Gas Detectors and Monitors
Protection Type:	ia
Gas Group:	IIC
Marking Group:	
IP Rating:	N/A
Test Report #:	LOSC11390 **Issued by:** Londonderry Occupational Safety Centre
Standards:	AS 2380.1-1989 AS 2380.7-1987
Notes:	N/A

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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx BAS 07.0053X issue No.:0

Status: **Current**

Date of Issue: **2007-10-19** Page 1 of 3

Certificate history:
Issue No. 1 (2009-1-21)
Issue No. 0 (2007-10-19)

Applicant: **Rosemount Inc**
12001 Technology Drive
Eden Prairie
Minnesota 55344
United States of America

Electrical Apparatus: **Model 644 Temperature Transmitter**
Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking: **Ex ia IIC T4 / T5 / T6 See Schedule**

Approved for issue on behalf of the IECEx Certification Body: R S Sinclair

Position: Managing Director

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Baseefa (2001) Ltd.
Rockhead Business Park
Staden Lane
Buxton
Derbyshire
SK17 9RZ
United Kingdom

IECEx Certificate of Conformity

Certificate No.: IECEx BAS 07.0053X

Date of Issue: **2007-10-19** Issue No.: **0**

Page 2 of 3

Manufacturer: **Rosemount Inc**
12001 Technology Drive
Eden Prairie
Minnesota 55344
United States of America

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

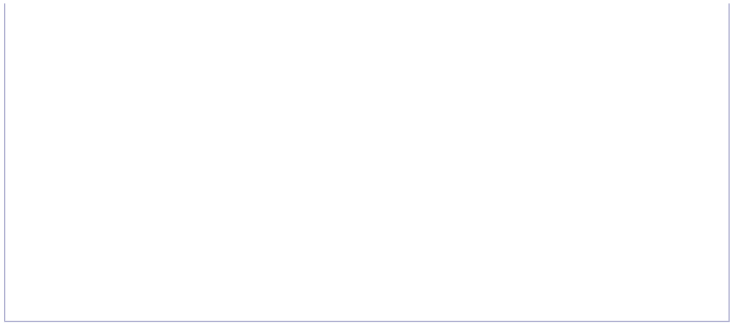
*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
GB/BAS/ExTR07.0148/00

Quality Assessment Report:

GB/BAS/QAR06.0072/00 GB/BAS/QAR07.0014/00 GB/BAS/QAR07.0039/00



IECEx Certificate of Conformity

Certificate No.: IECEx BAS 07.0053X

Date of Issue: **2007-10-19** Issue No.: **0**

Page 3 of 3

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The Model 644 Temperature Transmitters are designed to convert a temperature signal into an electrical signal and is designed to communicate via a 4-20mA HART loop (Model 644H/Model 644R) or in Foundation Fieldbus or Profibus PA mode by a change in software (Model 644H Fieldbus).

The Model 644H comprises a terminal / filter board and a main electronics board encapsulated within a plastic enclosure whereas the Model 644H Fieldbus comprises a terminal / filter board, an analogue-to-digital board and a microboard encapsulated within a plastic enclosure. With both versions, terminals are provided for connection to the power supply, the communications loop and to the temperature sensors. A jumper block enables connection to an optional display module and a simulation switch is also provided. The Model 644R is a railmount version of the Model 644H.

See Annex for electrical data.

CONDITIONS OF CERTIFICATION: YES as shown below:

1. The apparatus must be installed in an enclosure which affords it a degree of protection of at least IP20.
2. Non-metallic enclosures must have a surface resistance of less than 1GΩ; light alloy or zirconium enclosures must be protected from impact and friction when installed.

Annexe: IECEx BAS 07-0053X Annex Issue 0.pdf

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

Certificate of Conformity

Certificate No:	AUS Ex 1461X	**Issue 0:** **Issue 5:**	Original Issue 27/7/1993 Revalidation: 03/08/2004
Date of Expiry:	31/12/2006		
Certificate Holder:	Flowserve Corporation 1350 North Mountain Springs Parkway Springville UTAH 84663 USA		
Electrical Equipment:	NT 3000 Transducer		
Type of Protection:	Ex ia IIC T4 (at an ambient 100 °C) IP65 Ex n IIC T6 IP65		
Marking Code:	Ex ia IIC T4 (at an ambient 100 °C) IP65 Ex n IIC T6 IP65 AUS Ex 1461X		
Manufactured By:	Flowserve Corporation 1350 North Mountain Springs Parkway Springville UTAH 84663 USA		

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
Australia

Phone: +61 2 4724 4900 **Fax: +61 2 4724 4999**

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP69 and the Procedure (Doc Q7134) of the scheme.

The electrical equipmentand any acceptable variation to its pecified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS/NZS 60079.0-2000	Electrical equipment for explosive atmospheres – Part 0 - General requirements (incorporating Amendment 1)
AS/NZS 60079.11-2000	Electrical equipment for explosive atmospheres – Part 11 – Intrinsic Safety 'i' (incorporating Amendment 1)
AS 2380.9:1991	Electrical apparatus for explosive gas atmospheres – Part 9:N on-Sparking "n"
AS 1939-1990	Degrees of protection provided by enclosures of electrical equipment(IP Code)

This certificate does not ensure compliance with electrical safety requirements and performance other than those included in the Standards listed above.

The equipment listed successfully met the examination and test requirements as recorded in

Test Report No: TestSafe 24629

File Reference: TestSafe 2003/019033

Signed for and on behalf of issuing authority

Quality & Certification Manager
Position

03/08/2004
Date of Issue

Ex1461X-5

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of the issuing body to whom it must be returned in the event of it being revoked or not renewed.

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road LondonderryNS W 2753
Australia

Phone: +61 2 4724 4900 **Fax: +61 2 4724 4999**

JAS-ANZ

Accreditation by the Joint Accreditation System of Australia and New Zealand, Acc No. Z2221100AS

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

Schedule

Certificate No: AUS Ex 1461X **Issue:** 5 **Date of Issue:** 03/08/2004

Certified Equipment: The NT Model 3000 positioner is ac ontrol device providing ar eciprocating motion for control positioning ofl inear orr otary action actuators. It is an electro-pneumatic assembly which operates by input milliampere signals. The positioner is fabricated from cast A413 aluminium or stainless steel and is a two piece housing comprising a base and screw on cover. The base of the housing has two sintered bronze flame arrestors, one of which vents to atmosphere, the other through the process fluid.

Conditions of Certification:
The equipment has been assessed to the "Entity Concept" and accordingly the following electrical parameters must be taken into accountd uring installation:

Maximum Input Voltage (U_i)	=	30 Volts
Maximum Input Current(I_i)	=	125 milliamperes
Maximum Input Power (P_i)	=	0.8 W
Maximum Internal Capacitance (C_i)	=	0 µF
Maximum Internal Inductance (L_i)	=	2 µH

Variations permitted by issue 5
This supplementary is a revalidation of the NT3000.

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road LondonderryNS W 2753
Australia

Phone: +61 2 4724 4900 **Fax: +61 2 4724 4999**

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

Addendum to Certificate No. Ex 1461X-5

Drawings Relating to Revalidation Permitted by Issue 5

Drawing No	Drawing Title	Issue	Date
195121 7 shts	BOM Master Electronics Assembly Report		03/06/2003
194337	NT3000 Schematic Drawing	1	06/05/2003
194348 sht1 of 6	NT3000 PCB Plastic Cover Design Drill Drawing	1	06/05/2003
194348 sht2 of 6	NT3000 PCB Plastic Cover Design Top Silkscreen Layer	1	06/05/2003
194348 sht3 of 6	NT3000 PCB Plastic Cover Design Top Mask Layer	1	06/05/2003
194348 sht4 of 6	NT3000 PCB Plastic Cover Design Top Layer	1	06/05/2003
194348 sht5 of 6	NT3000 PCB Plastic Cover Design Bottom Layer	1	06/05/2003
194348 sht6 of 6	NT3000 PCB Plastic Cover Design Bottom Mask Layer	1	06/05/2003
195121 sht1 of 2	NT3000 PCBA Top Assembly Drawing	1	06/05/2003
195121 sht2 of 2	NT3000 PCBA Bottom Assembly Drawing	1	06/05/2003
82791	I/P ModuleTransducer CoilA ssembly	6	27/05/2004
199605	Enclosure PCB, Board, Top, Cover. NT3000 Transducer	0	06/03/2003
196606	Enclosure PCB, Board, Bottom, Cover. NT3000 Transducer	0	06/03/2003
87607	Flame Arrestor - ϕ .633,.375 LG., I/P Module	3	29/04/2003
87608	Flame Arrestor - ϕ .508,.375 LG., I/P Module	3	29/04/2003
089583	Detail, Flame path, I/P Module	2	04/04/2003
137545	Housing, NT3000	6	19/03/2003
139736	Housing, NT3000.S tainless Steel	2	21/10/1998
141216	Nameplate, NT 3000Ex ia,Ex n, ExdS AA	3	04/03/1998
164399	Casting, Cover, NT3000 Transducer	3	19/03/2003
164400	Cover – NT3000 Transducer	4	07/05/2002
166778	Cover, NT3000, Stainless Steel	2	10/09/1999

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road LondonderryNS W 2753
Australia

Phone: +61 2 4724 4900 **Fax: +61 2 4724 4999**

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx CSA 05.0005 issue No.:6

Status: **Current**

Date of Issue: **2011-06-23** Page 1 of 4

Certificate history:
Issue No. 6 (2011-6-23)
Issue No. 5 (2010-5-7)
Issue No. 4 (2009-7-24)
Issue No. 3 (2008-6-24)
Issue No. 2 (2006-12-15)

Applicant: **Yokogawa Electric Corporation**
2-9-32 Naka-cho, Musashino-shi
Tokyo 180-8750
Japan

Electrical Apparatus: **Pressure Transmitters, Series EJX**
Optional accessory:

Type of Protection: **Ex i; Ex n**

Marking: **IECEx CSA 05.0005**
Ex ia IIC T4, Ex nL IIC T4
IP66, IP67
(Refer to Schedule)

Approved for issue on behalf of the IECEx Certification Body: D R Stubbings BA MIET

Position: Technical Manager

Signature:
(for printed version) _____

Date: _____

1. This certificate and schedule may only be reproduced in full.
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3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

CSA International
178 Rexdale Boulevard
Toronto, Ontario M9W IR3
Canada
and
1707 - 94th Street
Edmonton, AB T6N 1E6
Canada

CSA INTERNATIONAL

IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0005

Date of Issue: **2011-06-23** Issue No.: **6**

Page 2 of 4

Manufacturer: **Yokogawa Electric Corporation**
2-9-32 Naka-cho, Musashino-shi
Tokyo 180-8750
Japan

Manufacturing location(s):
Yokogawa Electric Corporation
155 Takamuro-cho, Kofu-shi
Yamanashi-ken, 400-8558
Japan

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2000 Edition: 3.1	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'
IEC 60079-15 : 2001 Edition: 2	Electrical apparatus for explosive gas atmospheres - Part 15: Type of protection 'n'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

IECEx ATR:	File Reference:
CA/CSA/ExTR08/0007/01	**172608-2136152 (1626032)**
CA/CSA/ExTR08.0007/02	**172608-2267020 (1626032)**
CA/CSA/ExTR08.0007/03	**172608-2380376(1626032)**

IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0005

Date of Issue: **2011-06-23** Issue No.: **6**

Page 3 of 4

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The EJX series are two wire electronic transmitters which convert differential pressure, gauge pressure or absolute pressure into a 4 to 20mA dc output signal with a possibility for digital communication.

The EJX series transmitter consists of a field wiring compartment, an electronic amplifier in an aluminum alloy housing and pressure sensor assembly.

The electrical amplifier consists of four printed-circuit boards:
Terminal board, CPU board, Driver board and LCD board. (Refer to ICS014-A12 P.5 and P.6)

Model: EJX Series Pressure Transmitters
for Electrical Equipment for Explosive Atmospheres

Type of Protection: Ex ia IIC T4, Ex nL IIC T4
Ambient Temperature: -50 to 60C
Process Temperature: 120Cmax
Ambient Humidity: 0 to 100% (No condensation)
Degree of Protection of Enclosure: IP66 and IP67
Electrical Parameters (Ex ia): Ui=30V, Ii=200mA, Pi=0.9W, Ci=10nF, Li=0
Electrical Parameters (Ex nL): Ui=30V, Ci=10nF, Li=0
The model variations and configurations covered by this IECEx Certificate are detailed in the attached Addendum.
REFER TO ANNEX.

CONDITIONS OF CERTIFICATION: NO

IECEx Certificate of Conformity

Certificate No.: IECEx CSA 05.0005

Date of Issue: **2011-06-23** Issue No.: **6**

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

ISSUE 1: Original Certification
ISSUE 2: Revision of model codes in accordance with Document ICS014. Rev 2: Minor revisions not affecting explosion protection - CA/CSA/ExTR06.0027/00
ISSUE 3: ExTR CA/CSA/ExTR08//0007/00 covers the addition of a Resistor R80 on the CPU board with revised Drawings.
ISSUE 4: ExTR CA/CSA/ExTR08/0007/01 consists of updating and reissuing Yokogawa Document ICS014, reflecting nomenclature changes, revised circuit boards and component changes not affecting safety.
ISSUE 5: ExTR CS/CSA/ExTR08.0007/02 consists of updating and reissuing Yokogawa Document ICS014, reflectingnomenclature changes, addition of -J suffix and component changes not affecting safety.
ISSUE 6: This Project covers the following changes, which have no affect on safety parameters: Addition of Parts List by addition of alternative LCD Board; Addition of Schematic Circuit Diagram of alternative LCD Board; Addition of Trace Layout of alternative LCD Board; Correction of pages.; Addition of coating material.

Annexe: IECEx CSA 05.0005_ICS014.pdf

[1] # EC-TYPE EXAMINATION CERTIFICATE

[2] **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

[3] EC-Type Examination Certificate Number: **DEMKO 02 ATEX 130948X**

[4] Equipment or Protective System: **Shaft Position Indicator**

[5] Manufacturer: **Flowserve Corporation, Flow Control Division, Utah Operation**

[6] Address: **1350 N. Mountain Springs PKY, Springville, UL 84663 USA**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to 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 confidential report no. **0218321**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 50014: 1997 E incl. A1+A2, EN 50019:2000, EN 50028:1987

[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 or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:

Ex II 2 G EEx me II T5

On behalf of UL International Demko A/S

Herlev, 2002-08-21

Steen Lumby
Certification Manager

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565

[13] # Schedule

[14] ## EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 02 ATEX 130948X

[15] Description of Equipment: Description of Equipment or protective system: The Shaft Position Indicator provides visible position confirmation for "on-off' valve acturators. These indicator feature 'green open' and 'red closed' colour schemes for intuitive viewing. The visual indication can be supported with mounting of Phazer II Ultraswitch. These switches are of the reed-type proximity type. The switches are tripped by magnets embedded in cams to indicate valve open and closed positions. Phazaer's are available with LED's which light upon switch tripping to visually indicate completed circuits. Up to two contact are available in the types AGL, DCF1 and DCF3, and up to four contacts in the type APL. The terminal type is AKZ 2.5 of the make "Weidmuller", certified by LCIE with the No. 89.B0006 U code: Eexe I/II.

Ambient temperature range: -20 C≤ Tamb ≤ +40 C

Nomenclature for the type - APL

A	D	PL	1	L	0	0	0	3-3
I	II	III	IV	V	VI	VII	VIII	IX

I-PREFIX

A	Accord manufacturer

II-PREFIX

Blank	Standard
D	Hex head cover screws and Namur shaft
H	Hex head cover screws
N	Namur shaft

III - ENCLOSURE

PL	Ultraswitch with polymeric enclosure

IV-Type

1	Flat top cover
2	Indicator cover
4	90° 3-way perpendicular position indicator
5	90° 3-way parallel position indicator
6	180° 3-way perpendicular position indicator
7	180° 3-way parallel position indicator
8	180° 3-way,center blocked, position indicator, perpendicular
9	180° 3-way,center blocked, position indicator, parallel
C	Includes both numbers 4 and 5 rotors (indicators)
D	Includes both numbers 6 and 7 rotors (indicators)
E	Includes both numbers 8 and 9 rotors (indicators)
F	Through/ Divert 3-way
G	Black/Gray/yellow 2-way

Nomenclature for the type – APL Continued

V- SWITCHES

L	(2) Phazer II with led
M	(4) Phazer II with led
T	(2) Phazer II BRS, no led
W	(4) Phazer II BRS, With led
X	(2) Phazer II BRS, no led
Y	(4) Phazer II BRS, with led

VI-Analog Output

O	None

VII-Asco Solenoid

O	None

VIII-Sealed Leads

O	None

IX-Extra Terminal Locations- No suffix- 2 terminals (standard)

3-3	Open terminal	A	10
4-4	Open terminal	B	11
5-5	Open terminal	C	12
6-6	Open terminal	D	13
7-7	Open terminal	E	14
8-8	Open terminal		
9-9	Open terminal		

Nomenclature for the type AGL

A	D	GL	1	L	0	T	3-3
I	II	III	IV	V	VI	VII	VIII

I-Prefix

A	Accord manufacture

II-Prefix

Blank	Standard
B	Epoxy coated with Namur shaft
D	Hex head cover screws with Namur shaft
E	Epoxy coated
H	Hex head cover screws
N	Namur shaft

III - SWITCH

GL	Ultra switch

Nomenclature for the type – AGL Continued

IV-Type

1	Flat top cover
2	Indicator cover
4	90° 3-way perpendicular position indicator
5	90° 3-way parallel position indicator
6	180° 3-way perpendicular position indicator
7	180° 3-way parallel position indicator
8	180° 3-way, center blocked, position indicator perpendicular
9	180° 3-way, center blocked, position indicator, parallel
C	Includes both numbers 4 and 5 rotors (indicators)
D	Includes both numbers 6 and 7 rotors (indicators)
E	Includes both numbers 8 and 9 rotors (indicators)
F	Through/Divert 3-way
G	Black/gray/yellow 2-way

V-switches

P	(2) Phazer II switches, no led
L	(2) Phazer II switches, no led
T	(2) Phazer II switches, no led
X	(2) Phazer II switches, no led

VI-Asco Solenoid

O	None

VII-Options, no suffix

T	Third conduit entry

VIII-Extra Terminal Locations-No suffix- 2 terminals (standard)

3-3	Open terminal	A	10
4-4	Open terminal	B	11
5-5	Open terminal	C	12
6-6	Open terminal	D	13
7-7	Open terminal	E	14
8-8	Open terminal		
9-9	Open terminal		

Nomenclature for the two types-DCF1 and DCF3.

D	P	1	N
I	II	III	IV

I - Language option (indicator):

D	German
E	English
P	Portuguese
S	Spanish

Nomenclature for the type – DCF1 and DCF3 Continued

II - Switch option:

P (2) SPDT High Amp Reed Proximity Phazer II
T (2) SPDT Low/High Amp Reed Proximity Phazer II BRS.

III - Cam option:

1 Dual-adjustment Cam

IV - Suffix (mounting options):

STD Standard 1/4" shaft flats with no mounting kit
N NAMUR shaft flats with no mounting kit

All options below are NAMUR shaft flats with mounting kit included:
N28AEL-O-MATIC E12-350 and Hytork XL45-XL680 with #10-24 Bolting
N28L EL-O-MATIC E12-350 and Hytork XL45-XL680 with M5-.8 Bolting.
N313A EL-O-MATIC P500-4000 and Hytork XL1125-XL4580 with #10-24 Bolting.
N313L EL-O-MATIC P500-P4000 and Hytork XL1125-XL4580 with M5-.8 Bolting.

Example: DCF3EP1_N28A: CENELEC rated switch for Europe, Zytel Housing, English language, two SPDT switches, dual-adjustment Cam, NAMUR shaft with mounting kit.

Nomenclature for the type CNL

CNL	07	39	(1)	0	1	A
I	II	III	IV	V	VI	VII

I - BASE MODEL
CNL Plastic switchbox w/ 1/2" NPT and NAMUR shaft

II - MODEL
07 Zytel body and cover, Polycarbonate Pharos
09 Zytel body and cover, Flat Top (no indicator)
11 Zytel body and cover, Polycarbonate ULTRADOME

III - SWITCH TYPE
39 Phazer II switches, with led
40 Phazer II switches BRS
41 Phazer II switches BRS, with led
55 Phazer II switches

IV - SWITCH QUANTITY
(1), (2), (3) or (4)

V - INDICATOR
O Standard 2-way
Y 3 way - 120°
L 3 way - L - 90°
T 3 way - T - 90°

VI - LABEL
1 Automax

4 Accord

VII - OPTION
A Automax/Accord output shaft with 1/4" flats

Nomenclature for the type CGL

CGL	04	39	(1)	0	1	A
I	II	III	IV	V	VI	VII

I - BASE MODEL
CGL Aluminum switchbox w/ 1/2" NPT and NAMUR shaft

II - MODEL
04 Aluminum body and top cover, Polycarbonate Pharos
10 Aluminum body and cover, Flat Top (no indicator)

III - SWITCH TYPE
39 Phazer II switches, with led
40 Phazer II switches BRS
41 Phazer II switches BRS, with led
55 Phazer II switches

IV - SWITCH QUANTITY
(1), (2), (3) or (4)

V - INDICATOR
O Standard 2-way
Y 3 way - 120°
L 3 way - L - 90°
T 3 way - T - 90°

VI - LABEL
1 Automax
4 Accord

VII - OPTION
A Automax/Accord output shaft with 1/4" flats

Nomenclature for the two types-DCF.

D	C	F	A	A	P	3	N
I	II	III	IV	V	VI	VII	VIII

I-Prefix
D – Dow Chemical Contract Ultraswitch
II – Enclosure Rating
C – Built to CENELEC Standards – CE

III – Housing Type
F – Glass-reinforced Zytel
IV – Indicator Option
Any Single alphanumeric digit
V – Language Option (Indicator)

Any single alphanumeric digit

VI – Switch Option

P – (2) SPDT High Amp Reed Proximity Phazer II

T – (2) SPDT Low/High Amp Reed Proximity Phazer II BRS

VII – Terminal Option

3 – 12 position terminal block

VIII – Suffix (Mounting options)

STD

N

All options below are Namur shaft flats with mounting kit included:

N28A EL-O-MATIC E12-E350

N28L EL-O-MATIC E12-E350 and Hyotork

[16] Report No.: Report 0218321

The certificate entitles the licensee to provide the product with the registered mark Ⓓ and the Epsilon-x mark €x.

Drawings:

Number	Date/Rev	Description
XA0188-A	1996-08-07	Assembly Dwg. PL switch W/2Phzrs and Brck for dow
XA0189-A	1996-08-07	Assembly Dwg. PL switch W/ECN and terminal Brck for dow
XA0190-A	1996-09-12	Assembly drawing showing BRS-switch inside housing
XA0191-A	1996-09-12	Assembly drawing showing Phazor- switch inside housing
XE0016-A	1994-10-26	Wiring diagram type P Ultraswitch (Phazer)
XE0041-A	1996-04-18	Wiring diagram type T & X Ultraswitch
X00628-A	1996-11-11	Wire drawings
X00751	2000-06-18	CE-nameplate for PL Series
1035 07-B	1988-08-05	Limit switch shaft
105761-A	1990-10-18	Limit switch shaft w/o pos. ind. (NAMUR)
ASPL7620	1996-09-12	Epoxy Encapsulant Set-UP and Test Procedure for Phazer II
X00573-C	1994-04-29	PhazerII switch housing
XM0039	1990-11-15	Plastic limit switch base
XM0040-C	1990-12-03	Plastic limit switch cover flat top
XM0198-C	1994-06-01	Housing cover-Pharos GL limit switch machining
XM0199-C	1994-06-01	GL limit switch base machining
XM0232-C	1995-02-28	Plastic limit switch cover Pharos dome
LML0005	-0	Instructions

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

[17] Special conditions for safe use:

1. The certificate No, contains an "X" because, when installating of the Shaft Position Indicator the user must mount a fuse outside the hazardous area with a breaking capacity of 4000A. By placing the fuse in the hazardous area an E.-portection principle must be included.

2. The approval applies to equipment without cable glands. When mounting the enclousre in hazardous area, only cable glands certified to EN 50019 must be used.

[18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

On behalf of UL International Demko A/S Herlev, 2002-08-21

Steen Lumby
Certification Manager

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Certificate of Conformity

Certificate No:	AUS Ex 484X	**Issue 0:** **Issue 2:**	Original Issue 22/11/1983 4/6/1998
Date of Expiry:	4/6/2008		
Certificate Holder:	RGS Electro-Pneumatics Ltd Church Street Accrington Lancashire BB5 2ET UK		
Electrical Equipment:	Solenoid Operated Valve Coil Assembly Type EP000/ia		
Type of Protection and Marking Code:	Ex ia IIC T6 AUS Ex 484X		
Manufactured By:	RGS Electro-Pneumatics Ltd Church Street Accrington Lancashire BB5 2ET UK		

Issued by:

WORKCOVER NEW SOUTH WALES

Londonderry Occupational Safety Centre

919 Londonderry Road LONDONDERRY NSW 2753
Phone: (02) 4724 4900 Fax: (02) 4724 4999

QUALITY SYSTEM NAQA CERTIFIED AS3902.ISO9002

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Ex 484X-2

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP 69 and the Procedures (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1-1989 Electrical equipment for explosive atmospheres - Explosion-protection techniques - General requirements
AS 2380.7-1987 Electrical equipment for explosive atmospheres - Explosion-protection techniques - Intrinsic safety 'i'

The equipment listed has successfully met the examination and test requirements as recorded in

Test Report No: LOSC Assessment Report 17629

File Reference: LOSC 98/8772

K. J. Wale
Signed for and on behalf of issuing authority

Coordinator, Approvals + Certification
Position

4/6/1998
Date of issue

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of Standards Australia Quality Assurance Services and must be returned in the event of its being revoked or not renewed.

Issued by:

WORKCOVER NEW SOUTH WALES

Londonderry Occupational Safety Centre

919 Londonderry Road LONDONDERRY NSW 2753
Phone: (02) 4724 4900 ***Fax: (02) 4724 4999***

QUALITY SYSTEM NACA CERTIFIED AS3902.ISO9002

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Schedule

Certificate No: AUS Ex 484X **Issue:** 2 **Date of Issue:** 4/6/1998

Certified Equipment: Type EP000/ia Solenoid Operated Valve Coil Assembly is designed to operate a pneumatic valve when connected to a dc supply. The equipment comprises a solenoid coil wound on an insulating former which is placed in the valve body. Connected to the coil leads is a duplicated diode assembly which acts as a safety shunt to the coil assembly. The voids around the coil and the bridge diode assembly are encapsulated in epoxy resin. External connections are made via a terminal block mounted in an integrally cast terminal box or optionally via a plug and socket.

Conditions of Certification:
The equipment has been assessed to the 'Entity' Concept and accordingly the following electrical parameters must be taken into account during installation:

Maximum Input Voltage (U_i)	=	31 Volts
Maximum Input Current (I_i)	=	0.67 Amperes
Maximum Input Power (P_i)	=	2.98 Watts
Maximum Internal Capacitance (C_i)	=	0F
Maximum Internal Inductance (L_i)	=	0H

Schedule of Variations

Variations Permitted by Issue 2:

1. Re-validation of the Certificate of Conformity

2. Inclusion of 'Entity' Concept electrical parameters.

Issued by:

WORKCOVER NEW SOUTH WALES

Londonderry Occupational Safety Centre

919 Londonderry Road LONDONDERRY NSW 2753
Phone: (02) 4724 4900 ***Fax: (02) 4724 4999***

QUALITY SYSTEM NATA CERTIFIED AS3902.ISO9002

STANDARDS AUSTRALIA

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

Administered by: Standards Australia Quality Assurance Services

Addendum to Certificate No. Ex 484X-2

Drawing Schedule

Drawing No	Drawing Title	Issue	Date
AV2404	Label EP000/IA/SAA	3	10/12/97
BV2043	EP000/IA Solenoid Assembly	6	16/5/97
BV2664	Intrinsically Safe Sol Type EP000/IA/S	3	undated
BV2670	Intrinsically Safe Solenoid Unit Type EP000/ia/PS	2	6/10/89

Issued by:

WORKCOVER NEW SOUTH WALES

Londonderry Occupational Safety Centre

919 Londonderry Road LONDONDERRY NSW 2753

Phone: (02) 4724 4900 Fax: (02) 4724 4999

QUALITY SYSTEM NAQA CERTIFIED AS3902.ISO9002

STANDARDS AUSTRALIA

Standards Australia Quality Assurance Services Pty Limited A.C.N. 050 611 642

6 Datasheets and Electrical Drawings

Documentation in relation to this section is to be included and maintained by APA Group.

7 Calculations

Documentation in relation to this section is to be included and maintained by APA Group.

Calculations need to be confirmed for equipment installed in hazardous areas. These include heat dissipation calculation for Ex e and intrinsically safe barrier assessment for Ex i, which are relevant for the ADP sites.

This section contains sample calculation sheet for intrinsically safe barrier assessment and extracts from AS 2381.6-1993 and AS 2381.7-1989.

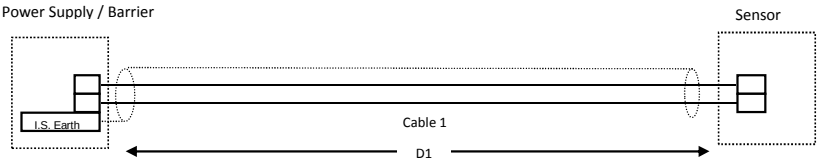
Intrinsically Safe Barrier Assessment Sheet

Document No:		**Prepared By:**	
Site:		**Checked:**	
Loop Description:		**QA:**	
		Approved:	
Loop Drawing Number:		**Date:**	

Hazardous Area:

H. A. Report:		**Area Class:**	
H. A. Drawing No.:		**Gas Group:**	
		Temperature Class:	

Cable Screens shall be connected to intrinsically safe earth at the Intrinsically Safe Barrier end.



I.S. Device details (Hazardous Area) [Note 2]

Tag:		**Max Voltage Um:**		V
Type of instrument:		**O/C Voltage Uo:**		V
Manufacturer:		**S/C Current Io:**		mA
Model Number:		**Power Po:**		mW
Serial No:		**Allowable Cap. Co:**		uF
Certificate Number:		**Allowable Ind. Lo:**		mH
Certifying Authority:		**L/Ro:**		uH/Ohm
Protection Type:				

Cables:

Cable 1:			**Cable 2:**			**Total Cable:**		
Tag:			**Tag:**					
Capacitance:		uF/m	**Capacitance:**		uF/m	**Capacitance:**		uF
Inductance:		mH/m	**Inductance:**		mH/m	**Inductance:**		mH
L/R_C:		mH/Ohm	**L/R_C:**		mH/Ohm	**Max L/Rc**		mH/Ohm
Length(D1):		m	**Length(D2):**		m			

I.S. Apparatus Parameters (Hazardous Area):

Tag:		**O/C Voltage Ui:**		V
Type of instrument:		**S/C Current Ii:**		mA
Manufacturer:		**Power Pi:**		mW
Model Number:		**Capacitance Ci:**		uF
Serial No:		**Inductance Li:**		mH
Certificate Number:				
Certifying Authority:				
Protection Type:				

Checks:

			PASS/FAIL/NA
1	Uo <= Ui	<=	
2	Io <= Ii	<=	
3	Po <= Pi	<=	
4	$Ci+C_{Cable}$ <= Co	<=	
6	$Li+L_{Cable}$ <= Lo	<=	
	OR		
7	L/R_{Cable} < L/Ro	<	

Conclusion: The circuit IS Loop Calculation

Notes:

1- Calculation is based on AS.NZS 2381.1:2005, AS2381.7-1989 & AS/NZS 60079.25:2004 for a single power supply loop in an intrinsically safe system.

2- The I.S. Barrier is an integral part of the discrete input wireless transmitter.

3- The above calculation, check and conclusion are also applicable to wireless transmitter LSL and LSLL level switch I.S. circuits used for pump 1161C/D, 1162C/D, 1163C/D and 1164C/D sealoil pots.

4- The level switch in this I.S. Circuit is classified as simple device.

APPENDIX A

DETERMINATION OF EXTERNAL CIRCUIT PARAMETERS FOR INTRINSICALLY SAFE SYSTEMS

(This Appendix forms an integral part of this Standard.)

A1 CERTIFICATION METHODS. As specified in Clause 1.4, intrinsically safe electrical equipment may be certified under one of three categories as follows:

(a) *Self-contained equipment.* Since this equipment has no external cabling, there are no external parameters to be specified, and hence, such equipment will not be considered further in this Appendix.
(b) *Entity concept equipment.*
(c) *Integrated systems.*

A2 PARAMETERS TO BE DEFINED.

A2.1 Entity concept equipment. For certified entity concept equipment the following parameters should be defined:

(a) *Associated electrical equipment.*
  (i) Maximum open circuit voltage (U_o).
  (ii) Maximum output current (I_o).
  (iii) Maximum external capacitance (C_o).
  (iv) Maximum external inductance (L_o).
  (v) Maximum external connected inductance to resistance ratio (L/R).
(b) *Intrinsically safe equipment.*
  (i) Maximum input voltage (U_i).
  (ii) Maximum input current (I_i).
  (iii) Maximum internal capacitance (C_i).
  (iv) Maximum internal inductance (L_i).

The parameters are marked on the equipment or specified in the accompanying documentation.

A2.2 Integrated systems. For integrated systems, either one of the following cable parameters should be defined:

(a) Maximum capacitance, inductance, and inductance to resistance ratio.
(b) Maximum cable lengths for defined cable types.

These parameters are specified in the system documentation or the certificate.

A3 INSTALLATION OF ENTITY CONCEPT EQUIPMENT. For entity concept equipment to be installed, the total of the cable parameters and those for the intrinsically safe equipment shall be less than those permitted to be connected to the associated electrical equipment, i.e.

(a) $C_i + C_{cable} < C_o$; and
(b) either $L_i + L_{cable} < L_o$, or $L/R_{cable} < L/R$.

Also, the voltage and current allowed for the intrinsically safe equipment shall be greater than those available from the associated electrical equipment, i.e. $U_i > U_o$; $I_i > I_o$.

Where shunt diode safety barriers are being used and their capacitance, inductance and L/R ratio parameters have not been specified in the documentation, the values specified in Table A1 may be used.

A4 INSTALLATION OF INTEGRATED SYSTEMS. For an integrated system to be installed correctly, the cable characteristics shall be below those specified in the system certification, i.e. the total cable capacitance and either the total lumped cable inductance or the L/R ratio must be less than those shown in the certificate or installation diagram. Cable characteristics may be obtained from the manufacturer or the values specified in Tables A2 and A3 may be used.

Alternatively, the following cable characteristics represent probable maximums:

(a) C = 0.11 μF/km.
(b) L = 0.8 mH/km.
(c) L/R = 56 μH/Ω.

If the parameters are only specified in the system certification for Group IIC they may be multiplied by 3 for Group IIB, by 8 for Group IIA, or by 10 for Group I installations.

Where the system documentation specifies cable types and corresponding lengths it is simply a matter of adhering to those specific requirements.

TABLE A1

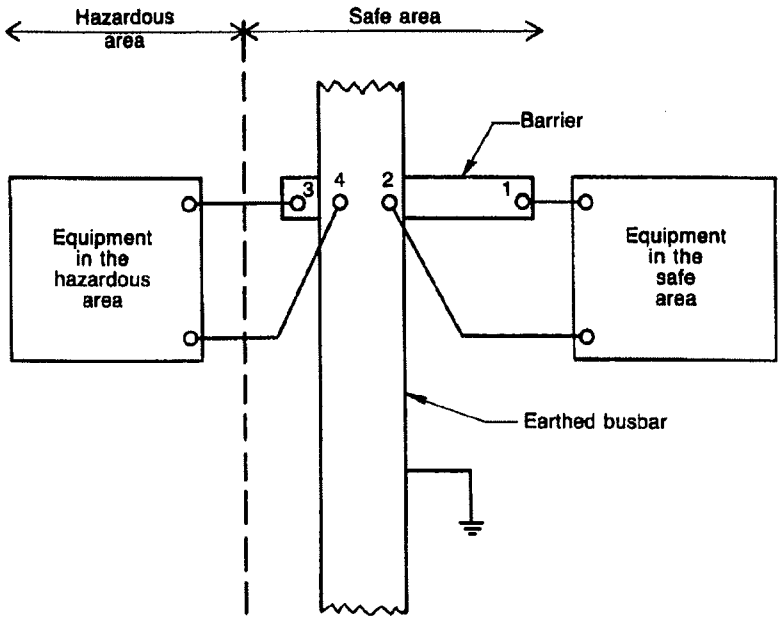
EXTERNAL PARAMETERS
MAXIMUM VALUES FOR GROUP IIC (HYDROGEN)*

Barrier type	Permissible configuration	Max. permissible capacitance μF	Max. permissible inductance mH	Max. permissible *L/R* ratio μH/Ω
27 V 270 Ω	Figure A1	0.15	3.7	55
22 V 150 Ω	Figure A1	0.2	1.5	40
15 V 100 Ω	Figure A1	0.8	1.5	60
	Figure A2	0.8	1.5	60
10 V 47 Ω	Figure A1	3.0	1.0	80
	Figure A2	3.0	1.0	80
	Figure A3	0.2	1.0	40
47 V 10 Ω	Figure A1	>1 000	0.16	100
	Figure A2	>1 000	0.16	100
	Figure A3	3.0	0.16	50
1 V 2 Ω	Figure A1	>1 000	0.16	320
	Figure A2	>1 000	0.16	320
	Figure A3	>1 000	0.16	160

* For most practical purposes, the value for gases of Group IIB are 3 times these values, and for gases of Group IIA are 8 times these values.

† The *L/R* ratio of the cable is defined as follows:

$$L/R \text{ ratio} = \frac{\text{Inductance per unit length } (\mu H)}{\text{Resistance per unit length } (\Omega)}$$



NOTE: Barrier can be either positive or negative.

FIGURE A1 INSTALLATION CONFIGURATION 2-WIRE SYSTEM WITH SINGLE BARRIER

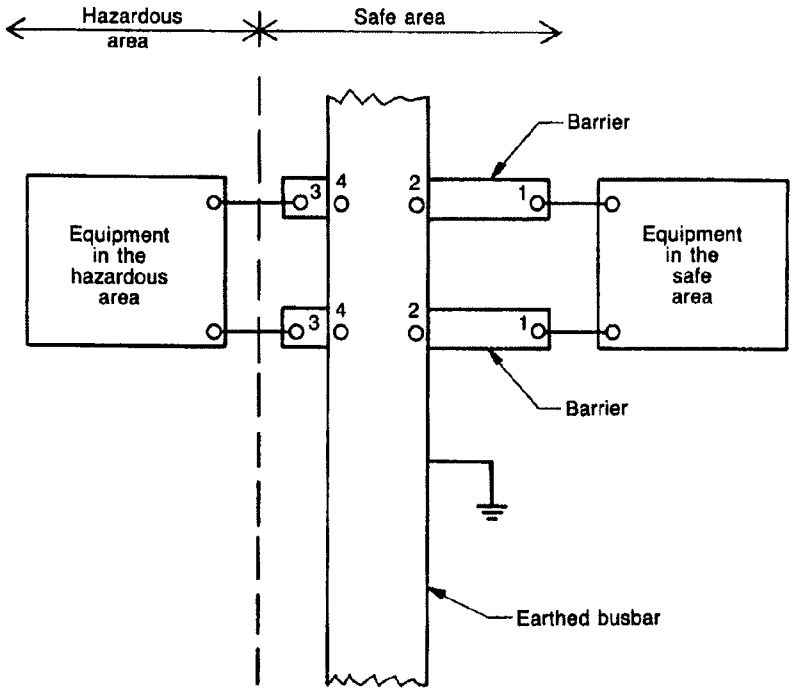


FIGURE A2 INSTALLATION CONFIGURATION 2-WIRE SYSTEM WITH TWO BARRIERS OF LIKE POLARITY

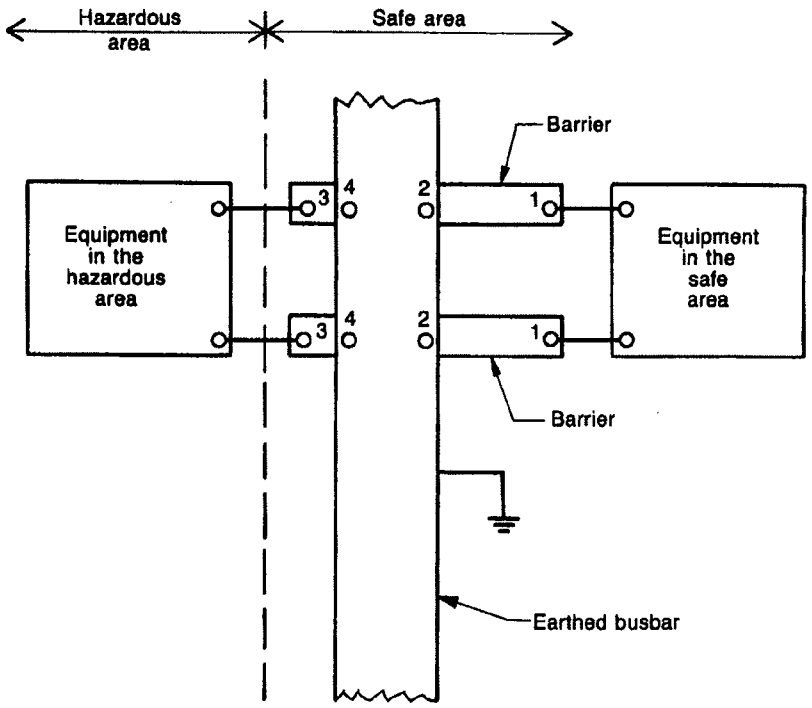


FIGURE A3 INSTALLATION CONFIGURATION 2-WIRE SYSTEM WITH TWO BARRIERS OF OPPOSITE POLARITY

TABLE A2

TYPICAL CABLE CHARACTERISTICS FOR PVC CABLES WITH 0.3 mm RADIAL THICKNESS

Nominal conductor size, number and dia. of wires	7/0.3 mm (0.5 mm^2)		7/0.5 mm (1.5 mm^2)	
Screening	**Screened**	**Unscreened**	**Screened**	**Unscreened**
Conductor resistance at 20°C (Ω/100 m)	3.8	3.8	1.4	1.4
Capacitance of pairs (μF/km)	0.145	0.090	0.2	0.12
Inductance at 1 kHz (mH/km)	0.9	0.9	0.8	0.8
***L/R* ratio (μH/ohm)**	12	12	31	31

TABLE A3

TYPICAL CABLE CHARACTERISTICS FOR 2-CORE MICC CABLE

Nominal conductor size (mm^2)	1
Conductor resistance single core (Ω/100 m)	3.45
Capacitance of pairs (μF/km)	0.1194
Capacitance, conductor to earth (μF/km)	1.1612
Inductance at 1 kHz (mH/km)	0.684
***L/R* ratio (μH/ohm)**	20

APPENDIX C
SELECTION OF Ex e COMPONENTS
(Normative)

C1 GENERAL Each enclosure is allocated a permissible maximum dissipating power, expressed in watts, taking into account—

(a) the dissipation per component for a given cable conductor size;

(b) the size of each cable used and the resistance of its length, equal to the diagonal of the enclosure;

(c) the maximum allowable current for the Ex e component or the maximum current allowable for each cable, if below the maximum allowable for the terminal block; and

(d) the bunching of cables within each enclosure and the effect this has in producing 'hot spots'.

The selection of an acceptable combination in any assembly is based upon the requirement that enclosures shall not exceed a specified total dissipation of power (in watts) from the cables and the components which are to be housed within each enclosure.

The permissible maximum dissipating power (*MDP*) for the temperature classification of the enclosure, determined by test, will appear on the manufacturer's rating plate, e.g. 15.5 W.

Having established maximum dissipation of power from the enclosures, the wired assembly may be expressed in power loss in the following way:

Dissipation per terminal: $P = I^2[R_t + L \times R_c]$ . . . . E(1)

$P = I^2[R_t + R_d]$ . . . . E(2)

where

P = power dissipation, in watts

I = current through terminal (max. allowable or limited by cable size)

R_t = internal resistance of terminal, in ohms

R_c = cable resistance per metre, in ohms

L = length of cable equal to the diagonal of the enclosure, in metres

MDP = maximum dissipating power, in watts—the sum total of all terminals and wiring within the enclosure

R_d = resistance of a length of cable equal to the diagonal of the enclosure

Therefore, for a combination of terminals and cables the watts loss can be calculated from the basic test information and cable data as follows:

$MDP = aP_1 + bP_2 + cP_3 \ldots + zP_n$ . . . . E(3)

where

aP_1; bP_2; cP_3, ... zP_n represent the heat dissipation of different combinations and numbers (a; b; c ...z) of terminals and cables.

C2 EXAMPLE: SELECTION OF TERMINAL BLOCKS FOR COMPLIANCE WITH T6 CLASSIFICATION

Assume that the following is derived from tests:

Enclosure *MDP* = **15 watt**

Terminal block TBK2.5 = 15 A max.
Terminal block TBK16 = 47 A max.
L = 270 mm

A. ***P* (TBK2.5) for**

P_1 3 amps 0.5 mm^2 cable = 0.092 W

P_2 12 amps 1.0 mm^2 cable = 0.763 W

P_3 15 amps 2.5 mm^2 cable = 0.530 W

B. ***P* (TBK16) for**

P_4 47 amps 16 mm^2 cable = 0.790 W

Maximum number of allowable terminals:

$$P_1 \text{ only} = \frac{15.0}{0.092} = 163; \quad \textit{or}$$

$$P_2 \text{ only} = \frac{15.0}{0.763} = 19; \quad \textit{or}$$

$$P_3 \text{ only} = \frac{15.0}{0.530} = 28; \quad \textit{or}$$

$$P_4 \text{ only} = \frac{47.0}{0.790} = 59;$$

Now assume the following combination of terminals—

$(60 \times P_1) + (6 \times P_2) + (3 \times P_3) + (3 \times P_4)$

$(60 \times 0.092) + (6 \times 0.763) + (3 \times 0.530) + (3 \times 0.790)$

Total Heat Dissipation is—

$5.52 + 4.578 + 1.590 + 2.37 =$ **14.058 Watt**

It is concluded that the combination of terminals and cables does not exceed MDP of 15 W and is therefore satisfactory for T6.

NOTE: The cables should not be bunched in quantities greater than the number of cores from each cable or conduit entering the enclosure and in any case should not exceed six per bunch.

C3 CABLE SELECTION v TERMINAL SELECTION The maximum current density permitted in any conductor inside or outside the enclosure is to be established as though the conductors are insulated with V75 material and enclosed in conduit in air and derated according to the ambient temperature and in any case not less than 50°C as established according to AS 3008.1. Additional derating factors may be necessary where bunching of cables occurs.

However, where the cables are run in situations that allow an increase of current-carrying capacity, the Ex e installation is placed at risk, particularly when the cable enters the terminal enclosure.

It is important to keep in mind that—

(a) the Ex e terminal block rated current must not be exceeded; and

(b) the cable connected to each terminal block is of a size acceptable to that block and the current carried by that cable complies with the requirements of Clause 2.7.2.

C4 FACTORS TO BE CONSIDERED IN SELECTING EQUIPMENT CERTIFIED TO Ex e The establishment of criteria which can lead to practical installation of terminal boxes for use in Class I, Zones 1 and 2 hazardous areas can only be made by testing and from the tests a manufacturer can tabulate and mark—

(a) maximum power for each enclosure to meet the temperature class—generally T6 or as certified;

(b) maximum current per Ex e terminal—marked thereon, in amps;

(c) resistance per terminal, in ohms;

(d) average length per conductor—box diagonal in metres;

(e) resistance per conductor length, in ohms;

(f) actual load current per terminal for the installation in amps; and

(g) maximum current per conductor, in amps in accordance with AS 3008.1.

For a particular manufacturer's terminal box, these criteria lead to the following tabulations:

TABLE C1

CONDUCTOR RESISTANCE PER BOX FOR EACH CONDUCTOR SIZE

Size mm^2	Enclosure types No. 1 No. 2 No. 3 No. 4 No. 5
0.5	
1.0	
2.5	$\frac{ohms/1000\ m \times L}{1000}$
4.0	
6.0	
10.0	
16.0	
25.0	
35.0	
50.0	where L is in metres
70.0	
95.0	

TABLE C2

TERMINAL/COMPONENT RESISTANCE (R_t)

Component type	Average resistance (ohms)
TBK 2.5 TBK 4 TBK 6 TBK 10 TBK ... *n*	Determined by test

From Tables C1 and C2, details for each enclosure can be derived:

Assume ..... Enclosure type box No. 1. **MDP = 15 watt**

Ex e component			Cable	Total
Type	Qty	Load or rating A	mm^2	W
TBK 2.5	60	3.0	0.5	5.52
TBK 2.5	6	12.0	1.0	4.578
TBK 2.5	3	15.0	2.5	1.590
TBK 16	3	47.0	16.0	2.37
			Enclosure Total =	14.058

It is possible to determine a large variety of enclosure combinations for different components, given—

(a) conductor resistance;

(b) component resistance;

(c) current drawn through each cable and component; and

(d) enclosure MDP.

The manufacturer should be able to supply details of certified components and enclosures. Cable resistances are readily available from tables or the enclosure manufacturer may provide the values for each enclosure size and each cable length, equal to the enclosure diagonals.

C5 ENCLOSURE CONTENTS AND LABEL Having established the contents for each enclosure for a known application, it is important that any spare space within is **not** filled at some later stage with equipment which—

(a) exceeds the certified MDP;

(b) is not certified Ex e; or

(c) arcs or sparks.

The user or the supplier should attach to the inside of the enclosure a label showing—

(i) certified MDP;

(ii) original component contents; and

(iii) calculated total power dissipation of original installed components.

If the user changes the contents, it would be his responsibility to secure a revised list, having first established that the enclosure temperature class and certified MDP will not be exceeded by the proposed changes.

8 Manufacturer's Data Report (MDR) & Installation, Operation and Maintenance (IOM) Manual

Documentation in relation to this section is to be included and maintained by APA Group.

9 Maintenance Records

Documentation in relation to this section is to be included and maintained by APA Group. This section includes sample maintenance sheet.

FYFE Earth Partners ENVIRONMENT DEVELOPMENT RESOURCES	**MAINTENANCE REGISTER**	Site:	APA Group

DATE	DESCRIPTION	ASSOCIATED TAGS	DOSSIER UPDATE AS REQUIRED (YES / NO / NA)									
			P&ID	DATASHEET	HA EQUIPMENT REGISTER	CERTIFICATE OF CONFORMITY	INSTALLATION CHECK LIST	REPAIR & EXAMINATION REPORT	HA CLASSIFICATION	HA DRAWING	REMARKS	

HAD 1.9
Rev 0

FYFE Earth Partners
ENVIRONMENT DEVELOPMENT RESOURCES

MAINTENANCE REGISTER

Site:

APA Group

DATE	DESCRIPTION	ASSOCIATED TAGS	DOSSIER UPDATE AS REQUIRED (YES / NO / NA)								REMARKS
			P&ID	DATASHEET	HA EQUIPMENT REGISTER	CERTIFICATE OF CONFORMITY	INSTALLATION CHECK LIST	REPAIR & EXAMINATION REPORT	HA CLASSIFICATION	HA DRAWING	

HAD 1.9
Rev 0

FYFE
Earth Partners
ENVIRONMENT
DEVELOPMENT
RESOURCES

MAINTENANCE REGISTER

Site:

APA Group

DATE	DESCRIPTION	ASSOCIATED TAGS	DOSSIER UPDATE AS REQUIRED (YES / NO / NA)								
			P&ID	DATASHEET	HA EQUIPMENT REGISTER	CERTIFICATE OF CONFORMITY	INSTALLATION CHECK LIST	REPAIR & EXAMINATION REPORT	HA CLASSIFICATION	HA DRAWING	REMARKS

HAD 1.9
Rev 0

10 Inspection Records

Close visual inspection to confirm equipment installations was performed by Daniel Williams, a sub-contract industrial/commercial electrician from Sitzler during a site visit on 3 August 2011.

This Section contains the inspection sheets. The Section also contains sample inspection sheet(s) for future inspection.

Documentation in relation to this section is to be maintained by APA Group.

SITZLER
ABN 17 091 273 013
SITZLER Pty Ltd
Construction and Civil Contractors,
Project Managers and Developers

Ref: I:\data\sitzler\contracts\darwin\sbsj12\fyf1 fyfe pty ltd hazardous areas reporting award 28.07.11\fyf1 fyfe southern end pipeline\reports\palm valley - interconnect\electrical equipment for hazardous area summary report - palm valley inter 29.08.11.doc

29 August 2011

FYFE PTY LTD
Level 3, 80 Flinders St
Adelaide SA 5000

Attention: Tony Bird

Dear Tony,

RE: AMADEUS PIPELINE – PALM VALLEY INTERCONNECT

HAZARDOUS AREA ELECTRICAL INSPECTION REPORTING

Please find attached hazardous area device inspection sheets for the above site as part of the visual grade of inspection reporting completed on August 3rd 2011. In addition we also provide a copy of FYFE's instrument index to include the actions required to ensure device and/or installation compliance to Australian standards.

We list the items of deliverables requested by FYFE below and trust the scope of work delivered is in accordance with the specified requirements.

1. Preparation of hazardous area device inspection check-sheets
2. Attend sites and inspect all electrical equipment at each site
3. Complete inspection check-sheets for each instrument
4. Production of a memo stating what work was done and a summary of rectification work
5. To provide ongoing support to the client, it is recommended that a cost estimate is provided for any rectification work.

The level of electrical inspections were carried out in accordance with the Australian/New Zealand Standard AS/NZS 60079 series for explosive atmospheres and in particular parts 14 and 17 relating to electrical installations, design, selection, inspections and maintenance. The grade of inspection completed was a combination of visual and close techniques as defined within the above standard. The inspections were conducted on energised equipment with emphasis on the condition reporting of the equipment and installation techniques applicable to the hazardous area classification and associated environment. It is acknowledged that at the commissioning date of the original installation the Australian standards have since been revised which has been taken into consideration in the evaluation of each device compliance.

In general, the condition of the installation and equipment is considered satisfactory with minor non conformance issues with respect to an intrinsically safe method of installation to Australian Standards. The issues identified requiring remediation works are as follows.

1. Equipment and cable identification labelling required in accordance with the piping and instrumentation diagrams and electrical loop drawings.
2. Application of blue cable sheathing and/or labelling to clearly identify intrinsically safe installations.
3. Re-terminate cabling where exposed armour exists at equipment cable gland entry.

Where Australian certification was valid at the time of installation and the general condition is acceptable for use within the hazardous area, minor remediation works in conjunction with a maintenance plan is recommended to maintain compliance in accordance with current standard requirements. For example, the application of blue cable sheathing or equipment/cable labelling to identify an intrinsically safe installation.

In summary, the issues were found as being minor as a result of the visual inspections completed on site. For recently installed equipment the required remediation works could be completed without the need for de-energising in-service equipment.

The establishment of a regular periodic maintenance regime with respect to hazardous area compliance is recommended as a minimum in accordance with AS/NZS 60079 Part 14/17.

We look forward to providing further advice and discussions with FYFE in order to assist the client with a remediation plan and associated cost estimating of the works. Trusting the above is satisfactory, please do not hesitate to contact the undersigned should you require any further information on the above or attached.

Yours faithfully,

Neville Green
Engineering Services Manager
Encl. Device Inspection Sheets,
Instrument Index – Sitzler Revised

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

Based on AS/NZS 60079 part 17

Ref: I:\data\sitzler\company operations\darwin\tenders\sbsj11\fyf1 - haz area inspections\hazardous area inspection forms\hazardous area device inspection sheet for ex-d,ex-e,ex-i,ex-n,ex-p and other ex devices.doc

Specifications

0891
0892
0893

General

Device ID or tag:	PIT001	Asset:	
Circuit ID:	PIT001	Physical location:	Palm Valley - Alice meter
Area classification :	2	Environment: (hot?)	External - Exposed

Data from Label

Apparatus type: (light, JB, Motor)	Press Transmitter	Type of protection: (d,e, i, n, p etc)	Ex ia
Manufacturer:	Rosemount	Gas group: (IIA/B/C)	IIC
Full model number:	3051-TG4A2B21BB4E7M5Q4	Temp class: (T1-T6)	T5
Serial number:	RS0600691	Certificate number:	AUS Ex 1249X
IP Class		Test authority: (BAS, PTB, SAA etc)	

Number of cables:

For each cable entry	gland 1	gland 2	others BLNG
Gland manufacturer:	SUREFIT		BEDART
Model:	FLWP M0		M20
Gland type of protection: (d,e)			Exd IIC
			BAS No 83 12180

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗
2	Equipment ID or circuit ID is correct	all	X	⊗
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗
4	There are no damage or evidence of unauthorised modifications	all	X	⊗
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗
6	Flange facings are clean and undamaged	d	X	
7	Lamp rating, type and position correct	all	X	
8	Electrical connections are tight	all	X	
9	Hermetically sealed devices are undamaged	n	X	
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X	
11	Motor fans have sufficient clearance	motors only	X	
12	Installation clearly labelled	i	X	⊗ – IS LABEL
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗
14	Entity calculation/documentation is available	i	X	⊗ – GALE

	B Installation			
1	Type of cable is appropriate, cables are undamaged	all	X	⊗
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗
3	Stopper boxes or barrier glands are properly filled	d	X	
4	Integrity of conduit system and interface with mixed system is maintained	all	X	
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ – NO EARTHS
6	Fault loop impedance is satisfactory	power outlets	X	
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X	
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X	
9	Special certification conditions U,X or B have been complied with	all	X	
10	Cables/spare cores are terminated satisfactorily	all	X	
11	No obstructions adjacent to flameproof flanged joint	d	X	⊗
12	Ducts, pipes and enclosures are in good condition	p	X	⊗
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	⊗
14	Protective gas flow/pressure is adequate	p	X	
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X	
16	Pre-energising purge period is adequate	p	X	
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X	

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

(No)

Yes: List action required

Contractor (write): Inspector D.WILLIAMS **Supervisor**	**Client (write): Inspector**
Date: 3/8/11	**Date:**

Device ID or tag

Action required to make device compliant:

NIL.

Reviewed by: N. GREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

Ref: I:\data\sitzler\company operations\darwin\tenders\sbsj11\fyf1 - haz area inspections\hazardous area inspection forms\hazardous area device inspection sheet for ex-d,ex-e,ex-i,ex-n,ex-p and other ex devices.doc

0894
0895

Specifications

General

Device ID or tag:	JB01 (FROM TERMINALS INSIDE BOX)	Asset:	–
Circuit ID:		Physical location:	Palm Valley - Alice Mother
Area classification :		Environment: (hot?)	Exposed - outside

Data from Label

Apparatus type: (light, JB, Motor)	EB	Type of protection: (d,e, i, n, p etc)	e
Manufacturer:	STAHL Clipsal Ex	Gas group: (IIA/B/C)	IIC
Full model number:	E542/5027	Temp class: (T1-T6)	T6
Serial number:	–	Certificate number:	AUS Ex 2344X ✓
IP Class	IP66	Test authority: (BAS, PTB, SAA etc)	SA-Cert-(Simtars)

Number of cables:	~~10~~ 12

For each cable entry	gland 1	gland 2	others ADAPTORS
Gland manufacturer:	NOT VISABLE		NO GLANDS
Model:			
Gland type of protection: (d,e)			

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗	← NO LABELS
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗	–

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗	
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗	← NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	X	
12	Ducts, pipes and enclosures are in good condition	p	X	X	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	X	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector D. Williams	**Supervisor**
Date: 3/8/11	

Client (write): Inspector	
Date:	

Device ID or tag

Action required to make device compliant:

- Equipment ID required. & IS label to door.
- 2x cables entering JBox (totaliser pulses?) require blue sheath and cable labels.

Reviewed by: D. GREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

Ref: I:\data\sitzler\company operations\darwin\tenders\sbs|11\fyf1 - haz area inspections\hazardous area inspection forms\hazardous area device inspection sheet for ex-d,ex-e,ex-i,ex-n,ex-p and other ex devices.doc

0847
0896

Specifications

General

Device ID or tag:	?, (FQI-002)	Asset:	
Circuit ID:	?	Physical location:	PALM VALLEY – ALICE
Area classification :	?	Environment: (hot?)	EXTERNAL

Data from Label (TOTALISER)

Apparatus type: (light, JB, Motor)	VOLUME DATA SYSTEM	Type of protection: (d,e, i, n, p etc)	ia
Manufacturer:	INLINE	Gas group: (IIA/B/C)	IIC
Full model number:	INLINE VDS	Temp class: (T1-T6)	T6
Serial number:	8450884	Certificate number:	AVS Ex 843X
IP Class	–	Test authority: (BAS, PTB, SAA etc)	

Number of cables:	1

For each cable entry	gland 1	gland 2	others
Gland manufacturer:	NO CERT		
Model:			
Gland type of protection: (d,e)	–		

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗ –	IS LABEL
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗ –	CALC

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗ –	SHORT
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ –	NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	X	
12	Ducts, pipes and enclosures are in good condition	p	X	X	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	X	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X		
19	The circuit is isolated from earth or earthed at one point only	i	X		
20	Separation is maintained with non-IS circuits	i	X		
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X		

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector Supervisor	Client (write): Inspector
D. Williams	
Date: 3/8/11	Date:

Device ID or tag

Action required to make device compliant:

- Blue sheath or IS label to cable.
- Cable IO required.

Reviewed by: D. Green
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

Ref: I:\data\sitzler\company operations\darwin\tenders\sbsj11\fyf1 - haz area inspections\hazardous area inspection forms\hazardous area device inspection sheet for ex-d,ex-e,ex-i,ex-n,ex-p and other ex devices.doc

0901
0902 0900
0903

Specifications

General

Device ID or tag:	TT-009	Asset:	
Circuit ID:	TT-009	Physical location:	PALM VALLEY - ALICE
Area classification :		Environment: (hot?)	EXTERNAL

Data from Label

Apparatus type: (light, JB, Motor)	TEMP TX	Type of protection: (d,e, i, n, p etc)	NO ID SIMPLE DEVICE.
Manufacturer:	ROSEMOUNT	Gas group: (IIA/B/C)	"
Full model number:	644HA1RXA	Temp class: (T1-T6)	"
Serial number:	01343011	Certificate number:	"
IP Class		Test authority: (BAS, PTB, SAA etc)	"

Number of cables:	1

For each cable entry	gland 1	gland 2	others ADAPTOR
Gland manufacturer:	SUREFIT		NO CERT
Model:	FLWPM6		
Gland type of protection: (d,e)			

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	– DAMAGE
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	– RE TERM
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗ the IS CABLE	
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗	– CALC

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗	–
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗	– NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	N/A	
12	Ducts, pipes and enclosures are in good condition	p	X	✓	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	✓	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	⊗
2	No undue accumulation of dust or dirt	all	X	⊗
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector D.WILLIAMS **Supervisor**	**Client (write): Inspector**
Date: 3/8/11	**Date:**

Device ID or tag

Action required to make device compliant:

- Reterminate cabling at gland entry.
- Change device ID / cable tag from TT to TE.

Reviewed by: N. GREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

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Specifications

General

Device ID or tag:	PCV-003	Asset:	
Circuit ID:	PCV 003	Physical location:	PALM VALLEY - ALICE
Area classification :		Environment: (hot?)	

Data from Label

Apparatus type: (light, JB, Motor)	I/P TRANSDUCER	Type of protection: (d,e, i, n, p etc)	ia / n	d
Manufacturer:	FLOWSERVE	Gas group: (IIA/B/C)	IIC / IIC	IIB+H2
Full model number:	NT3600-05	Temp class: (T1-T6)	T5 / T6	T6
Serial number:		Certificate number:	AUS Ex 1461X	AUS Ex 14Cl
IP Class	65	Test authority: (BAS, PTB, SAA etc)		

Number of cables:	

For each cable entry	gland 1	gland 2	others
Gland manufacturer:	SUREFIT		
Model:	FWPMQ		
Gland type of protection: (d,e)	Ex de I/IIC		

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗
2	Equipment ID or circuit ID is correct	all	X	⊗
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗
4	There are no damage or evidence of unauthorised modifications	all	X	⊗
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗
6	Flange facings are clean and undamaged	d	X	
7	Lamp rating, type and position correct	all	X	
8	Electrical connections are tight	all	X	
9	Hermetically sealed devices are undamaged	n	X	
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X	
11	Motor fans have sufficient clearance	motors only	X	
12	Installation clearly labelled	i	X	⊗
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗
14	Entity calculation/documentation is available	i	X	⊗

	B Installation			
1	Type of cable is appropriate, cables are undamaged	all	X	⊗
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗
3	Stopper boxes or barrier glands are properly filled	d	X	
4	Integrity of conduit system and interface with mixed system is maintained	all	X	
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X	
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X	
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X	
9	Special certification conditions U,X or B have been complied with	all	X	
10	Cables/spare cores are terminated satisfactorily	all	X	
11	No obstructions adjacent to flameproof flanged joint	d	X	⊗
12	Ducts, pipes and enclosures are in good condition	p	X	X
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	X
14	Protective gas flow/pressure is adequate	p	X	
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X	
16	Pre-energising purge period is adequate	p	X	
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X	

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X		
19	The circuit is isolated from earth or earthed at one point only	i	X		
20	Separation is maintained with non-IS circuits	i	X		
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X		

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector D. Williams **Supervisor**	**Client (write): Inspector**
Date: 3/8/11	**Date:**

Device ID or tag

Action required to make device compliant:

N:/.

Reviewed by: D. GREEN
Date: 25/5/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

Based on AS/NZS 60079 part 17

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Specifications

General

Device ID or tag:	~~PT23~~ PT003	Asset:	
Circuit ID:	PT003	Physical location:	Palm Valley - Mice meter
Area classification :		Environment: (hot?)	~~Hot~~ External - Exposed

Data from Label

Apparatus type: (light, JB, Motor)	Press Transmitter	Type of protection: (d,e, i, n, p etc)	Ex ia
Manufacturer:	Rose.Mount	Gas group: (IIA/B/C)	II C
Full model number:	3051-T64A2B21BB4I7Q6	Temp class: (T1-T6)	T5
Serial number:	RS0600690.	Certificate number:	AVS Ex 1249X
IP Class	–	Test authority: (BAS, PTB, SAA etc)	

Number of cables:	1

For each cable entry	gland 1	gland 2	others
Gland manufacturer:	NOT ACCESSABLE		BARTEC RECOMHOT
Model:	~~M20~~		M20
Gland type of protection: (d,e)	~~Exd IIC BAS 831218U~~		Exd IIC BAS 831218U

Inspection → Circle as checked

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗	– ISI LABEL
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗	– CABLES

	B Installation			
1	Type of cable is appropriate, cables are undamaged	all	X	⊗
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗
3	Stopper boxes or barrier glands are properly filled	d	X	
4	Integrity of conduit system and interface with mixed system is maintained	all	X	
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗
6	Fault loop impedance is satisfactory	power outlets	X	
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X	
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X	
9	Special certification conditions U,X or B have been complied with	all	X	
10	Cables/spare cores are terminated satisfactorily	all	X	
11	No obstructions adjacent to flameproof flanged joint	d	X	✗
12	Ducts, pipes and enclosures are in good condition	p	X	✗
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	✗
14	Protective gas flow/pressure is adequate	p	X	
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X	
16	Pre-energising purge period is adequate	p	X	
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X	

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector B. WILLIAMS **Supervisor**	**Client (write): Inspector**
Date: 5/8/11	**Date:**

Device ID or tag

Action required to make device compliant:

N:l

Reviewed by: N. GREEN
Date: 25/2/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

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Based on AS/NZS 60079 part 17

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Specifications

General

Device ID or tag:	PIT007	Asset:	
Circuit ID:	PIT007.	Physical location:	Palm Valley - Alice Meter
Area classification :		Environment: (hot?)	External - Exposed.

Data from Label

Apparatus type: (light, JB, Motor)		Type of protection: (d,e, i, n, p etc)	ia, ~~d~~ e,
Manufacturer:	Yokogawa	Gas group: (IIA/B/C)	IIC
Full model number:	EJX ~~S1~~ 530A	Temp class: (T1-T6)	T4
Serial number:	F1B84N-014NF/5U2 ✓	Certificate number:	IECEx - CSA 05.0005
IP Class	IP67	Test authority: (BAS, PTB, SAA etc)	~~IECEx CSA~~

Number of cables:	1

For each cable entry	gland 1	gland 2	others BUNK
Gland manufacturer:	SUREPIT		CEAG
Model:	FLWPMD.		M20
Gland type of protection: (d,e)	de		e

ATEX 3130

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗ –	IS LABEL
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗ –	CABLES

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗	
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ –	NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	X	
12	Ducts, pipes and enclosures are in good condition	p	X	X	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	X	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

(No:)

Yes: List action required

Contractor (write): Inspector D WILLIAMS **Supervisor** **Date:** 3/8/11	**Client (write): Inspector** **Date:**

Device ID or tag

Action required to make device compliant:

N:l.

Reviewed by: D. GREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

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Specifications

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General

Device ID or tag:	X	Asset:	
Circuit ID:	XY 005	Physical location:	PATM VALLEY – ALICE
Area classification :	2	Environment: (hot?)	EXTERNAL

Data from Label

Apparatus type: (light, JB, Motor)	SOLENOID	Type of protection: (d,e, i, n, p etc)	ia
Manufacturer:	RGS ELECTRO PNEUMATICS	Gas group: (IIA/B/C)	IIC
Full model number:	EP000/IA/S/SAA	Temp class: (T1-T6)	T6
Serial number:	AV63602AHB	Certificate number:	AUS Ex 484/X-1
IP Class		Test authority: (BAS, PTB, SAA etc)	SAA

Number of cables:	1

For each cable entry	gland 1	gland 2	others
Gland manufacturer:	SUREFIT		
Model:	FWPMO		
Gland type of protection: (d,e)	Ex de		

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	✱
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗	IS CABLE
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗	CALC

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗	
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗	NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	X	
12	Ducts, pipes and enclosures are in good condition	p	X	X	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	X	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X	
19	The circuit is isolated from earth or earthed at one point only	i	X	
20	Separation is maintained with non-IS circuits	i	X	
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X	

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	⊘
2	No undue accumulation of dust or dirt	all	X	⊘
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector D.WILLIAMS Supervisor	Client (write): Inspector
Date: 3/8/11	Date:

Device ID or tag

Action required to make device compliant:

- Equipment ID required.
- "Red" coloured screw indicates modification works. Review manufacturers literature to ensure nil issues.

Reviewed by: N.AREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

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Specifications

General

Device ID or tag:	XV-005	Asset:	
Circuit ID:	XV-005.	Physical location:	PALM VALLEY – ALICE
Area classification :		Environment: (hot?)	EXTERNAL

Data from Label

Apparatus type: (light, JB, Motor)	ZSC/O (LIMIT SWITCHES)	Type of protection: (d,e, i, n, p etc)	N/A - Simple Device.
Manufacturer:	FLOWSERVE	Gas group: (IIA/B/C)	—
Full model number:	5175ST WDBΦ1Φ12Φ1	Temp class: (T1-T6)	—
Serial number:	2248836	Certificate number:	—
IP Class	IP66/67	Test authority: (BAS, PTB, SAA etc)	—

Number of cables:	

For each cable entry	gland 1	gland 2	others BUNA
Gland manufacturer:	?		NO CERT
Model:			
Gland type of protection: (d,e)			

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗ –	IS LABEL
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗ –	CALCS

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗	
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ –	NO EARTH
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	⊗	
12	Ducts, pipes and enclosures are in good condition	p	X	⊗	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	⊗	
14	Protective gas flow/pressure is adequate	p	X		
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

SITZLER

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X		
19	The circuit is isolated from earth or earthed at one point only	i	X		
20	Separation is maintained with non-IS circuits	i	X		
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X		

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No

Yes: List action required

Contractor (write): Inspector D. Williams	Supervisor	Client (write): Inspector
Date: 3/8/11		Date:

Device ID or tag

Action required to make device compliant:

- Equipment ID required

Reviewed by: N. GREEN
Date: 25/8/11
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

Hazardous area device inspection sheet for Ex-d, Ex-e, Ex-i, Ex-n, Ex-p and other Ex devices

SITZLER

Based on AS/NZS 60079 part 17

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Specifications

General

Device ID or tag:	✓ (FQI-002)	Asset:	
Circuit ID:	—	Physical location:	PALM VALLEY – ALICE
Area classification :		Environment: (hot?)	EXTERNAL

Data from Label

Apparatus type: (light, JB, Motor)	PULSE TRANSMITTER	Type of protection: (d,e, i, n, p etc)	– SIMPLE DEVICE?
Manufacturer:	FOXBORO	Gas group: (IIA/B/C)	—
Full model number:	G160 ON80 ANSI 600	Temp class: (T1-T6)	—
Serial number:	8004450 1/99	Certificate number:	—
IP Class		Test authority: (BAS, PTB, SAA etc)	—

Number of cables:	

For each cable entry	gland 1	gland 2	others
Gland manufacturer:	N6 CERT		
Model:			
Gland type of protection: (d,e)	–		

Inspection → **Circle as checked**

	A Equipment	Applicable to protection type:	Internal	External	
1	Equipment (incl group and temp class) is appropriate for area classification	all	X	⊗	
2	Equipment ID or circuit ID is correct	all	X	⊗	
3	Enclosure, sealing gaskets or compounds are satisfactory	all	X	⊗	
4	There are no damage or evidence of unauthorised modifications	all	X	⊗	
5	Bolts, cable entries and blanking elements are correct and tight	all	X	⊗	
6	Flange facings are clean and undamaged	d	X		
7	Lamp rating, type and position correct	all	X		
8	Electrical connections are tight	all	X		
9	Hermetically sealed devices are undamaged	n	X		
10	Restricted breathing enclosure is satisfactory to enclosure and/or covers	n	X		
11	Motor fans have sufficient clearance	motors only	X		
12	Installation clearly labelled	i	X	⊗ – IS CABLE	
13	Safety barriers/isolators installed as per certification and securely earthed where required	i	X	⊗	
14	Entity calculation/documentation is available	i	X	⊗ – CERT	

	B Installation				
1	Type of cable is appropriate, cables are undamaged	all	X	⊗ – TIGHT	
2	Sealing of ducts and/or conduits is satisfactory	all	X	⊗	
3	Stopper boxes or barrier glands are properly filled	d	X		
4	Integrity of conduit system and interface with mixed system is maintained	all	X		
5	Earthing and bonding connections are tight, in good condition and of sufficient cross section	all	X	⊗ – NO EARTH	
6	Fault loop impedance is satisfactory	power outlets	X		
7	Insulation resistance is satisfactory (check only during initial inspection)	all	X		
8	Automatic electrical protective devices are set correctly and operate within permitted limits	all	X		
9	Special certification conditions U,X or B have been complied with	all	X		
10	Cables/spare cores are terminated satisfactorily	all	X		
11	No obstructions adjacent to flameproof flanged joint	d	X	✓	
12	Ducts, pipes and enclosures are in good condition	p	X	✓	
13	Protective gas is substantially free from contaminants (water, oil, dirt)	p	X	✓	
14	Protective gas flow/pressure is adequate	p	X	✓	
15	Pressure and/or flow indicators, alarms and interlocks function correctly	p	X		
16	Pre-energising purge period is adequate	p	X		
17	Condition of spark/particle barriers of ducts exhausting the gas into hazardous area are satisfactory	p	X		

18	Cables are installed and screens are earthed in accordance with the documentatio0n	i	X		
19	The circuit is isolated from earth or earthed at one point only	i	X		
20	Separation is maintained with non-IS circuits	i	X		
21	As applicable, short circuit protection of the power supply is in accordance with the documentation	i	X		

C Environment

1	Apparatus adequately protected from corrosion, weather, vibration, other	all	X	
2	No undue accumulation of dust or dirt	all	X	
3	Electrical insulation is clean and dry	all	X	

Faults found? (circle as appropriate)

No:

Yes: List action required

Contractor (write): Inspector D WILLIAMS **Supervisor**	**Client (write): Inspector**
Date: 3/8/14	**Date:**

Device ID or tag

Action required to make device compliant:

- Blue sheath or IS label to cable
- Cable ID required.

Reviewed by: D. GREEN
Date: 25/8/14
Priority:

Comments:

All action items now completed: ☐
Job closed: ☐

Device now fully compliant, spreadsheet register has been updated
Supervisor (write):
Date:

INSPECTION CHECK SHEET
Intrinsically Safe Ex i

TAG/IDENTIFICATION	DESCRIPTION

Area Classification - Zone 0 1 2 20 21 22 Non Hazardous - Group I IIA IIB IIC - Temp T1 T2 T3 T4 T5 T6

Record Name Plate Details						Record other nameplate information that may be relevant
Manufacturer		Vin		Chin		
Serial No.		Lin		Lin		
Model						
Certificate no.		T		IP		
Certifying authority						

Inspection Type Performed (I=Initial, P=Periodic, S=Sample)	**I**	**P**	**S**	
Inspection Grade Performed (D=Detailed, C=Close, V=Visual)	**D**	**C**	**V**	Detailed requires de-energization

Equipment Y=OK, N=Not Acceptable, N/A=Not Applicable, N/C=Not Checked					**Inspect Grade**	**Remarks**
Equipment is Australian or IEC Certified	Y	N	N/A	N/C	DCV	
EX markings are suitable for the area	Y	N	N/A	N/C	DCV	
Equipment is clearly marked and has appropriate tag/identification details	Y	N	N/A	N/C	DCV	
Enclosure is not damaged and maintains its weatherproofing	Y	N	N/A	N/C	DCV	
Terminations are tight	Y	N	N/A	N/C	DC	
All unused conductors terminated	Y	N	N/A	N/C	DC	
Bolts, bungs, plugs/blank plates installed and tight	Y	N	N/A	N/C	DCV	
Fuses and lamps are correct rating	Y	N	N/A	N/C	DCV	
No unautorised modifications (Y=OK)	Y	N	N/A	N/C	DCV	
Installation					**Grade**	**Remarks**
Cable type is as per the documentation	Y	N	N/A	N/C	D	
IS Entity and cable parameters are suitable for installation	Y	N	N/A	N/C	D	
The device is securely mounted	Y	N	N/A	N/C	DC	
Cables/conduits in acceptable condition	Y	N	N/A	N/C	D	
Cables/conduit entry correct, complete, and tight	Y	N	N/A	N/C	DCV	
No excessive vibration present that may cause conductors to work loose (Y=OK)	Y	N	N/A	N/C	DCV	
Segregation between IS and non IS circuits at junction boxes	Y	N	N/A	N/C	DCV	
Segregation between IS and non IS circuits in cable ladder and conduit	Y	N	N/A	N/C	DCV	
Earthing and equipotential bonding satisfactory	Y	N	N/A	N/C	D	
Insulation resistance is satisfactory (NB Danger of MEGGER testing HA)	Y	N	N/A	N/C	D	
Cable screens earthed as per documentation (normally one point only)	Y	N	N/A	N/C	D	
Barriers					**Grade**	**Remarks**
Record Safety Barriers manufacturer and model no. (available on device = Y)	Y	N	N/A	N/C	DC	
Equipment is Australian or IEC Certified (Enter certification details in 'Remarks')	Y	N	N/A	N/C	DCV	
Record Safety Barriers certification details (available on device = Y)	Y	N	N/A	N/C	DC	
Safety Barriers are the correct type as per the drawings	Y	N	N/A	N/C	DC	
Safety Barriers are securely connected to the earth bar	Y	N	N/A	N/C	DCV	
Barrier/Isolator terminations are tight	Y	N	N/A	N/C	DCV	
Maximum voltage on the safe side of the barrier/isolator is 240V	Y	N	N/A	N/C	DCV	
IS circuits are all free from external power circuit infiltration	Y	N	N/A	N/C	DCV	
No energy storing devices in excess of the max energy permitted	Y	N	N/A	N/C	DC	
Relays acting as safety barriers are in good condition	Y	N	N/A	N/C	DCV	
Earth continuity from barrier bar to the transformer neutral point is <1ohm	Y	N	N/A	N/C	D	Check one connection at a time
Environment					**Grade**	**Remarks**
Equipment adequately protected against corrosion, weather, vibration, etc	Y	N	N/A	N/C	DCV	
Dust and dirt on the equipment and cable are within acceptable limit	Y	N	N/A	N/C	DCV	
Special conditions					**Grade**	**Remarks**
Special conditions on certificate are satisfied	Y	N	N/A	N/C	D	

Notes:

Inspected:_____ Date:_____ Checked:_____ Date:_____

INSPECTION CHECK SHEET
Increased Safety Ex e

TAG/IDENTIFICATION	DESCRIPTION

Area Classification - Zone 0 1 2 Non Hazardous - Group I IIA IIB IIC - Temp T1 T2 T3 T4 T5 T6

Record Name Plate Details						Record other nameplate information that may be relevant
Manufacturer		KW		FLC		
Serial No.		Volts		RPM		
Model						
Certificate No.		T		IP		
Certifying authority						

Inspection type performed (I=Initial, P=Periodic, S=Sample)	**I**	**P**	**S**	
Inspection Grade Performed (D=Detailed, C=Close, V=Visual)	**D**	**C**	**V**	Detailed requires de-energization

Equipment Y=OK, N=Not Acceptable, N/A=Not Applicable, N/C=Not Checked					**Inspect Grade**	**Remarks**
Equipment is Australian or IEC Certified	Y	N	N/A	N/C	DCV	
EX markings are suitable for the area	Y	N	N/A	N/C	DCV	
Equipment is clearly marked and has appropriate tag/identification details	Y	N	N/A	N/C	DCV	
Enclosure is not damaged and maintains its weatherproofing (min IP54)	Y	N	N/A	N/C	DCV	
Enclosure gaskets are in a satisfactory condition	Y	N	N/A	N/C	D	
Bolts, bungs, plugs/blank plates installed and tight	Y	N	N/A	N/C	DCV	
Terminals are sized correctly for the rating	Y	N	N/A	N/C	D	
Conductors > 0.5mm2 for multistranded and 1mm2 for single strand	Y	N	N/A	N/C	D	
No chafing parts that may cause local hot spots (motor fans) (Y=OK)	Y	N	N/A	N/C	D	
Guards are correctly fitted	Y	N	N/A	N/C	D	
No unautorised modifications (Y=OK)	Y	N	N/A	N/C	DCV	
Lamp rating, type and position are correct	Y	N	N/A	N/C	D	

Installation					**Grade**	**Remarks**
Equipment carries correct circuit identification at switchboard and local isolator	Y	N	N/A	N/C	D	
Effective means of isolation of all live conductors (including neutral)	Y	N	N/A	N/C	D	
Installation is in compliance with documentation	Y	N	N/A	N/C	DC	
Cable type is as per the documentation	Y	N	N/A	N/C	D	
The device is securely mounted	Y	N	N/A	N/C	DCV	
Cables/conduits in acceptable condition	Y	N	N/A	N/C	DCV	
Cables/conduit entry correct, complete, and tight (Exd or Exe glands used)	Y	N	N/A	N/C	DCV	
Exd glands have additional weatherproofing	Y	N	N/A	N/C	DCV	
Electrical connections are tight	Y	N	N/A	N/C	D	
Creapage and clearance distance are maintained	Y	N	N/A	N/C	D	
All unused conductors terminated in Exe terminals	Y	N	N/A	N/C	D	
Earthing and equipotential bonding satisfactory	Y	N	N/A	N/C	DCV	
Insulation resistance is satisfactory (NB Danger of MEGGER testing HA)	Y	N	N/A	N/C	D	
Motor parameters (Ia/In and te) and TOLs coordinate (record TOL mfr/model)	Y	N	N/A	N/C	D	

Cable Glands and adaptors					**Grade**	**Remarks**
Cable glands details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	DCV	
Cable glands certificate details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	DCV	
Adaptors and plugs details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	DC	
Glands and adaptors Ex markings are suitable for area	Y	N	N/A	N/C	DCV	

Environment					**Grade**	**Remarks**
Equipment adequately protected against corrosion, weather, vibration, etc	Y	N	N/A	N/C	DCV	
Dust and dirt on the equipment and cable are within acceptable limit	Y	N	N/A	N/C	DCV	

Special conditions					**Grade**	**Remarks**
Special conditions on certificate are satisfied	Y	N	N/A	N/C	D	

Notes:

Inspected:_____ Date:_____ Checked:_____ Date:_____

Hazardous Area Check Sheet
Flameproof Ex d

TAG/IDENTIFICATION	DESCRIPTION

Area Classification - Zone 0 1 2 Non Hazardous - Group I IIA IIB IIC - Temp T1 T2 T3 T4 T5 T6

Record Name Plate Details						Record other nameplate information that may be relevant
Manufacturer		KW		FLC		
Serial No.		Volts		RPM		
Model						
Certificate No.		T		IP		
Certifying authority						

Inspection Type Performed (I=Initial, P=Periodic, S=Sample)	**I**	**P**	**S**	
Inspection Grade Performed (D=Detailed, C=Close, V=Visual)	**D**	**C**	**V**	Detailed requires de-energization

Equipment Y=OK, N=Not Acceptable, N/A=Not Applicable, N/C=Not Checked					**Inspect Grade**	**Remarks**
Equipment is Australian or IEC Certified	Y	N	N/A	N/C	DCV	
EX markings are suitable for the area	Y	N	N/A	N/C	DCV	
Equipment is clearly marked and has appropriate tag/identification details	Y	N	N/A	N/C	DCV	
Enclosure is not damaged and maintains its flameproof characteristics	Y	N	N/A	N/C	DCV	
Locking sealing, fastening devices are of type certified by manufacturer	Y	N	N/A	N/C	DCV	
Locking sealing, fastening devices operate correctly and are tight	Y	N	N/A	N/C	DC	
Bolts, bungs, plugs/blank plates installed and tight	Y	N	N/A	N/C	DCV	
Sealing gaskets and components in acceptable condition	Y	N	N/A	N/C	DCV	
Flange faces are clean and undamaged	Y	N	N/A	N/C	D	
Flange gap dimensions are less than_____ mm	Y	N	N/A	N/C	DC	
No unauthorised modifications (Y= OK)	Y	N	N/A	N/C	DCV	
Equipment is clear of obstructions (minimum dimensions 40mm)	Y	N	N/A	N/C	DCV	
No chafing parts that may cause local hot spots (motor fans) (Y=OK)	Y	N	N/A	N/C	D	
Guards are correctly fitted	Y	N	N/A	N/C	D	
Lamp rating, type and position are correct	Y	N	N/A	N/C	D	

Installation					**Grade**	**Remarks**
Equipment carries correct circuit identification at switchboard and local isolator	Y	N	N/A	N/C	D	
Effective means of isolation of all live conductors (including neutral)	Y	N	N/A	N/C	D	
Cable type is as per the documentation	Y	N	N/A	N/C	D	
The device is securely mounted	Y	N	N/A	N/C	DCV	
Cables/conduits in acceptable condition	Y	N	N/A	N/C	DCV	
Cables/conduit entry correct, complete, and tight with sufficient threads	Y	N	N/A	N/C	DCV	
Sealing of conduits, ducts or other connections is satisfactory	Y	N	N/A	N/C	D	
Integrity of conduit system and mixed system interface satisfactory	Y	N	N/A	N/C	D	
Earthing and equipotential bonding satisfactory	Y	N	N/A	N/C	DCV	
Insulation resistance is satisfactory (NB Danger of MEGGER testing HA)	Y	N	N/A	N/C	D	
Protection devices (Limit sws, phase rot, TOLs) operate correctly	Y	N	N/A	N/C	D	

Cable Glands and adaptors					**Grade**	**Remarks**
Cable glands details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	DCV	
Cable glands certificate details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	DCV	
Adaptors and plugs details available, record (available=Y, not recorded=N/C)	Y	N	N/A	N/C	D	
Adaptors and plugs have sufficient engaged threads	Y	N	N/A	N/C	DCV	
Glands and adaptors Ex markings are suitable for area	Y	N	N/A	N/C	DCV	

Environment					**Grade**	**Remarks**
Equipment adequately protected against corrosion, weather, vibration, etc	Y	N	N/A	N/C	DCV	
Dust and dirt on the equipment and cable are within acceptable limit	Y	N	N/A	N/C	DCV	

Special conditions					**Grade**	**Remarks**
Special conditions on certificate are satisfied	Y	N	N/A	N/C	D	

Notes:

Inspected:_____ Date:_____ Checked:_____ Date:_____

11 Overhaul, Repair, Modification and Replacement Records

This Section contains the sample repair and examination report(s).

Documentation in relation to this section is to be maintained by APA Group.

REPAIR AND EXAMINATION REPORT FOR INTRINSICALLY SAFE EQUIPMENT (EX 'i')

General

Tag no.:	Site:
P&ID:	Area Classification:

Equipment Details

Equipment type:	Gas group (IIA/B/C):
Manufacturer:	Temp class (T1-T6):
Model no.:	Certificate no.:
Serial no.:	Test authority:

Competent Operator

Name:	Identification no.:
Company:	Company registration:

Condition

Condition upon receipt:
Old repair label details:
Reported Fault (if any):

Action

Repair action:…… …… …… …… …… ……
Remarks:…… …… …… …… …… …… ……

I,……confirm that the above equipment, repaired/overhaul/modified (strike out whichever is not applicable) as above, complies/does not comply with the relevant requirements of AS/NZS 3800 (including markings as required by Appendix D) and AS……..and that this Report has been recorded in the logbook of the service facility.

Sign:…… Date:……/……./……

REPAIR AND EXAMINATION REPORT FOR INCREASED SAFETY ENCLOSURES (EX 'e')

FYFE Earth Partners
ENVIRONMENT DEVELOPMENT RESOURCES

General

Tag no.:	Site:
P&ID:	Area Classification:

Equipment Details

Equipment type:	Gas group (IIA/B/C):
Manufacturer:	Temp class (T1-T6):
Model no.:	Certificate no.:
Serial no.:	Test authority:

Competent Operator

Name:	Identification no:
Company:	Company Registration:

Enclosure Condition

Old repair label no.:		
External surface cleaned for inspection - Yes / No		
Covers and fasteners:		Base of enclosure:
Threaded holes:		External corrosion:
Surface coating:		Gland entries and glands:
General external condition:		
Enclosure dismantled:		Degree of protection: IP
Internal Condition - Dust/Liquids:		Corrosion: Heat:
Missing parts:		
Cables and terminations:		Terminal blocks:
Earth terminals:		Insulation:
Windows and seals:		Actuators and seals:
Ex 'de' parts:		Meters:
Lamps:		Transformers:
Switches:		Others:
Relays:		Interlocks:
Luminaire:		Lamp power (W):
Transparent part:		Lampholders:
Ballasts:	Capacitors:	Batteries:

Action

Repair ……
Remarks:…… ……

I,……confirm that the above equipment, repaired/overhaul/modified (strike out whichever is not applicable) as above, complies/does not comply with the relevant requirements of AS/NZS 3800 (including markings as required by Appendix D) and AS……..and that this Report has been recorded in the logbook of the service facility.

Sign:…… Date:……/……./……

REPAIR AND EXAMINATION REPORT FOR ELECTRICAL EQUIPMENT INSTALLED WITHIN FLAMEPROOF ENCLOSURE (EX'd')

General

Tag no.:	Site:
P&ID:	Area Classification:

Equipment Details

Equipment type:	Gas group (IIA/B/C):
Manufacturer:	Temp class (T1-T6):
Model no.:	Certificate no.:
Serial no.:	Test authority:

Operator

Name:	Identification no.:
Company:	Company registration:

Equipment Condition Checklist

Item	Description of check	No work	Repaired	Replaced
(a)	Isolator mechanism and switch operation			
(b)	Earthing device and operation			
(c)	All auxiliary mechanisms, trip bars, latching arrangements, etc.			
(d)	All locking devices, function and operation			
(e)	All parts for mechanical condition			
(f)	All insulation checked – no heat, cracks, etc.			
(g)	Phase barriers fitted correctly and functional			
(h)	Oil levels and/or gas pressure			
(i)	Gas pressure-sensing devices			
(J)	All wiring and terminations			
(k)	Earth continuity; phase/earth fault lock units			
(l)	Overcurrent, overload and earth-fault devices			
(m)	Earth-fault trip devices			
(n)	Timing devices			
(o)	Temperature-sensing devices			
(p)	Transformer connections, bolts, tapes. bracing, insulators and fittings, etc.			
(q)	Installation			
(r)	Machine cables and glands			

Details of repair or modification (attach extra pages if required):

Results of insulation resistance tests on transformers:

Transformers ratio:…….. Capacity:……. Serial no.:……

Manufacturer:…….. Type of cooling:……

Tested with:……. V (megohmmeter)

Primary winding to secondary winding:…… MΩ

Primary winding to earth:…….. MΩ

Secondary winding to earth:…….. MΩ

Earth continuity of earth screen to core:……

Continued….

REPAIR AND EXAMINATION REPORT FOR ELECTRICAL EQUIPMENT INSTALLED WITHIN FLAMEPROOF ENCLOSURE (EX'd')

Assembled unit tested for insulation resistance with: V megohmmeter, and power frequency tested on the following circuits:

Circuit description	Insulation resistance MΩ	Test voltage kV	Test frequency Hz	Result

Certification no(s).……..
……
Remarks:……
……
……
……
……
……

I,…….confirm that the above equipment, repaired/overhaul/modified (strike out whichever is not applicable) as above, complies/does not comply with the relevant requirements of AS/NZS 3800 (including markings as required by Appendix D) and AS……..and that this Report has been recorded in the logbook of the service facility.

Sign:…… Date:…../……/……

REPAIR AND EXAMINATION REPORT FOR FLAMEPROOF ENCLOSURE (EX'd')

General

Tag no.:	Site:
P&ID:	Area Classification:

Equipment Details

Equipment type:	Gas group (IIA/B/C):
Manufacturer:	Temp class (T1-T6):
Model no.:	Certificate no.:
Serial no.:	Test authority:

Operator

Name:	Identification no.:
Company:	Company registration:

Equipment Condition Checklist

Item	Description of check	Remarks
(a)	Check of external and internal damage	
(b)	Dimensional check	
(c)	Corrosion on flamepaths	
(d)	Result of static pressure test	
(e)	Check of flanged joint surfaces	
(f)	Check of all threaded holes	
(g)	Check of all windows and lenses	
(h)	Check of breathers	
(i)	Check of all bolt holes, studs, screws,	
(J)	Check of all gland entries and fixing	
(k)	Check of all cables glands	
(l)	Check of all handhole and inspection	
(m)	Check of all mechanical interlocks	
(n)	Check of all flamepath gaps	

Main control panel

1. Max. out of plane of box flanges:……
2. Max. out of plane of cover:……
3. Max. flameproof gap when bolted up:……
4. Max. diametral clearance of spindles:……
5. Max. diametral clearance of gland to gland apertures:……
6. Static pressure test – pressure:……
7. Water jacket – pressure test:……Capacity:……

Certification drawing no(s).:……

Remarks:……
……
……

I,……confirm that the above equipment, repaired/overhaul/modified (strike out whichever is not applicable) as above, complies/does not comply with the relevant requirements of AS/NZS 3800 (including markings as required by Appendix D) and AS…….and that this Report has been recorded in the logbook of the service facility.

Sign:…… Date:…../……/……

12 Schedule of Equipment and Conditions Requiring Compliance Status Attention

Tag	P&ID No.	Location	Reason for non-compliance
AD00-ZSO/ZSC-005	AD00-2-7004	Flow meter and pressure control skid	Certification is not suitable to be used in Australia.