Luggage Point STP
Manufacturers Data Report
and O&M

Contract No: C1314-20
Evoqua Ref: 1515-000002-MDR-002

ISSUE	DESCRIPTION	ISSUED BY	DATE	APPROVED BY	DATE
0	First Issue	JJ	8/05/2015	EA	15/05/2015

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1 Introduction

Evoqua Water Technologies have designed, supplied and installed new, above ground DN500 PE pipework at the MF/RO Product water pumps at Luggage Point STP, together with replacement of isolation butterfly valves and replacement of the transfer pumps, as part of the Contract C1314-20 Miscellaneous Works at Lugagge Point.

Butterfly Valves

Make and Model	Challenger USSE450 -SBWG02-1S IQ12 415VAC USSE500-SBWG02
Valve Size and Class	DN450 , DN500 – manual only
Valve Type	Lugged , Conforming to AS 4795.1
Material: - Body - Disc - Shaft - Seal	 Ductile Iron 316 SS 316SS EPDM
End Connection	AS 4087, PN16
Actuator	Rotork, IP68 suitable for immersion

The new DN500 PE pipework was installed from the pit to Product water pump above ground. Reinforced concrete slab was installed to support the pipework. Adjustable sliding pipe support brackets were installed. Periodic inspection of the ground settlement and height adjustment may be required. Please refer to notes on dwg : 468/5/8/-0358-001 Sheet 1 Rev 1. To compensate for lateral and axial movement, as well as thermal expansion of the new pipework, one DN500 stainless steel below is installed. Additional bulkhead pipe support was constructed at the pumps end. For detail, please refer to dwg : 468/5/8/-0358-001 Sheet 1 Rev 1.

The new pumps were installed in place of old pumps and are specified below:

Pump Make and Model	Southern Cross ISO – Pro 250x200-315
Impellor Size	342 nominal, trimmed to 315mm for 185L/s duty
Material	Impellor :316 stainless steel Seat: SiC/SiC/Viton; O ring Viton
Internal Coating	All wetted parts 316 stainless steel
Flanges	AS2129 Table E
Motor Make and Model	CMG, 55kW, High Efficiency, IP56 Mining Specification

A-1 Inspection and Test Plans

INSPECTION AND TEST PLAN

EVOQUA

Evoqua Water Technologies Pty Ltd
A.B.N. 52 165 060 168
160 Herring Rd ,
Macquarie Park NSW 2113
Ph: 1300 661 809

PROJECT: Replacement of MF,RO Membranes & Misc Works at Luggage Point and Wynnum Sewage Treatment Plants

COMPONENT/PROCESS: Membrane Replacement

CONTRACT NO: C1314-20

EWT REFERENCE: 1515-000002

LEGEND:
W = Witness A= Approve
V = Visual Check
R = Review
H = Hold
S = Surveillance Point

SHEET 1

DOCUMENT NUMBER 1511/000002-ITP-001

DATE	DESCRIPTION	PREPARED	APPROVED	Revision
11/02/2015	First Revision	AJ	EA	0

NOTES:
1. CLIENT TO ADVISE HOLD/WITNESS POINT PRIOR TO START.
2. ACCEPTANCE OUTCOME COLUMN TO BE INITIALLED BY INSPECTOR FOLLOWING COMPLETION OF EACH ACTIVITY.
3. RELEVANT EWT AND CLIENT SPEC'S TO BE READ IN CONJUNCTION WITH THIS I.T.P.

No	INSPECTION ACTIVITY	INSPECTION PROCEDURE	APLICABLE STANDARD, SPEC, DRAWING	ACCEPTANCE CRITERIA	INSPECTION TYPE				INSPECTION APPROVAL / SIGN OFF				REMARKS
					End User	Client	EWT	Subcont	End User	Client	EWT	Subcont	
1	Good Receival												
1.1	Specification	Review Specification and Scope of Works	Contract C1314-20	Scope of works defined			R				AJS		
1.2	Place Order for RO and UF Membranes	Order mebranes. Check Order confirmation	Relevant Purchase Order	Orders as per scope of works							AJS		
1.3	Receive RO Membranes	Check delivery for any visisble faults or damage. Check against order	Relevant Purchase Order	Membranes in good condition and as per order			V				AJS		
1.4	Receive MF Membranes	Check delivery for any visisble faults or damage. Check against order. Check temperature log and shock switches if present	Relevant Purchase Order	Membranes in good condition and as per order			V				AJS		
2	UF Membrane Change												
2.1	Collect MF Performance Data	Data to be provided to EWT from SCADA logs and manual logs	per QUU Standard	Data in useable format			R				AJS		
2.2	Perform CIP on MF Membranes	Clean UF membranes directly prior to removal	MF Unit Standard Operation	Verification of CIP			S				AJS		
2.4	Remove MF Modules (Keep 2 for Autopsy)	Remove and Dispose of UF Membranes	MGS00omm01_05	Modules Removed			S				AJS		
2.5	Replace MF Modules	Replace Modules as per installation guide	MGS00omm01_05	Modules replaced as per Memcor installation guide			S				AJS		
2.7	Run MF Check PDT and other critical processes	Recommission UF Units	MF Unit Standard Operation	UF Operating to expected parameters		W					AJS		PDT 0.19 & PDT 0.2
3	RO Membrane Change												
3.1	Collect RO Performance Data	Data to be provided to EWT from SCADA logs and manual logs	per QUU Standard	Data in useable format			R				AJS		
3.2	Perform CIP on RO Membranes	Clean UF membranes directly prior to removal	RO Unit Operation	Verification of CIP		W					AJS		
3.4	Remove RO Modules	Remove and Dispose of UF Membranes	Filmtec Data Sheet BW 30 400FR	Modules Removed			S				AJS		
3.5	Replace RO Modules	Replace Modules	Filmtec Data Sheet BW 30 400FR	Modules replaced as per Memcor installation guide			S				AJS		
3.7	Restart RO	Restart RO and check pressure dorp and permeate conductivity	RO Unit Operation	UF Operating to expected parameters		W					AJS		
4	Disposal												
4.1	Dispose of all membranes in approved landfill	Disposal off site to be by liscenced contractor	AJS				S				AJS		
4.2	Receive goods disposal confirmation	Receive document confirming propoer disposal		Document Received			S						N/A

Inspection and Test check list – HDPE LINES

Job name: 096 Luggage Point **Customer: Evoqua**	Description of Work: SUPPLY AND INSTALLATION OF Raw Water Pipe and rafting Slab Location: Luggage Point	ITP number: 1

Inspection/ Test actions		Abbreviations used to describe inspection / test records	
(H)	Hold	MC	Material Certificates (Concrete etc)
(W)	Witness	PO	Purchase Order
(M)	Monitor	CKL	Checklist
(D)	Dimension	CC	Certificate of Compliance
(V)	Visual check	TC	Test Certificate
(R)	Document review		

I/T number	Inspection / Test Description	Frequency of inspections / tests	Drawing / Specification Reference	Inspection / Test Action, name, initial and date of initial			Inspection / Test Record	Sign Off
				Site Supervisor	Superintendent	End Customer		
1	Notification of Intention to Commence	Prior to Sewer Works	Drawing No:	(W)	(W)	(W)	Site Record – Daily Diary	
2	Excavation correct position and finish levels	Ongoing during excavation and final check	Drawing No:	(M, D)			Site Record	
3	Subgrade to correct Specification	2 Tests	98% MDD	(D, M)			Compaction TEst	
4	Reinforcemnt as per plan	Prior to pour	Drawing No	(W)			Photos	
5	Concrete To Correct Specification	1 Test	40MPA	(D, M)			Delivery Dockets, CCC Test results	
6	Brackets and Hardware to correct Spec	Arrival Inspection	Drawing No	(W)			Delivery Dockets	
7	Brackets to correct Positions	On going	Drawing No	(W)			As Con drawings	
8	HDPE Pipe Material Correct	Arrival Inspection	Drawing No	(W)			Delivery Dockets	

9	On Site Welding to WASA SPEC	Test Log on completion	WASA CODE 1	(W)			Weld Logs	
10	Flange Connection Integrity	Each Flange	Wasa Code 1	(W)			Photos, Test Record	
11	Pump Commisioning	COmmisioning Test	Pump Commisioning Manual	(W)			Test Certificate	

Final inspection by Site Supervisor:
Section of Works completed as per inspection and test Check List:

Name: Signature: Date:

Supporting Information Register :

B-1 Material Reports and Certificates

Holcim

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www.holcim.com.au

Concrete Delivery Docket

21375332

WARNING WORK SAFELY WITH CONCRETE

WET CONCRETE MIX. A splash of concrete into the eyes can cause serious eye injury and blindness. Wear eye protection (AS/NZS 1337) when handling wet concrete. Direct contact with wet concrete will irritate your skin and can cause dermatitis and severe chemical (caustic) burns. Do not kneel or rest any part of your body on wet concrete or wet concrete surfaces. Wear gloves (AS 2161) and protective clothing and change if they become wet from concrete. Special protective equipment may be required depending on the application, e.g. concrete pumping may require a face shield or sealed goggles.
FIRST AID: Eyes – flush with plenty of water for at least 15 minutes.
Skin – remove soaked clothing and wash thoroughly.
HARDENED CONCRETE: If you cut, drill, saw, chase, sand, grind or break up hardened concrete, concrete dust containing crystalline silica may be released. National Exposure Standard for Respirable Crystalline Silica must be complied with. Breathing Crystalline Silica dust repeatedly may lead to lung diseases including bronchitis and silicosis. Breathing heavy concentrations of concrete dust may cause coughing and sore throat. Wear an approved P2 dust mask (AS/NZS 1715/1716) when exposed to concrete dust. Dust may irritate the eyes: wear eye protection (AS/NZS 1337).
To stop dust build up regularly wet and sweep up or vacuum and put dust in a covered container.
DISPOSAL: Follow local authority guidelines for getting rid of waste.
See Holcim Premixed Concrete Material Safety Data Sheet for more information – available at this website address: www.holcim.com.au
September, 2009

TAX INVOICE
Total price includes GST for COD only
Holcim (Australia) Pty Ltd ABN 87 099 732 297

Date	Command Job No./ZMAD SAP Quote No.	Plant	Plant No.	DOCKET No.

Customer No.	Customer Name	Time Printed	Time Batched

Delivery Address / Instructions	Customer Purchase Order No.	Post Code	End Use	Mkt Seg

Total Order M³	Progressive M³	This Load M³	Truck No.	Klm / Zone / Map Ref.	Hash Total	Design Slump	Actual Slump

Material Code / Strength MPa	Mix Description	COD Unit Price	GST Inc COD Total

EXTRA PRODUCTS, SURCHARGES AND MERCHANDISING

Material Code	Description/UOM	Quantity	COD Unit Price

CASH SALES ONLY

Received the sum of $	Received by (Driver to sign)	Total COD Price (This Docket)
Cash ☐ Cheque ☐ Credit Card ☐	Received by (Plant to sign)	Total COD Progressive

Comments

CUSTOMER SERVICE PH

WAITING TIME		WATER ADDED		RETURNED CONCRETE			
Arrive job site		Batch + Moisture		Quantity delivered		Cart Chg $/Unit	
Time finished		Slump stand		Quantity returned		Cart Pay $/Unit	
		On site		Return kilometres		Minimum Cartage	
Chargeable waiting time		Customer's request				Order Distance km	
Payable waiting time		Max. water		ENVIRONMENTAL DISPOSAL FEES APPLY		In Plant Mix	

Customer signature	Driver signature	Kerb line crossed - clause 9 (overleaf) accepted Customer signature
Print name	Print name	Print name

Signed by or on behalf of the Customer who accepts the products, service and charges detailed above, and the Terms of Sale referred to overleaf; and who acknowledges the Safety Warning above.
White – Signature Copy Blue – Customer Copy Green – Driver's Copy Yellow – Plant Copy

SOIL, AGGREGATE & CONCRETE TESTING
SES
Soil Engineering Services
P.O. BOX 7760, GARBUTT B.C. Q. 4814. PHONE: (07) 4774 7888. FAX: (07) 4774 7677
ses01@bigpond.com

Dry Density Ratio Report

Client :	GNM Drainage	Report Number:	TS16908 - 1
Address:	PO BOX 423 Deeragun QLD 4818		
Job Number :	TS16908	Report Date :	26/02/2014
Project :	Luggage Point MFRO	Order Number:	
Location :	Pinkenba Brisbane	Test Methods:	AS1289.2.1.1/5.4.1/5.8.1

Lab No :	B51598	B51599	B51600	
Test No :	-	-	-	
Lot No :	-	-	-	
Item No :	063/3688	063/3688	063/3688	
Date Sampled :	26/2/2014	26/2/2014	8/3/2014	
Date/Time Tested :	3/3/2014 / -	3/3/2014 / -	3/3/2014 / -	
Material Source :	Natural	Natural	Natural	
For Use As :	Building Platform	Building Platform	Building Platform	
Sample Location :	Pform: Main Slab Pump end Layer: 150mm Desc: Silty Gravely Clay, Brown	Pform: Main slab Pit end Layer: 150mm Desc: Silty Gravely Clay, Brown	Pform: Manifold Slab Layer: 200mm Desc: Sand and Shot rock drainage base	
Test/Layer Depth (mm)	150 / 125	150 / 125	150 / 125	
Max Size (mm) :	19	19	50	
Oversize Wet (%) :	1	-	-	
Oversize Dry (%) :	1	-	-	
Field Moisture (%) :	9.3	9.9	19.1	
MDR Taken:	After Compaction	After Compaction	After Compaction	
MDR No :	B51598	B51599	B51600	
Assigned MDR :	No	No	No	
Field Wet Density (t/m^3)	2.12	2.15	2.13	
Field Dry Density (t/m3)	1.94	1.96	1.96	
MDD (t/m3) :	1.94*	1.95	1.95	
OMC (%) :	12.0	12.0	11.5	
Variation from OMC	2.5% dry of omc	2% dry of omc	2.5% dry of omc	
Compactive Effort :	Standard	Standard	Standard	
Moisture Ratio / Spec(%) :	77.5 / -	83.0 / -	88.0 / -	
Dry Density Ratio (%) :	100.0	100.0	98.5	
Min Dry Dens Ratio (%)	98	98	98	

Remarks :

* - Denotes corrected for oversize

NATA WORLD RECOGNISED ACCREDITATION	Accredited for compliance with ISO/IEC 17025.	APPROVED SIGNATORY Matt McCarthy NATA Accred No:2856	FORM NUMBER REP ANUC-1-48

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Concrete Delivery Docket

21426133

WARNING WORK SAFELY WITH CONCRETE

WET CONCRETE MIX: A splash of concrete into the eyes can cause serious eye injury and blindness. Wear eye protection (AS/NZS 1337) when handling wet concrete. Direct contact with wet concrete will irritate your skin and can cause dermatitis and severe chemical (caustic) burns. Do not kneel or rest any part of your body on wet concrete or wet concrete surfaces. Wear gloves (AS 2161) and protective clothing and change if they become wet from concrete. Special protective equipment may be required depending on the application, e.g. concrete pumping may require a face shield or sealed goggles.
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September, 2009

TAX INVOICE
Total price includes GST for COD only
Holcim (Australia) Pty Ltd ABN 87 099 732 297

Plant No.	DOCKET No.
5168	16877133

Date	Command Job No./ZMAD SAP Quote No.	Plant
02-Apr-15	1069	BRISBANE CITY

Customer No.	Customer Name	Time Printed	Time Batched
541389	GNM GROUP (QLD) PTY LTD	12:52	

Delivery Address / Instructions: PINKENBA 200 MAIN BEACH RD

Customer Purchase Order No.: 0228

Post Code	End Use	Mkt Seg

Total Order M³	Progressive M³	This Load M³	Truck No.	Klm / Zone / Map Ref.	Hash Total	Design Slump	Actual Slump
1.20	1.2	1.2	6655	9	BR122K16	100	

Material Code / Strength MPa	Mix Description	COD Unit Price	GST Inc COD Total
DN402T100	N40 20mm 100mm SLUMP CONCRETE		

EXTRA PRODUCTS, SURCHARGES AND MERCHANDISING

Material Code	Description/UOM	Quantity	COD Unit Price	

CASH SALES ONLY

Received the sum of $	Received by (Driver to sign)	Total COD Price (This Docket)	
Cash ☐ Cheque ☐ Credit Card ☐	Received by (Plant to sign)	Total COD Progressive	

CUSTOMER SERVICE PH

Comments: PREVIOUS TRUCK:

WAITING TIME		WATER ADDED		RETURNED CONCRETE			
Arrive job site		Batch + Moisture		Quantity delivered		Cart Chg $/Unit	
Time finished		Slump stand	20	Quantity returned		Cart Pay $/Unit	
		On site		Return kilometres		Minimum Cartage	
Chargeable waiting time		Customer's request				Order Distance km	
Payable waiting time		Max. water		ENVIRONMENTAL DISPOSAL FEES APPLY		In Plant Mix	

Customer signature	Driver signature	Kerb line crossed - clause 9 (overleaf) accepted Customer signature
Print name	Print name	Print name

Signed by or on behalf of the Customer who accepts the products, services and charges detailed above, and the Terms of Sale referred to overleaf; and who acknowledges the Safety Warning above.
White – Signature Copy Blue – Customer Copy Green – Driver's Copy Yellow – Plant Copy

3M

Scotch-Weld™

Structural Plastic Adhesive

DP-8005 Translucent • DP-8005 Black

Technical Data **September, 2010**

Product Description

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 is a two-part acrylic-based adhesive (10:1 ratio by volume) that can bond many low surface energy plastics, including many grades of polypropylene, polyethylene, and TPO's *without special surface preparation.*

Scotch-Weld Adhesive DP-8005 can replace screws, rivets, plastic welding, and two-step processes which include chemical etchants, priming or surface treatments in many applications.

Features

- Ability to Bond Dissimilar Substrates
- Ability to Structurally Bond Polyolefins
- Room Temperature Cure
- Excellent Water and Humidity Resistance
- Very Good Chemical Resistance
- One Step Process - No Pre-Treatment of the Substrates Needed
- Solvent-free Adhesive System
- Convenient Hand-Held Applicator System
- Available in Bulk

3M™ Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Typical Uncured Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Product		3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
		Translucent	Black
Color	Base (B) Accelerator (A)	Amber White	Black White
Lbs./gal.	Base (B) Accelerator (A)	8-8.4 8.75-9.15	8-8.4 8.75-9.15
Viscosity (cPs.)(1)	Base (B) Accelerator (A)	17,000-30,000 35,000-55,000	15,000-30,000 35,000-55,000
Base Resin	Base (B) Accelerator (A)	Methacrylate Amine	Methacrylate Amine
Mix Ratio (B:A)	By Volume By Weight	10:1 9.16:1	10:1 9.16:1
Full Cure Time @ 73°F (23°C)		8-24 hrs.	
Time to Handling Strength (minimum of 50 psi shear at 73°F/23°C)		2-3 hrs.	
Work Life at 73°F (23°C)		2.5-3 min.	

(1) Viscosity obtained by Brookfield, DV-II, #7 Spindle, 20 rpm at 75°F (24°C).
The accelerator formula is common to both Scotch-Weld Adhesive DP-8005 Translucent and DP-8005 Black

Typical Cured Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Product	Scotch-Weld Adhesive DP-8005	
	Translucent	Black
Color	Yellow	Black
Shore D Hardness (ASTM D-2240)	55	60
Mechanical Properties(2) Strain at Peak Load Stress at Peak Load (psi) Modulus at 1% Strain (psi)	 5.3% 1889 85,669	 4.5% 1692 58,782
Tg onset (°C)(3)	33	
Coefficient of Thermal Expansion (ppm/°C)(3) Below Tg Above Tg	 125 170	

(2) Mechanical properties obtained using a Sintech 5GL Mechanical Tester. Approximate dimensions of the test specimen was 1.5" x 0.5" x 0.3". Elongation was determined by crosshead displacement. The crosshead velocity was 0.5"/min.

(3) Tg and CTE determined by TMA -40°F to 249°F (-40°C to 120°C) at 10°F (5°C)/min. (after 2 heat cycles).

3M™ Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Typical Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Overlap Shear Strength(4), tested @ 73°F (23°C)

Product	3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
	Translucent	Black
Substrate	OLS (psi)	OLS (psi)
HDPE	1100 SF	1100 SF
PE	1075 SF	875 SF
PP	1100 SF	1150 SF
UHMWPE	750 SF	750 SF
LDPE	400 SF	400 SF
ABS	1525 SF	1575 SF
Polycarbonate	850 SF	1100 AF
Plexiglass (PMMA)	950 SF	1075 SF
PVC	2050 SF	1900 SF
HIPS	550 SF	575 SF
Green FRP	2475 CF	2500 CF
PTFE	250 AF	200 AF
Polystyrene	775 SF	750 SF
Glass (3/16" thick)	650 SF	525 SF
Gel Coat (3/16" thick)	1500 SF	1425 SF
Copper (1/16" thick)	2275 CF	2050 CF
Aluminum (1/16" thick)	2275 CF	2075 CF
Cold-Rolled Steel (1/32" thick)	2500 AF	2275 CF
304 Stainless Steel (1/32" thick)	2300 CF	1100 AF
HDPE/HDG	975 SF (HDPE)	850 MM
HDPE/Galvanealed	950 SF (HDPE)	1025 SF (HDPE)
HDPE/CRS (non-abraded CRS)	950 SF (HDPE)	1025 MM
Oily HDG	2150 CF	1225 MM

SF = Substrate Failure/Break/Yield
CF = Cohesive Failure
AF = Adhesive Failure
MM = Mixed (Mode of AF and CF)

(4) Overlap Shear Test Method: Overlap shear test for adhesion determined in accordance to ASTM D1002. Sampe dimenions were 1" x 4" x 1/8" (unless other thicknesses indicated) with an overlap area of 1" x 1/2". Plastics and glass substrates were cleansed with isopropyl alcohol (IPA) wipes; metal substrates were abraded with 150-grit sandpaper and cleansed with methyl ethyl ketone (MEK) wipes. All bonds were allowed to cure for a minimum of 48 hours at 73°F (23°C) before tested. Data were collected using a Sintech 5GL Mechanical Tester with the 2000-lb or 5000-lb load cells. Test rate was 2"/min. for plastic bonds, and 0.1"/min. for metal and glass bonds at 73°F (23°C).

3M™ Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Typical Performance Characteristics *(continued)*

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

T-Peel Strength[5], tested @ 73°F (23°C)

Product	3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
Substrate	**Translucent**	**Black**
HDPE	17 pli SF	9 C sh

SF = Substrate Failure/Break/Yield
C sh = Cohesive but shocky

(5) Peel tests on 0.02" thick HDPE, 0.017" bondline thickness, 8" x 1" in T-peel mode at a rate of 2.0"/min.

Environmental & Chemical Exposure Test on HDPE[6]
All Exposure Times 14 Days Unless Otherwise Noted
All Temperatures are Room Temperature Unless Otherwise Noted

Product	Scotch-Weld Adhesive DP-80005	
	Translucent	**Black**
Condition	**Overlap Shear (psi)**	**Overlap Shear (psi)**
Control - no chemical exposure	1100 SF	1100 SF
160°F (71°C)/100% RH	950 MM	950 MM
160°F (71°C) Water Soak	975 CF	1000 SF
Room Temperature Salt Water Soak (5% by wt.)	1100 SF	975 SF
160°F (71°C)/100% RH Salt Water Soak (5% by wt.)	925 CF	925 CF
NaOH (10% by wt.)	1075 SF	1025 SF
HCl (16% by vol.)	1100 SF	1000 SF
Isopropyl Alcohol	950 SF	1000 SF
Antifreeze Coolant	1000 SF	1025 SF
Gasoline	325 CF	450 CF
Diesel Fuel	1050 SF	950 SF
Toluene	25 CF	50 CF
Acetone	100 CF	200 CF

SF = Substrate Failure/Break/Yield
CF = Cohesive Failure
AF = Adhesive Failure
MM = Mixed (Mode of AF and CF)

(6) Environmental tests were conducted by immersing bonded coupons of HDPE and subsequent testing in accordance with footnote 4.

OLS Bond Strengths at Elevated Temperatures[7]

Product	Scotch-Weld Adhesive DP-8005			
Test Temperature	**Translucent (HDPE)**	**Black (HDPE)**	**Translucent (Green-FRP)**	**Black (Green-FRP)**
-20°F (-29°C)	750 CF	875 CF	975 AF	900 AF
73°F (23°C)	1100 SF	1100 SF	2475 AF	2450 AF
120°F (49°C)	700 CF	700 CF	1875 MM	1550 MM
150°F (66°C)	500 CF	475 MM	1150 MM	1025 MM
180°F (82°C)	300 CF	300 MM	750 MM	975 MM

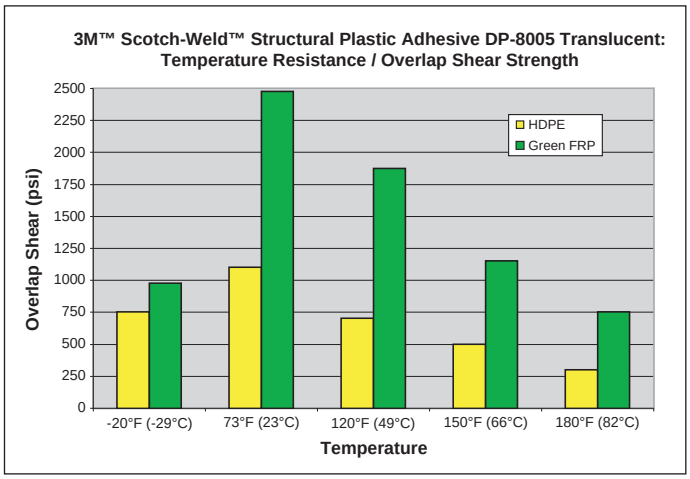
OLS bond strength expressed in psi.
SF = Substrate Failure/Break/Yield
CF = Cohesive Failure
AF = Adhesive Failure
MM = Mixed (Mode of AF and CF)

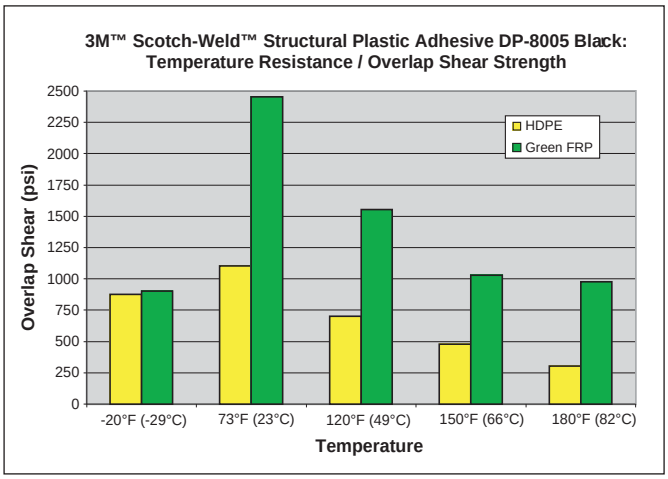
(7) Temperature resistance tests were conducted at specified temperature in accordance with footnote 4.

3M™ Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Temperature Resistance

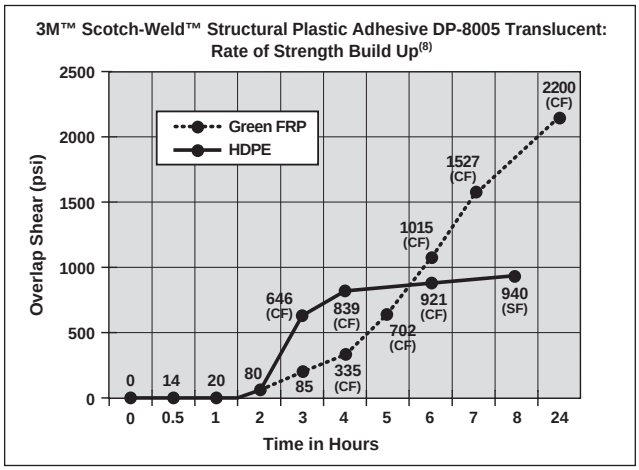
Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

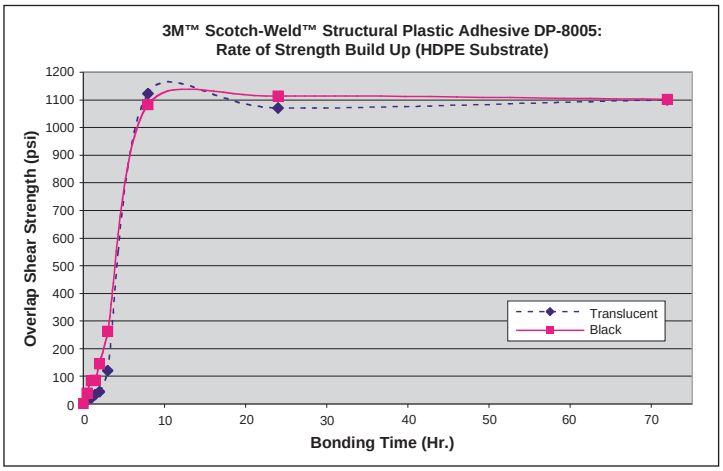




Typical Rate of Strength Build-Up(8)

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.



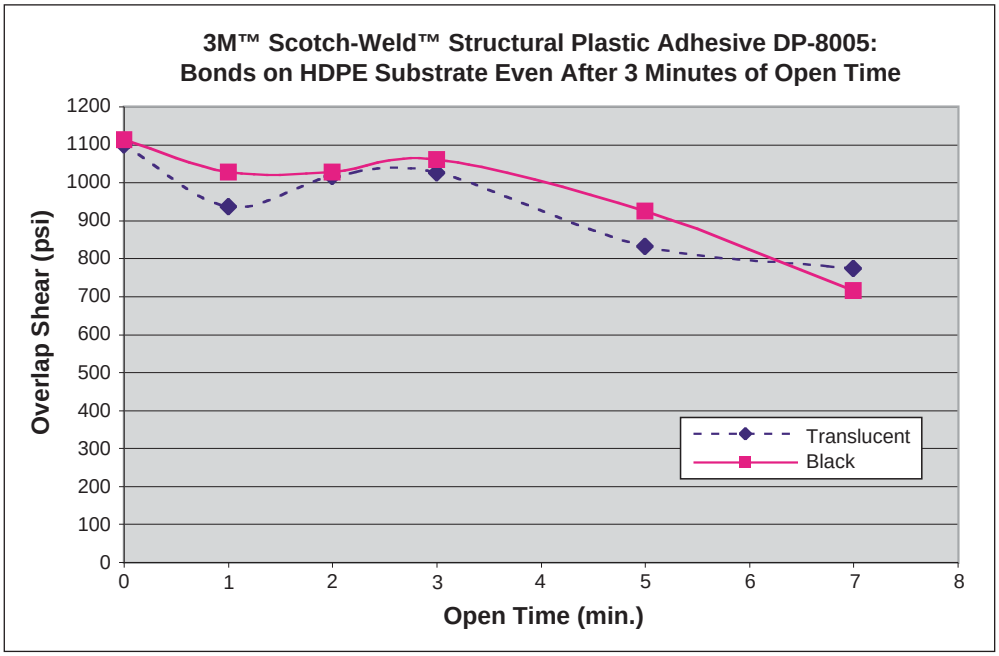


(8) Rate of strength testing done using overlap shear test described in footnote 4.

3M™ Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Times and Substrates[9]

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.



(9) Open Time Overlap Shear Test done using test method described in footnote 4.

Suggested Substrates

Note: The following suggestions are based on laboratory tests on typical grades of the listed substrates. Because of the many combinations of process aids and additives that are used with plastic substrates, the user is responsible for determining whether 3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 is appropriate for a given application.

Potential Primary Surfaces	Polypropylene (PP) Polyethylene (PE, HDPE, LDPE)	
Potential Secondary Surfaces	Fiber Reinforced Plastic (FRP) Polycarbonate (PC) Wood Aluminum Glass Thermoplastic Elastomers (TPE)	PVC ABS Acrylic (PMMA) Polystyrene Concrete Metals
Not Recommended Surfaces Inconsistent results have been exhibited with substrates that contain oils and anti-stats.	PTFE Silicone Surfaces Surfaces Containing Mold-Release Agents Polyimide Nylons	

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Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Handling/Curing Information

Directions for Use:

Important: Use only the specified 3M™ EPX™ Plus II Applicator system or appropriate meter mix equipment to ensure the proper 10:1 mix ratio and mix. Hand mixing is not recommended and may result in unpredictable results.

1) Apply adhesive to clean, dry substrates, which are free of loose paint, oxide films, oils, dust, mold release agents and all other surface contaminants. See the Surface Preparation section for specific substrate preparation methods.

   35 ml Cartridge:

   Place duo-pak cartridge in EPX applicator. Remove cap. Remove rubber plug. Dispense and discard a small amount of adhesive to assure even ratio and free flow. Clear orifice if necessary. Use only orange 10:1 mixing nozzle by: (a) aligning nozzle notch with cartridge recess, and (b) twisting into place. Dispense and discard a small amount of adhesive through nozzle until the adhesive is mixed.

   250 ml Cartridge:

   While holding duo-pak cartridge in an upright position, remove and discard the insert from the cartridge by unscrewing plastic nut and removing metal washer. Place cartridge in a 10:1, 250 ml EPX applicator.

   Clean orifice if clogged; dispense and discard a small amount of adhesive to even pistons. Attach orange 10:1 EPX mixing nozzle by:

   (a) sliding the nozzle over the cartridge orifice until the nozzle notch **aligns** and **seats** against the tab on the neck of the cartridge and;

   (b) screwing the plastic nut back onto the cartridge to secure the nozzle. Dispense and discard a small amount of adhesive until the mixed adhesive has a milky white appearance. If adhesive is clear, check the small orifice for debris or flow.

   Meter-Mix Equipment:

   Follow manufacturer's precautions, directions for use, and recommendations.

2) After the adhesive is applied, substrates must be mated within the worklife of the adhesive, 2-2.5 minutes or sooner for one-sided applications. Adhesive thickness less than .005" will yield unpredictable results. The joint design of the substrates should facilitate a .005" to .008" adhesive thickness at the bondline. Adhesive contains .008" micropheres for this purpose.

3) The bonded surfaces should be fixtured, or clamped, for at least 2 hours. The clamping pressure should be sufficient to keep the surfaces in contact during cure (typically 4-8 psi). Plastic parts can be designed to be self-fixturing, negating the need for external fixturing.

   Note: Heating the bondline to 150-175°F (66-80°C) for 30 minutes will speed up curing. The parts should be dwelled for a minimum of 10 minutes at room temperature prior to heating to allow more adhesive penetration into the substrates before heat-accelerated cure.

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Handling/Curing Information *(continued)*

4) Cured adhesive appearance: the adhesive will yellow with time; a rippling effect in the adhesive as it cures is normal and indicates that the adhesive is mixed properly and curing normally.

Approximate Coverage – By Size of Container [Figures do not include nozzle waste]

Bead Size	Linear ft per 35 ml	Linear ft per 250 ml	Linear ft per mixed gallon
1/2"	1.8	12.9	196
3/8"	3	23	350
1/4"	7	51.8	785
1/8"	28.9	206.7	3,130
1/16"	114.8	820	12,240

Coverage in square feet – (.008" bond line) [Figures do not include nozzle waste]

Square ft per 35 ml	Square ft per 250 ml	Square ft per mixed gallon
2	13	200

Surface Preparation

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 can bond polypropylene, polyethylene and other thermoplastic polyolefins without special surface preparation. However, all substrates should be clean, dry and free of paint, oxide films, oils, dust, mold release agents and other surface contaminants. The amount of surface preparation directly depends on the bond strength and environmental resistance desired by the user.

The following cleaning methods are suggested for common surfaces.

Steel and Aluminum

1) Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol.
2) Sandblast or abrade using clean fine grit abrasives (150 grit or finer).
3) Wipe again with solvent to remove loose particles.
4) If a primer is used, it should be applied within 4 hours after surface preparation (or see instructions pertinent to a specific primer).

Note: Aluminum may also be acid etched. Follow the manufacturer's precautions and directions for this procedure.

Plastic/Rubber

1) Wipe with isopropyl alcohol.*****
2) Abrade using fine grit abrasives (150 grit or finer).
3) Remove residue by wiping again with isopropyl alcohol.*****
4) Allow solvent to evaporate before use.

***Note:** When using solvents, be sure to extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

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Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Surface Preparation *(continued)*

Thermoplastic Polyolefin (TPO)

1) Wipe with isopropyl alcohol.*****
2) Allow solvent to evaporate before use.

Glass

1) Solvent wipe surface using acetone or isopropyl alcohol.*****
2) Allow solvent to evaporate before use.

***Note:** When using solvents, be sure to extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

Storage

For maximum shelf life, store duo-pak cartridges and bulk containers at 40°F (4°C) or below.

Shelf Life

When stored at the recommended temperatures in the original unopened containers, this product has a shelf life of six months from date of shipment.

Precautionary Information

Refer to Product Label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577 or (651) 737-6501.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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Unless an additional warranty is specifically stated on the applicable 3M product packaging or product literature, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability

Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

ISO 9001:2000

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001:2000 standards.

3M

Industrial Adhesives and Tapes Division
3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (Fax)
www.3M.com/industrial

Recycled Paper
40% pre-consumer
10% post-consumer

C-1 Hydrostatic Test Certificate

TESTING REPORT - WATER

PROJECT	LUGGAGE POINT WORKS
CLIENT	EVOQUA
	PRODUCT WATER LINES
SPEC	WASA 1
DETAILS	**MAIN LINE**
	INITIAL PRESSURE 1200 KPA
	TEST TIME 1 hr
	ALLOWABLE PRESSURE DROP 100 KPA
	NO LEAKS TO BE OBSERVED

SECTION TESTED	MAIN LINE PUMP 1 and 2	
PRE TEST		
DATE	18/03/15	
TIME	12.15	
TEST RESULT	5kPo DROP 1hR	
PASS/FAIL	PASS	
COMMENTS	SYSTEM OK	
ACCEPTANCE TEST		
DATE	18/03/15	
TIME	13.15 - 14.15	
TEST RESULT	0 kPo DROP	
PASS/ FAIL	PASS	
INSPECTOR APPROVAL		
GNM APPROVAL		

CHALLENGER VALVES AND ACTUATORS

TEST CERTIFICATE ISO 5208

DATE	05/03/15	CERTIFICATE NUMBER	O/N	4500679672

Valve		CHALLENGER BUTTERFLY VALVE		
	Figure No.	WSSE _ WSSN _ LSSE _ LSSN _ USSE ✓ USSN _	Serial Number	103942
	NB Size MM	50 _ 65 _ 80 _ 100 _ 125 _ 150 _ 200 _ 250 _ 300 _ 350 _ 375 _ 400 _ 450 ✓ 500 _ 600 _		
Design	Double Flanged ✓	Wafer _	Lugged ✓	
Actuation	Lever _	Gearbox _	ISO Shaft ✓	

VALVE PRESSURE TEST RESULTS

Pressure Test Results	Shell Barg	Seat Barg	Tested /Passed By
	Pass	Pass	NM

TABLES IN ACCORDANCE WITH ISO 5208

SHELL TEST			SEAT TIGHTNESS TEST		
Shell Test in Accordance to ISO 5208 Table 2	Duration	Shell Test Pressure	Seat Test in Accordance to ISO 5208 Table 4	Duration	Pressure in Accordance to ISO 5208 Table 1
Size DN	Seconds	Barg	Size DN	Seconds	Barg
≤ DN 50	15	24	≤ DN 50	15	17.6
≥ DN 65	60	24	≥ DN 65	15	17.6
≤ DN300	60	24	≤ DN200	15	17.6
≥ DN350	180	10	≥ DN250	30	17.6
			≤ DN450	30	11.0
			≥ DN 500	60	11.0

SHELL TEST METHOD

Shell test using water at a pressure of 1.5 times, the maximum permissible working pressure at 20°C. (clause 3.1 ISO 5208).

The shell test shall be performed by applying the specified pressure in Table 2. Inside the assembled valve with ends capped or plugged, the valve partially closed and the packing gland sufficiently tight to maintain the tested pressure.

SEAT TIGHTNESS TEST METHOD

Valves shall be in the closed position, the seat tightness test shall be performed by applying the specified pressure in Table 1 and the test duration in accordance with Table 4.

Test Medium: Water

CHALLENGER VALVE MATERIALS

Valve Materials	1. Body	Ductile Iron , ASTM A536 65-45-12
	2. Seat	EPDM Food Grade or NBR (Nitrile) AS1646, AS681.1
	3. Disc	Stainless Steel ASTM A351 CF8M
	4. Stem	Stainless Steel ASTM A276
	5. Steam Seal	NBR (Nitrile) AS1646, AS681.1
	6. Stem Bush	Delrin ASTM D6778-06
	7. Retaining Washer	Steel
	8. Circlip	Steel
	9. Lever	Ductile Iron , ASTM A536 65-45-12
	10.Gearbox	Cast Iron ASTM A126 Class B

Document Q33 Revision Date: 06.12.11

CHALLENGER VALVES AND ACTUATORS

TEST CERTIFICATE ISO 5208

DATE	05/03/15	CERTIFICATE NUMBER	O/N	4500679672

Valve		CHALLENGER BUTTERFLY VALVE		
	Figure No.	WSSE _ WSSN _ LSSE _ LSSN _ USSE ✓ USSN _	Serial Number	103941
	NB Size MM	50 _ 65 _ 80 _ 100 _ 125 _ 150 _ 200 _ 250 _ 300 _ 350 _ 375 _ 400 _ 450 ✓ 500 _ 600 _		
Design	Double Flanged ✓	Wafer _	Lugged ✓	
Actuation	Lever _	Gearbox _	ISO Shaft ✓	

VALVE PRESSURE TEST RESULTS

Pressure Test Results	Shell Barg	Seat Barg	Tested /Passed By
	Pass	Pass	NM

TABLES IN ACCORDANCE WITH ISO 5208

SHELL TEST			SEAT TIGHTNESS TEST		
Shell Test in Accordance to ISO 5208 Table 2	Duration	Shell Test Pressure	Seat Test in Accordance to ISO 5208 Table 4	Duration	Pressure in Accordance to ISO 5208 Table 1
Size DN	Seconds	Barg	Size DN	Seconds	Barg
≤ DN 50	15	24	≤ DN 50	15	17.6
≥ DN 65	60	24	≥ DN 65	15	17.6
≤ DN300	60	24	≤ DN200	15	17.6
≥ DN350	180	10	≥ DN250	30	17.6
			≤ DN450	30	11.0
			≥ DN 500	60	11.0

SHELL TEST METHOD

Shell test using water at a pressure of 1.5 times, the maximum permissible working pressure at 20°C. (clause 3.1 ISO 5208).

The shell test shall be performed by applying the specified pressure in Table 2. Inside the assembled valve with ends capped or plugged, the valve partially closed and the packing gland sufficiently tight to maintain the tested pressure.

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Valves shall be in the closed position, the seat tightness test shall be performed by applying the specified pressure in Table 1 and the test duration in accordance with Table 4.

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	3. Disc	Stainless Steel ASTM A351 CF8M
	4. Stem	Stainless Steel ASTM A276
	5. Steam Seal	NBR (Nitrile) AS1646, AS681.1
	6. Stem Bush	Delrin ASTM D6778-06
	7. Retaining Washer	Steel
	8. Circlip	Steel
	9. Lever	Ductile Iron , ASTM A536 65-45-12
	10.Gearbox	Cast Iron ASTM A126 Class B

Document Q33 Revision Date: 06.12.11

D-1 PE Weld Log

QA-JP-BWR-01 Butt Weld Register

Project: QUU. LUGGAGE POINT . Customer: GNM

Drawing Ref: 486/5/8 70358-002 .Pipe Line Number:

JAG POLY

QA/QC INSPECTION SHEET -Daily Butt Weld Joint Register.

RECORD SHEET	**Date:** 3-3-15 / 4-3-15				**Sheet N°** 1	
Welder Name/Number: 3636 IAN JAMES	**Welding Machine:** Make: TECNODUE. PT 500		**Protection (√)**		**Weather (√)**	
			None		Sunny	√
Inspector Name:	Serial #: 07083047	W5 W2 W3 W4 W1	Shed		Windy	
	Cyl Area: 1414		Day	Night	Rain	
			AmbTemp:	25-27	Dry	√
Material:	Polyethylene pipe PE100 500	**SDR:** 13.6				

Butt Welding Parameters (pressure in kPa, time in minutes & seconds, temperature in Celsius) 150 SLP

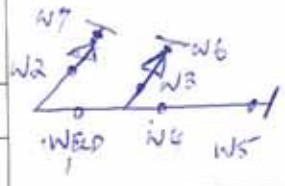
JAG Weld No.	Contract Weld N°	Pipe Size mm	Drag Press	Heater Plate Temp C°	Bead Up Press + Drag 3BAR	Soak Press + Drag	Soak Time SECS	Change Over Time	Bead Roll Over Time	Weld Press + Drag	Cooling Time	Vis. Insp	Chk'd
WELD1		500	5 BAR	225	73	5	429	8	10	73	45	√	
WELD2		500	5 BAR	225	73	5	429	8	10	73	45	√	
WELD3		500	5 BAR	222	73	5	429	8	10	73	45	√	
WELD4		500	5 BAR	223	73	5	429	8	10	73	45	√	
4-3-15		~~Test~~	JOIN PIPE ENDS.										
WELD5		500	8 BAR	226	77 BAR	8	429	8	10	75	45	√	
WELD6		500	5 BAR	222	73 BAR	8	429	8	10	75	45	√	

QA-JP-BWR-01 Butt Weld Register

Project: QLD. LUGGAGE POINT **. Customer:** GNM.

Drawing Ref: 486/5/8-0358-002 **.Pipe Line Number:**

QA/QC INSPECTION SHEET -Daily Butt Weld Joint Register.

RECORD SHEET	**Date:** 10-2-2015				**Sheet N°** 2
Welder Name/Number: 3636 IAN JAMES	**Welding Machine:** Make: TECNO DUE 630 CAR	WORK SHOT 	**Protection (√)** None		**Weather (√)** Sunny
Inspector Name:	Serial #: 0114 0002		Shed	√	Windy
	Cyl Area: 5302		Day	Night	Rain
Material: Polyethylene pipe PE100 500 /		**SDR:** 13-6	AmbTemp:	25-28	Dry

Butt Welding Parameters (pressure in kPa, time in minutes & seconds, temperature in Celsius) 180 SHP

JAG Weld No.	Contract Weld N°	Pipe Size mm	Drag Press	Heater Plate Temp C°	Bead Up Press + Drag	Soak Press + Drag BAR	Soak Time SEC.	Change Over Time	Bead Roll Over Time	Weld Press + Drag BAR.	Cooling Time MIN	Vis. Insp	Chk'd
WELD 1		500	5BAR	220	52-4	5BAR	404	—	12	52-4	16MIN	√	
WELD 2		500	5	222	52-4	5	404	—	12	52-4	16	√	
WELD 3		500	5	222	52-4	5	404	—	12	52-4	16	√	
WELD 4		500	5	223	52-4	5	404	—	12	52-4	16	√	
WELD 5		500	5	220	52-4	5	404	—	12	52-4	16	√	
WELD 6		500	5	222	52-4	5	404	—	12	52-4	16	√	
WELD 8		355	5	220	26-4	5	287	—	11	26-4	12	√	
WELD 7		355	5	220	26-4	5	287	—	11	26-4	12	√	

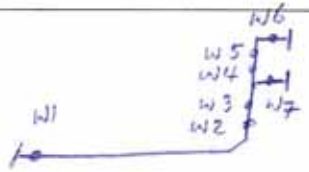
355

QA-JP-BWR-01 Butt Weld Register

Project: QLD LUGGAGE POINT. Customer: GNM

Drawing Ref: 486/5/8-0358-002 .Pipe Line Number:

QA/QC INSPECTION SHEET -Daily Butt Weld Joint Register.

RECORD SHEET	**Date:** 11-2-2015				**Sheet N°** 3
Welder Name/Number: 3636 IAN JAMES	**Welding Machine:** Make: TECNODUE. CAR 630		**Protection (√)**		**Weather (√)**	
			None		Sunny	
Inspector Name:	Serial #: 01140002		Shed	√	Windy	
	Cyl Area: 5302		Day	Night	Rain	
Material:	Polyethylene pipe PE100	**SDR:**	AmbTemp:		Dry	

Butt Welding Parameters (pressure in kPa, time in minutes & seconds, temperature in Celsius) 150 SHP

JAG Weld No.	Contract Weld N°	Pipe Size mm	Drag Press	Heater Plate Temp C°	Bead Up Press + Drag	Soak Press + Drag	Soak Time	Change Over Time	Bead Roll Over Time	Weld Press + Drag	Cooling Time	Vis. Insp	Chk'd
WELD1		500	5	222	52-4	5	404		12	52-4	16	√	
W2		500	5	222	52-4	5	404		12	52-4	16	√	
W3		500	5	223	52-4	5	404		12	52-4	16	√	
W4		500	5	223	52-4	5	404		12	52-4	16	√	
W5		500	5	222	52-4	5	404		12	52-4	16	√	
W6		500	5	222	52-4	5	404		12	52-4	16	√	
W7		500	5	220	52-4	5	404		12	52-4	16	√	

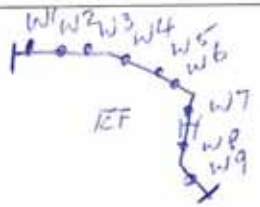
QA-JP-BWR-01 Butt Weld Register

Project: QLD Luggage Point. Customer: BNM

Drawing Ref: 486/5/8-0358-002 .Pipe Line Number:

JAG Poly Changes.

QA/QC INSPECTION SHEET -Daily Butt Weld Joint Register.

RECORD SHEET	Date: 7-3-2015				Sheet N° 4
Welder Name/Number: 3636 Ian James	Welding Machine: Make: TECNODUE. 630 CAR		Protection (√) None		Weather (√) Sunny	
Inspector Name:	Serial #: 0114 0002.		Shed		Windy	
	Cyl Area: 5302		Day	Night	Rain	
Material: Polyethylene pipe PE100 500 1"		SDR: 13.6	AmbTemp:		Dry	

Butt Welding Parameters (pressure in kPa, time in minutes & seconds, temperature in Celsius)

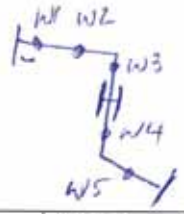
JAG Weld No.	Contract Weld N°	Pipe Size mm	Drag Press	Heater Plate Temp C°	Bead Up Press + Drag	Soak Press + Drag	Soak Time	Change Over Time	Bead Roll Over Time	Weld Press + Drag	Cooling Time	Vis. Insp	Chk'd
W1		500	5	220	52-4	5	404	—	12	52-4	16	√	
W2		500	5	225	52-4	5	404	—	12	52-4	16	√	
W3		500	5	222	52-4	5	404	—	12	52-4	16	√	
W4		500	5	220	52-4	5	404	—	12	52-4	16	√	
W5		500	5	222	52-4	5	404	—	12	52-4	16	√	
W6		500	5	222	52-4	5	404	—	12	52-4	16	√	
W7		500	5	223	52-4	5	404	—	12	52-4	16	√	
W8		500	5	225	52-4	5	404	—	12	52-4	16	√	
W9		500	5	225	52-4	5	404	—	12	52-4	16	√	

QA-JP-BWR-01 Butt Weld Register

Project: QLD. LUGGAGE POINT **. Customer:** GNM.

Drawing Ref: 486/5/8-0358 002 **.Pipe Line Number:**

QA/QC INSPECTION SHEET -Daily Butt Weld Joint Register.

RECORD SHEET	**Date:** 8-3-15				**Sheet N°** 5
Welder Name/Number: 3636 IAN JAMES	**Welding Machine:** Make: TECNODUE CAR 630		**Protection (√)**		**Weather (√)**	
			None		Sunny	
Inspector Name:	Serial #: C1140002		Shed	√	Windy	
	Cyl Area: 5302		Day	Night	Rain	
Material:	Polyethylene pipe PE100 500	**SDR:** 13.6	AmbTemp:		Dry	

Butt Welding Parameters (pressure in kPa, time in minutes & seconds, temperature in Celsius)

JAG Weld No.	Contract Weld N°	Pipe Size mm	Drag Press	Heater Plate Temp C°	Bead Up Press + Drag	Soak Press + Drag	Soak Time	Change Over Time	Bead Roll Over Time	Weld Press + Drag	Cooling Time	Vis. Insp	Chk'd
W1		500	5	220	52-4	5	404	—	12	52-4	16	√	
W2		500	5	220	52-4	5	404	—	12	52-4	16	√	
W3		500	5	220	52-4	5	404	—	12	52-4	16	√	
W4		500	5	220	52-4	5	404	—	12	52-4	16	√	
W5		500	5	220	52-4	5	404	—	12	52-4	16	√	

QA-JP-EFWR-01 Electrofusion Weld Register

JAG POLY

QA/QC INSPECTION SHEET –
Electro fusion Weld Register.

Project: QLD. LUGGAGE POINT
Drawing Ref: 486/5/8 - 0358 - 002
Pipeline Number: JAG POLY / GNM.

Welder Name: IAN JAMES
Number: 3636

Date	JAG Weld No	Contract Weld No	Welding Machine # 4	Fitting Type D	Pipe Dia- mm	SDR	Heating cycle SEC	Cooling Cycle MIN	Vis Insp.	Chk'd
11/3/15	EF1		FRIATEC	FUSION	500	13-6	1280	60	✓	IJ
13/4/15	EF2		FRIATEC	FUSION	500	13-6	1280	60	✓	IJ

EF Welding Machine

#1	Plasson	Monomatic	
#2	Plasson	Digimatic	
#3	Philmac	Calder	
#4	Philmac	Friatec	✓
#5			
#6			

Fitting

A	Plasson Litefit		
B	Plasson PN16		
C	Georg Fischer		
D	Fusion	✓	
E	Friatec		
F	Duraplas		
G	Other		

D-2 Electrical Test

E1.T039 – Low Voltage Cable

Sub System / Plant area	Product water transter pumps	Cable Number	
Project / Contract	QUU Luggage point		
Contract Number	14/309		
Client	QUU Luggage point	Department	Electrical

1. Reference Data

Cable Type	Cu/PVC/PVC Orange circular	No. of cores	3core+E	Voltage	.6/1kV
Cable size	50mm	Destination	Product water Transfer pump 1	Source	Module Control Panel
Cable Schedule		Drawing Number			

2. Installation & Equipment Checks

		Y' for Yes 'X' For No Or NA	Comment
2.1	Cable size / type as required by the cable schedule	Y	
2.2	Installed cable length	Y	
2.3	Cable support structure completed satisfactorily	Y	
2.4	Cable mechanical protection completed satisfactorily	Y	
2.5	Cable installation completed satisfactorily including correct segregation	Y	
2.6	Cable glands installed and tightened satisfactorily	Y	
2.7	Permanent cable labels attached, correct and visible	Y	
2.8	Earth (Armouring / Screen) termination's completed satisfactorily	NA	No Armouring or screen on cable
2.9	Termination's completed satisfactorily including correct polarity for type of cable and device	Y	
2.10	Core identification correct	Y	
2.11	Insulation resistance testing complete	Y	
2.12	Continuity / Resistance testing complete	Y	
2.13	Spares made off Correctly	NA	No Spares

3. Insulation test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Test Voltage	1000	**Duration in Secs**	30	**Record Readings**	

Red/White	Red/Blue	White/Blue	Red/Black	White/Black	Blue/Black	Red/Earth	White/Earth	Blue/Earth	Black/Earth
>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ	NA MΩ	NA MΩ	>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ

4. Earth Continuity test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Earth continuity reading in Ω	.22				

5. Point/point test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14

Red	White	Blue	Black	Earth
√	√	√	NA	√

6. Completion

		Y' for Yes 'X' For No Or NA	Comment
6.1	Remove all test leads and bridges	Y	
6.2	Replace all covers and check all bolts are correct and none missing	Y	
6.3	Drawings & schedules marked up to 'As Constructed' status	Y	
6.4	Are all conductors reconnected	Y	

E1.T039 – Low Voltage Cable

Sub System / Plant area	Product water transter pumps	Cable Number	

7. Comments / Remedial Action Required

Motor windings insulation resistance. U >1999 mOhm V >1999 mOhm W >1999 mOhm

Sign Off	Name	Signature	Company	Date
Remedial Action Completed				
Submitted by (PHE)	Joshua Dore		PHE	21-Apr-2015
Verified by (PHE)	Andrew Ubrihien		PHE	30-Apr-2015
Accepted by (Client)				

E1.T039 – Low Voltage Cable

Sub System / Plant area	Product water transter pumps	Cable Number	
Project / Contract	QUU Luggage point		
Contract Number	14/309		
Client	QUU Luggage point	Department	Electrical

1. Reference Data

Cable Type	Cu/PVC/PVC Orange circular	No. of cores	3core+E	Voltage	.6/1kV
Cable size	50mm	Destination	Product water Transfer pump 2	Source	Module Control Panel
Cable Schedule		Drawing Number			

2. Installation & Equipment Checks

		Y' for Yes 'X' For No Or NA	Comment
2.1	Cable size / type as required by the cable schedule	Y	
2.2	Installed cable length	Y	
2.3	Cable support structure completed satisfactorily	Y	
2.4	Cable mechanical protection completed satisfactorily	Y	
2.5	Cable installation completed satisfactorily including correct segregation	Y	
2.6	Cable glands installed and tightened satisfactorily	Y	
2.7	Permanent cable labels attached, correct and visible	Y	
2.8	Earth (Armouring / Screen) termination's completed satisfactorily	NA	No Armouring or screen on cable
2.9	Termination's completed satisfactorily including correct polarity for type of cable and device	Y	
2.10	Core identification correct	Y	
2.11	Insulation resistance testing complete	Y	
2.12	Continuity / Resistance testing complete	Y	
2.13	Spares made off Correctly	NA	No Spares

3. Insulation test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Test Voltage	1000	**Duration in Secs**	30	**Record Readings**	

Red/White	Red/Blue	White/Blue	Red/Black	White/Black	Blue/Black	Red/Earth	White/Earth	Blue/Earth	Black/Earth
>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ	NA MΩ	NA MΩ	>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ

4. Earth Continuity test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Earth continuity reading in Ω	.24				

5. Point/point test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14

Red	White	Blue	Black	Earth
√	√	√	NA	√

6. Completion

		Y' for Yes 'X' For No Or NA	Comment
6.1	Remove all test leads and bridges	Y	
6.2	Replace all covers and check all bolts are correct and none missing	Y	
6.3	Drawings & schedules marked up to 'As Constructed' status	Y	
6.4	Are all conductors reconnected	Y	

E1.T039 – Low Voltage Cable

Sub System / Plant area	Product water transter pumps	Cable Number	

7. Comments / Remedial Action Required

Motor windings insulation resistance. U >1999 mOhm V >1999 mOhm W >1999 mOhm

Sign Off	Name	Signature	Company	Date
Remedial Action Completed				
Submitted by (PHE)	Joshua Dore		PHE	21-Apr-2015
Verified by (PHE)	Andrew Ubrihien		PHE	30-Apr-2015
Accepted by (Client)				

E1.T039 – Low Voltage Cable

Sub System / Plant area	Product water transter pumps	Cable Number	
Project / Contract	QUU Luggage point		
Contract Number	14/309		
Client	QUU Luggage point	Department	Electrical

1. Reference Data

Cable Type	Cu/PVC/PVC Orange circular	No. of cores	3core+E	Voltage	.6/1kV
Cable size	50mm	Destination	Product water Transfer pump 2	Source	Module Control Panel
Cable Schedule		Drawing Number			

2. Installation & Equipment Checks

		Y' for Yes 'X' For No Or NA	Comment
2.1	Cable size / type as required by the cable schedule	Y	
2.2	Installed cable length	Y	
2.3	Cable support structure completed satisfactorily	Y	
2.4	Cable mechanical protection completed satisfactorily	Y	
2.5	Cable installation completed satisfactorily including correct segregation	Y	
2.6	Cable glands installed and tightened satisfactorily	Y	
2.7	Permanent cable labels attached, correct and visible	Y	
2.8	Earth (Armouring / Screen) termination's completed satisfactorily	NA	No Armouring or screen on cable
2.9	Termination's completed satisfactorily including correct polarity for type of cable and device	Y	
2.10	Core identification correct	Y	
2.11	Insulation resistance testing complete	Y	
2.12	Continuity / Resistance testing complete	Y	
2.13	Spares made off Correctly	NA	No Spares

3. Insulation test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Test Voltage	1000	**Duration in Secs**	30	**Record Readings**	

Red/White	Red/Blue	White/Blue	Red/Black	White/Black	Blue/Black	Red/Earth	White/Earth	Blue/Earth	Black/Earth
>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ	NA MΩ	NA MΩ	>1999 MΩ	>1999 MΩ	>1999 MΩ	NA MΩ

4. Earth Continuity test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14
Earth continuity reading in Ω	.24				

5. Point/point test

Asset Number	PHE18252	Test Equipment	KYORITSU Multi function tester		
Serial Number	8093416	Model Number	KEW 6016	Calibration date	05-Dec-14

Red	White	Blue	Black	Earth
√	√	√	NA	√

6. Completion

		Y' for Yes 'X' For No Or NA	Comment
6.1	Remove all test leads and bridges	Y	
6.2	Replace all covers and check all bolts are correct and none missing	Y	
6.3	Drawings & schedules marked up to 'As Constructed' status	Y	
6.4	Are all conductors reconnected	Y	

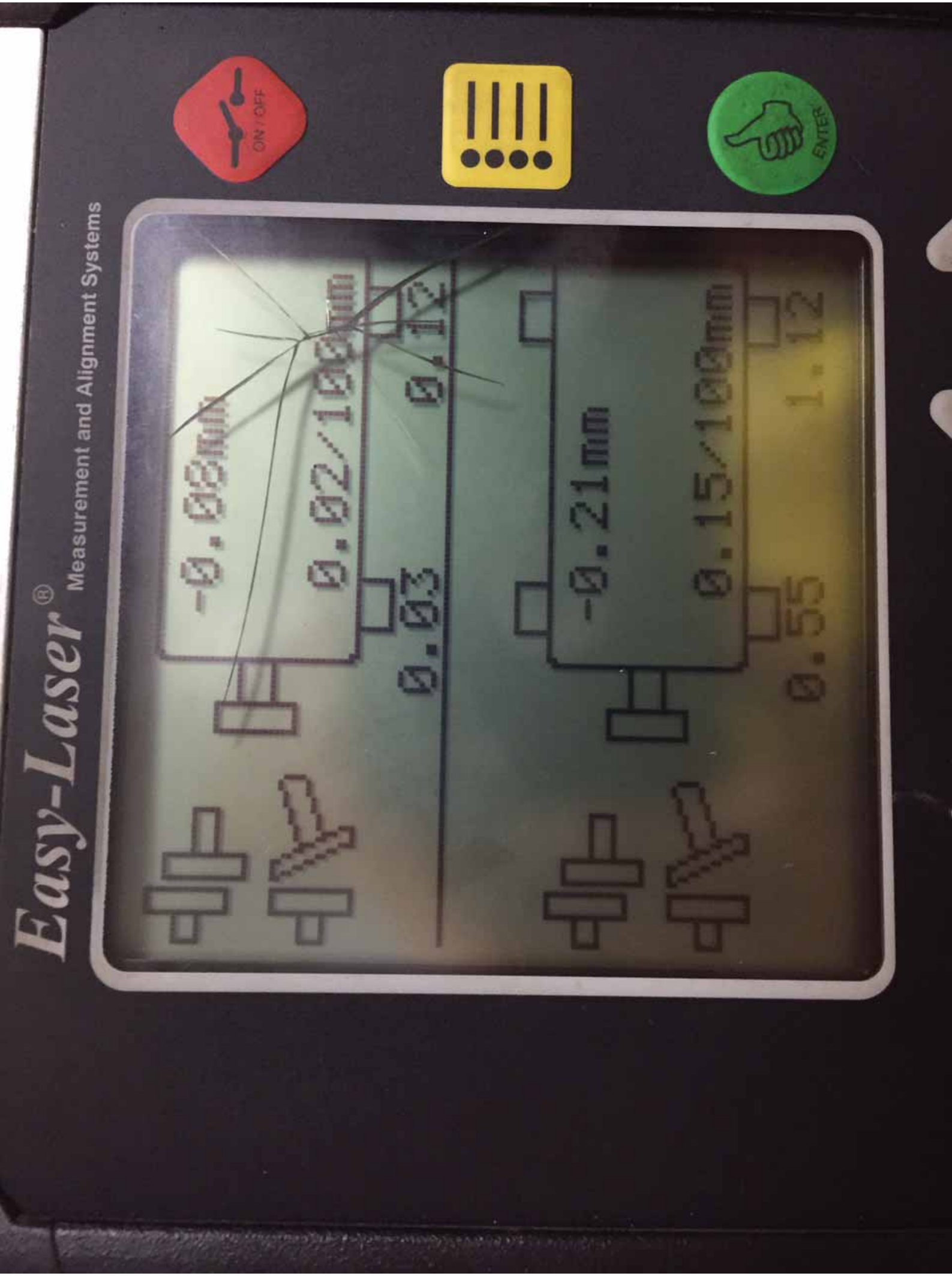
E1.T039 – Low Voltage Cable

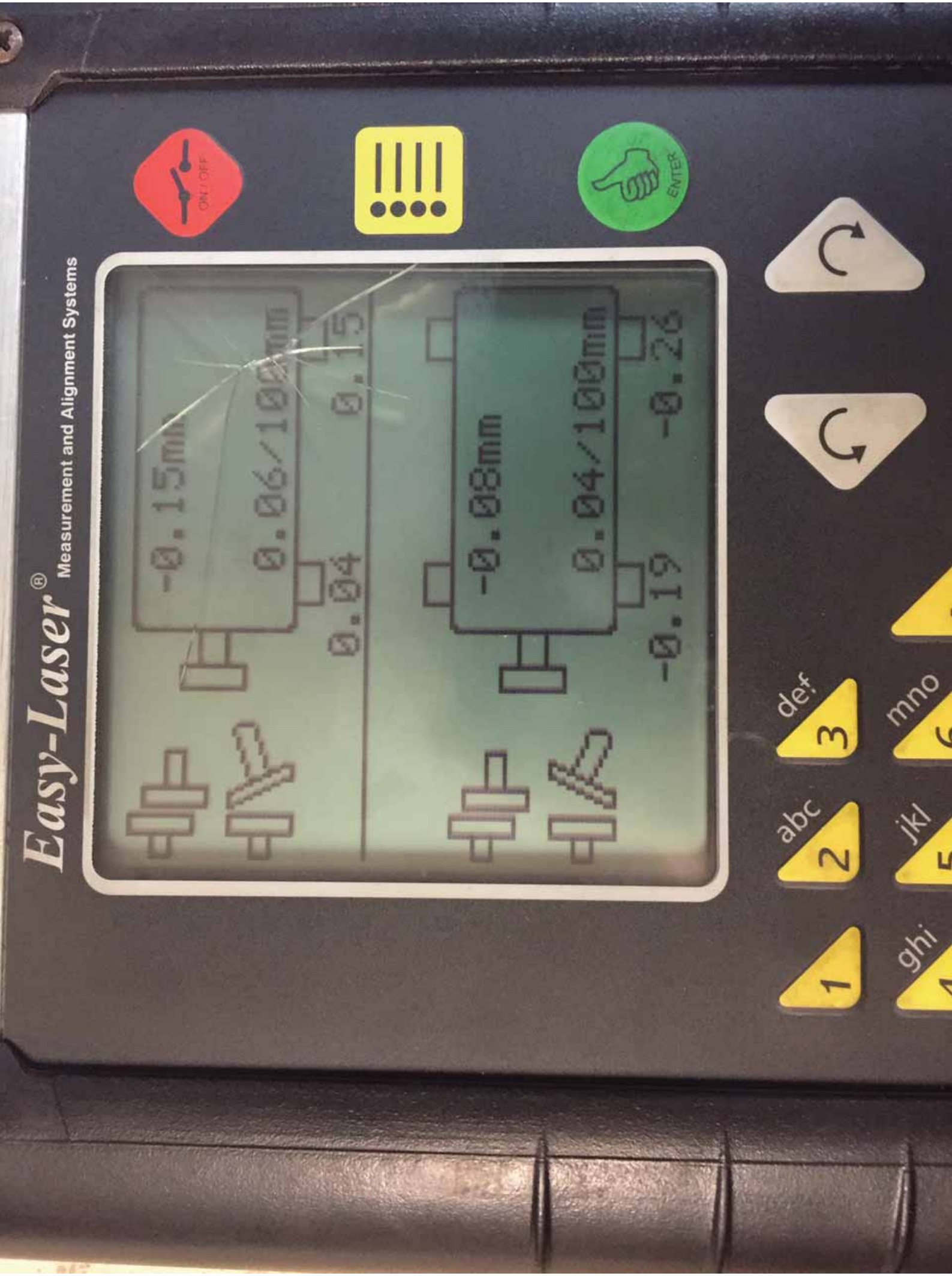
Sub System / Plant area	Product water transter pumps	Cable Number	

7. Comments / Remedial Action Required

Sign Off	Name	Signature	Company	Date
Remedial Action Completed				
Submitted by (PHE)	Joshua Dore		PHE	21-Apr-2015
Verified by (PHE)	Andrew Ubrihien		PHE	30-Apr-2015
Accepted by (Client)				

D-3 Laser Alignment Record


ON / OFF
ENTER
Easy-Laser®
Measurement and Alignment Systems
-0.08mm
0.02/100mm
0.12
0.03
-0.21mm
0.15/100mm
1.12
0.55


Easy-Laser®
Measurement and Alignment Systems
ON / OFF
ENTER
-0.15mm
0.06/100mm
0.04
0.15
-0.08mm
0.04/100mm
-0.19
-0.26
def
3
mno
6
abc
2
jkl
5
1
ghi

E-1 Pentair Pumps

PENTAIR

ISO PRO

ISO 5199 Standard
Centrifugal Pumps

Installation, Operation and Maintenance Manual

These instructions must be read prior to installing, operating, using and maintaining this equipment.

Southern Cross

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

CONTENTS

Section 1.....Introduction and Safety

1. GENERAL

These instructions must always be kept close to the product's operating location or directly with the product.

Pentair Southern Cross is committed to continual quality improvement. We are available at your service to answer any technical question and provide further information about the product relating to its Installation, Operation, Repair and Fault diagnostic services.

The instructions in this manual are intended to provide relevant information to the installer and operator to work with the product. Operating the product in compliance with these instructions is important to help ensure reliability in service and avoid risks.

Local regulations are not accounted for in these instructions. Ensure such local regulations are observed by all, including those installing the product. Always coordinate repair activity with operations personnel, and follow all plant safety requirements and applicable safety and health laws and regulations.

2. DISCLAIMER

The information in this manual is considered to be reliable. In spite of all the efforts made by Pentair Southern Cross to provide relevant information, not all circumstances can be accounted for. The content in this manual may appear insufficient in some areas. Contact Pentair Southern Cross for more information relating to your specific application if need be.

Pentair Southern Cross products are manufactured in compliance with ISO9001:2008 International Quality Management System Standard. Parts and Accessories have been designed, tested and incorporated into the products to help ensure their continued product quality and performance in use. Use of Non-Pentair Southern Cross supplied parts and accessories may adversely affect the performance and safety features of the products. Failure to properly select, install or use authorized Pentair Southern Cross parts and accessories is considered as misuse.

Damage or failure caused by misuse is not covered by Pentair Southern Cross warranty. In addition, any unauthorized modification to Pentair Southern Cross products or removal of original components may impair the safety of these products in their use and will be unwarrantable.

3. PERSONNEL QUALIFICATION AND TRAINING

All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involved. If the personnel in question do not already possess the necessary knowledge and skill, appropriate training and instruction must be provided.
Always coordinate repair activity with operations and health and safety personnel, and follow all plant safety requirements and applicable safety and health laws and regulations.

4. SUMMARY OF SAFETY MARKINGS

This document contains specific safety markings relating to various user instructions. The specific safety markings are:

A symbol to indicate safety instructions where non-compliance would affect personal safety and could result in loss of life.

A symbol to indicate electrical safety instructions where non-compliance would affect personal safety and could result in loss of life.

A symbol to indicate “hazardous and toxic fluid” safety instructions where non-compliance would affect personal safety and could result in loss of life.

A symbol to indicate safety instructions where non-compliance will involve some risk to safe operation and personal safety and would damage the equipment or property.

A symbol to indicate explosive atmosphere marking. It is used in safety instructions where non-compliance in the hazardous area would cause the risk of an explosion.

This sign indicates a Critical Instruction the Installer / Operator need to consider and follow.

5. MANDATORY SAFETY ACTION

ENSURE CORRECT LUBRICATION

START THE PUMP WITH OUTLET VALVE PARTLY OPENED
This is recommended to minimise the risk of overloading and damaging the pump and motor at full or zero flow. The pump outlet control valve may need to be adjusted to comply with the duty following the run-up process. (See section 5, Commissioning start-up, operation and shutdown.)

NEVER RUN THE PUMP DRY

INLET VALVES TO BE FULLY OPEN WHEN PUMP IS RUNNING
Running the pump at zero flow or below the recommended minimum flow continuously will cause damage to the pump itself and to the seal. Restriction of suction may cause cavitation resulting in damage to the pump.

PREVENT EXCESSIVE EXTERNAL PIPE LOAD
Do not use pump as a support for piping. Pipe supports and expansion couplings recommended.

DO NOT RUN THE PUMP AT ABNORMALLY HIGH OR LOW FLOW RATES
Operating at a flow rate higher than normal or at a flow rate with no back pressure on the pump may overload the motor and cause cavitation. Low flow rates may cause a reduction in pump/ bearing life, overheating of the pump, instability and cavitation/ vibration.

NEVER DO MAINTENANCE WORK WHEN THE UNIT IS CONNECTED TO POWER

HAZARDOUS LIQUIDS
When the pump is handling hazardous liquids care must be taken to avoid exposure to the liquid by appropriate setting of the pump, limiting personnel access and by operator training. If the liquid is flammable and/or explosive, strict safety procedures must be applied.
Gland packing must not be used when pumping hazardous liquids.

DRAIN THE PUMP AND ISOLATE PIPEWORK BEFORE DISMANTLING THE PUMP
The appropriate safety precautions should be taken where the pumped liquids are hazardous.

HANDLING COMPONENTS
Many precision parts have sharp corners and the wearing of appropriate safety gloves and equipment is required when handling these components. To lift heavy pieces above 25 kg (55 lb) use a crane appropriate for the mass and in accordance with current local regulations.

GUARDS MUST NOT BE REMOVED WHILE THE PUMP IS OPERATIONAL
The unit must not be operated unless coupling guard is in place. Failure to observe this warning could result in injury to operating personnel.

THERMAL SHOCK
Rapid changes in the temperature of the liquid within the pump can cause thermal shock, which can result in damage or breakage of components and should be avoided.

DO NOT APPLY HEAT TO REMOVE IMPELLER
Trapped lubricant or vapor could cause an explosion.

6. SAFE NOISE LEVEL

ISO PRO pump noise level is dependent on a number of factors – the type of driver used, the operating conditions, pipe-work design and acoustic characteristics of the building. The below table is a guide to calculating the noise level for a pump unit with any given driver.

Approximate Noise Level Table

Driver Sound Level dB(A)	Correction For Unit - Add to motor noise level dB(A)
60 - 64	12.0
65 - 69	10.0
70 - 74	8.0
75 - 79	6.5
80 - 84	5.0
85 - 89	4.0

If pump unit noise level exceeds 85 dBA attention must be given to prevailing Health and Safety Legislation, to limit the exposure of plant operating personnel to the noise. The usual approach is to control exposure time to the noise or to enclose the machine to reduce emitted sound. You may have already specified a limiting noise level when the equipment was ordered, however if no noise requirements were defined then machines above a certain power level will exceed 85 dBA. In such situations consideration must be given to the fitting of an acoustic enclosure to meet local regulations.

7. LEAKAGE PREVENTION

The pump must only be used to handle liquids for which it has been approved to have the correct corrosion resistance. Avoid entrapment of liquid in the pump and associated piping due to closing of suction and discharge valves, which could cause dangerous excessive pressures to occur if there is heat input to the liquid. This can occur if the pump is stationary or running.

Bursting of liquid containing parts due to freezing must be avoided by draining or protecting the pump and ancillary systems.

8. SAFETY NOTE

a. Read the instruction manual before installation, operation and maintenance of the equipment. Check and confirm that the manual is relevant copy by comparing pump type on the nameplate and with that on the manual.
b. The products supplied by Pentair Southern Cross have been designed with safety in mind. Where hazards cannot be eliminated, the risk has been minimized by the use of guards and other design features. Some hazards cannot be guarded against and the instructions below must be complied with for safe operation. These instructions cannot cover all circumstances; You are responsible for using safe working practices at all times.
c. Pentair Southern Cross products are designed for installation in designated areas, which are to be kept clean and free of obstructions that may restrict safe access to the controls and maintenance

access points. A Pump Duty Nameplate is fitted to each unit and must not be removed. Loss of this plate could make identification impossible. This in turn could affect safety and cause difficulty in obtaining spare parts.

d. Access to the equipment should be restricted to the personnel responsible for installation, operation and maintenance of pump unit, adequately qualified and supplied with appropriate tools for their respective tasks.

e. Pentair Southern Cross requires that, all personnel that are responsible for installation, operation or maintenance of the equipment, have access to and study the product instruction manual before any work is done and that they will comply with all local and industry based safety instructions and regulations.

f. Hearing protection should be worn where the specified equipment noise level exceeds locally defined safe levels. Safety glasses or goggles should be worn when working with pressurised systems and hazardous substances. Other personnel protection equipment must be worn where local rules apply.

g. Do not wear loose clothing or jewelry which could catch on the controls or become trapped in the equipment.

h. Note the 'Limits of product application – permissible use' specified in the manual.

i. Operation of the equipment beyond these limits will increase the risk from hazards noted below and may lead to premature and hazardous pump failure.

j. Clear and easy access to all controls, gauges and dials etc., must be maintained at all times. Hazardous or flammable materials must not be stored in pump rooms unless safe areas or racking and suitable containers have been provided.

k. Improper Installation, Operation or Maintenance of this Pentair Southern Cross Product could result in Injury or Death.

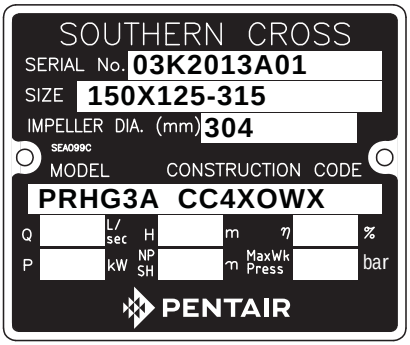
Section 2.....Pump Construction

1. CONFIGURATIONS

Southern Cross ISO-PRO is a single stage, horizontal, end suction process pump with overhung impeller and radially split casing. ISO-PRO is fully Compliant with ISO 5199. The range is designed for continuous service in clean water pumping applications.

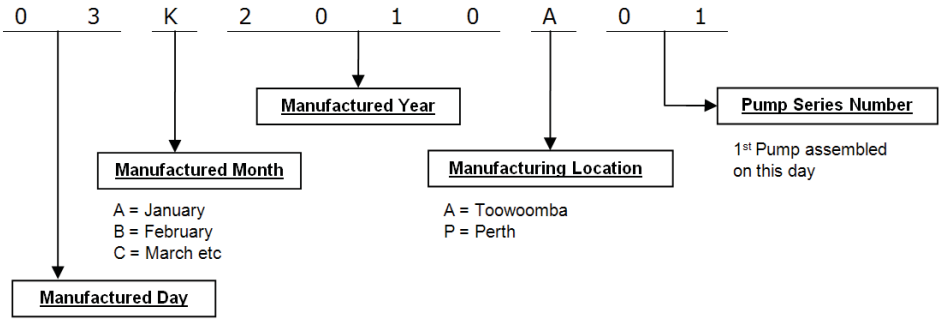
2. NOMENCLATURE AND NAME PLATE

A typical example of a Southern Cross Pump Name Plate is shown below.



2.1 Serial Number

The pump serial number is stamped on the name plate as shown above. A typical serial number is described below.



2.2 Pump Size

SUCTION FLANGE NOMINAL BORE	X	DISCHARGE FLANGE NOMINAL BORE	-	IMPELLER NOMINAL OUTSIDE DIAMETER

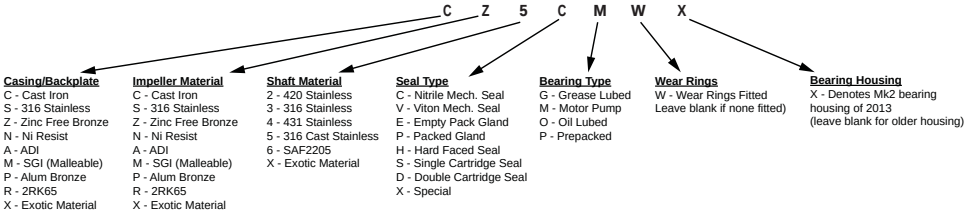
2.3 Impeller Diameter (mm)

Actual outside diameter of the impeller in millimeters (if blank, the impeller is full-size)

Section 2.....Pump Construction

2.4 Model
"Item Code" of pump (from work order)

2.5 Construction Code
This code defines construction material of various components in the pump.



3. DESIGN OF MAJOR PARTS

3.1 Pump Casing (All Pump Types)
The Casing type is Foot Mounted, ISO vertical, Centerline, End Suction, Top Discharge, one piece solid construction. A wear ring may be mounted in the casing to provide a close running clearance with the impeller Neck ring.

3.2 Impeller (All Models)
The impeller is a single suction, radial / Mixed flow, closed design. The impeller is dynamically balanced, keyed to the shaft. Renewable Neck rings can be press fit onto the impeller hubs (front and back) where needed. Double curvature impeller blades, provide highly efficient suction performance, higher speed capabilities and greater performance for reduced running costs and maintenance. Impeller is taper mounted and keyed to shaft and secured by Lock Washer and Impeller nut for positive locking.

3.3 Lock Washer (All Pump Types)
Lock washers are assembled between impeller and impeller nut. These Lock washers are manufactured by Nord-Lock. NORD-LOCK is a pair of washers with a wedge-locking action meeting DIN 25201 which is a unique method using tension instead of friction. The NORD-LOCK bolt securing system uses geometry to safely lock impeller onto the pump shaft.

3.4 Shaft (All Pump types)
The shaft is made of high grade stainless steel. It is precision machined over its entire length and has generous fillet radii at each change of section to reduce stress concentrations. Water slinger prevents intrusion of pumped fluid into shaft bearing.

3.5 Heavy Duty Bearing Housing
The pump has positively located dual bearings.

Section 2.....Pump Construction

Heavy duty roller bearings:
This pump is fitted with heavy duty roller bearings running in oil lubricated housing with oil flinger. Housing is fitted with breather and oil level plug and drain plugs. Available options include:
• Fitting deep groove grease lubricated bearings, either sealed for life or grease nipple lubricated
• Oil coolers
• Labyrinth shaft seals

Positively located dual bearings:
These ISO-Pro Pumps are fitted with positively located dual bearings at motor end and with a roller bearing at pump end. These bearings are oil lubricated. Available options include:
• Fitting deep groove grease lubricated bearings, either sealed for life or grease nipple lubricated
• Oil coolers
• Labyrinth shaft seals

3.6 Pump Shaft Seals
As a standard, ISO-PRO Pumps are fitted with single, unbalanced, on-shaft mechanical seal.

Other seal options are available but are not limited to:
• Single balanced Mechanical Seal
• Single Balanced cartridge seals
• Double Balanced cartridge seals
• Packed Gland Seals

External clean water flushing and cooling can be supplied for high temperature, abrasive or toxic applications.

Upon customer request, Southern Cross ISO-PRO pumps maybe supplied with an empty shaft seal cavity to allow the dealer/customer to fit a seal to suit a particular application. It is important that the shaft seal is fitted according to the manufacturer's instructions. In the case of a packed gland, the gland needs to be adjusted so a slow drip of water is evident when the pump is operating. A drain hole is provided in the bearing housing (below the seal cavity) for use with a packed gland.

If the gland in the pump is to be lubricated with water from the pump body, ensure the plug (A) is fitted and the passage from the pump body to the seal cavity is clear. If the pump gland is to be lubricated from an external water supply, plug (B) must be fitted. Ensure passage from seal cavity to external water supply is clear before connecting water supply line.

3.7 Driver
The driver is normally an electric motor. Different drive configurations may be fitted such as internal combustion engines, turbines, hydraulic motors etc driving via couplings, belts, gearboxes etc.

Section 2.....Pump Construction

3.8 Coupling and Coupling guards
The pump unit may be supplied with one type of the below three coupling:
Flexible Shaft Coupling – standard
Flexible Shaft Coupling - spacer
Flexible Tyre Coupling

Flexible couplings are provided in various makes and models to suit customer preference. Refer to the relevant manufacturers Installation, Operation and Maintenance manual for coupling information.

As a standard, galvanised steel Guards and end shields are provided for safety.

3.9 Baseplate
Standard baseplates are made of Mild-steel plates folded galvanized. Non standard bases can be supplied to suit individual installation circumstances.

3.10 Accessories
Accessories may be fitted when specified by the customer at additional cost.

4. PERFORMANCE AND OPERATING LIMITS

This product has been selected to meet the specifications of your purchase order. These pumps are furnished for a particular service condition only. Changes in the hydraulic system or Operating Condition may affect the pump's performance adversely. This is especially true if the changes reduce the pressure at the suction flange or if the liquid temperature is increased. Contact Pentair Southern Cross if there is a major change in the operating conditions to verify existing pumps' adequacy.

Section 3.....Pump Lubrication

1. PUMPS FITTED WITH OIL LUBRICATED BEARINGS

1.1 Oil Specification

HOUSING MODULE	OIL LUBE QTY (ml)	OIL SPECIFICATION
		Preferred oils are those that have non foaming properties. Typically, turbine or hydraulic oils would be suitable. Viscosity of SAE20 to SAE30 (ISO VG 46 to 100). Automotive oils would be suitable in light duty cycles.
1	450	Light Duty - Less than 8 hours/day or intermittent Tellus 46 or 68, or Turbo T46 or T68.
2	800	Heavy Duty - Greater than 8 hours/day or continuous Tellus 68, Turbo T68 or Madrella AS68.
3	1200	High Temperature - 100 to 150 degrees Celsius Turbo GT32 or Madrella AS68.
4	2300	Low Temperature - Less than 10 to -30 degrees Celsius Refrigerator Oil 68K.

Bearing housing temperature should not exceed 80 degrees Celsius in normal circumstances. Where higher temperatures are noted, use an oil of lower viscosity.

When pumping product of elevated temperature, it may be advisable to have oil cooling fitted to maintain an acceptable bearing housing temperature.
Consult dealer for maximum operating speeds

1.2 Change interval

TYPE OF SERVICE	HOURS OF SERVICE
LIGHT DUTY	Change oil after 2000 hours service
HIGH TEMPERATURE	Change oil after 1000 hours service
HEAVY DUTY	Change oil after 1000 hours service

1.3 Notes

- While Shell brand oils have been specified, equivalent oils manufactured by any reputable oil company are suitable alternatives.
- When changing oil, inspect for metal particles or other foreign matter, and for any signs of discolouration.
- The oils listed should not be taken as the only suitable oils. Any good quality oil possessing the properties specified may be used.
- It is never good practise to mix different oils.

1.4 Maximum angle of Incline

ISO PRO pumps should be run in the horizontal position. However, some applications require that the pump be run on an incline. For a standard oil lubricated pump, it is recommended that the pump angle not exceed 5° from the horizontal. If the application requires a greater angle of incline, Pentair Southern Cross recommend the use of regreasable bearings.

2. PUMPS FITTED WITH REGREASABLE BEARINGS

Section 3.....Pump Lubrication

2.1 Grease Specification
Recommended grease type is Shell Alvania R3 or an equivalent high quality Lithium-based grease.

2.2 Change interval
Grease replenishment intervals (running hours) specified below are relevant to a pump running at 70°C Operating temperature and 1450rpm.

BEARING HOUSING	HOURS	GREASE QTY (g)
Group 1	6000	10
Group 2	4500	14
Group 3	3700	19
Group 4	3000	26

Section 4.....Transport and Storage

1. GOODS RECIEVING, UNPACKING AND INSPECTION

Check Equipment against delivery / shipping documents for its completeness. Check for any damages caused due to transport. If any damage is found it should be reported to the carrier immediately. Any shortage and/or damage must be reported immediately to Pentair Southern Cross and must be received in writing within one month of receipt of the equipment. Later claims cannot be accepted.

Check any crate, boxes or wrappings for any accessories or spare parts that may be packed separately with the equipment or attached to side walls of the box or equipment.

Inspect the preservative coating on various parts. If necessary, renew preservative in areas where it has been rubbed or scraped.

Inspect all painted surfaces. If necessary, touch up the areas where paint has been chipped or scraped. Paints and preservatives used are either Pentair Southern Cross standard or 'special' as required by the contract specification. Refer to Pentair Southern Cross for the description of paints and preservatives used on this order if needed.

Inspect all covers over pump openings and piping connections. If covers or seals for the covers are damaged or lose, they are to be removed, and a visual inspection made of the accessible interior areas for accumulation of foreign materials or water. If necessary, clean and preserve the interior parts as noted above to restore the parts to the "as shipped" condition. Install or replace covers and fasten securely.

2. HANDLING

Boxes, crates, pallets or cartons may be unloaded using fork-lift vehicles or slings dependent on their size and construction.

Section 4.....Transport and Storage

3. LIFTING

CAUTION	Make sure that any equipment used to lift the pump or any of its components is capable of supporting the weights encountered. Make sure that all parts are correctly rigged before attempting to lift.

	Mechanical Lifting device must be used for all pump sets in excess of 25 kg. Fully trained personnel must carry out lifting, in accordance with local regulations. The driver and pump weights are recorded on general arrangement drawing included into the job user's instruction.

3.1 To Lift Complete Pump Only

Make sure the lifting equipment is rated to lift the pump weight. Use certified slings and chains only. Rig lifting sling below discharge flange as shown in the figure.

3.2 To Lift unit with Folded Base-Plate

Pump, driver and base-plate can be lifted as a unit. Sling the unit from the eyelets provided in the base. Make sure straps are adjusted to obtain an even lift.

3.3 To Lift Unit with Welded Base-Plate

Pump, driver and base-plate can be lifted as a unit. Sling from all four (4) eye bolts provided on base-plate side rails. Failure to use all four (4) could result in permanent distortion of the base-plate. Use as long a sling as possible, or use a spreader arrangement.

CAUTION	Coupling bolting and spacer piece must be removed from between pump and driver half couplings before lifting base-plate with pumping element.

3.4 To Lift Driver

Refer to Manufacturer's Instructions.

4. STORAGE

Store the pump in location away from vibration and Dampness

4.1 Short Term Storage (Maximum 6 months)

If at all possible, the pump and its component parts should be stored indoors where they will be protected from the elements. In no case should any pump element be subjected to extended periods of submergence or wetting prior to start up. If it is not possible to store the pump and its components indoors, precautions must be taken to protect them from the elements. Regardless of whether storage is indoors or outside, the storage area should be vibration free. All boxes marked for indoor storage should be stored indoors. When stored outdoors the pump and its components should be protected from dirt, dust, rain, snow, or other unfavorable conditions by heavy plastic sheets, canvas, or other suitable coverings. All equipment must be placed upon skids or blocks to prevent contact with the ground and surface contaminants. Equipment must be adequately supported to prevent distortion and bending. The pump shaft should be rotated, in the direction of rotation, at least 1 and 1/4 turns each week during the storage period and any other periods of standby.

Store the pump in a clean, dry location away from vibration. Leave piping connection covers in place to keep foreign material out of pump casing. Turn pump at intervals to prevent brinelling of the bearings and seal faces, if fitted, from sticking. Electric Motors (Pump Driver) should not be stored in damp places without special protection (Refer to Motor manufacturers instructions). The pump may be stored as above for up to 6 months.

4.2 Long Term Storage

Depending on the length of time the equipment has been stored, and the type of storage provided (i.e. Indoor: heated, unheated, earth floor, concrete floor. Outdoors: under roof, no roof, waterproof coverings, on concrete, on earth), the pump will require a full inspection before the scheduled installation date. This could include a visual inspection, partial or even a full dismantling of the equipment. This should be carried out by qualified personnel, or a Pentair Southern Cross representative. Dismantling the equipment may require the replacement of gaskets and seals. All costs involved during the inspection, dismantling, replacement of parts and reassembly will be at the expense of the customer. All necessary labour, tools and cranes required will be supplied by the customer.

5. PACKAGING

Goods are packed for Interstate Land Transport only unless otherwise specified in the contract. If transporting the goods overseas from buyers' location, they should be repacked appropriately.

Section 5.....Installation

1. SAFETY INSTRUCTIONS FOR ASSEMBLY & INSTALLATION

- Do not place fingers or hands etc., into the suction or discharge pipe outlets and do not touch the impeller, if rotated this may cause severe injury. To prevent ingress of any objects, retain the protection covers or packaging in place until removal is necessary for installation.

- Do not touch any moving or rotating parts. Guards are provided to prevent access to these parts. Where they have been removed for maintenance they must be replaced before operating the equipment.

- Failure to support suction and delivery pipe work may result in distortion of the pump casing, with the possibility of early pump failure.

2. LOCATION

- Install the unit close to the source of the liquid to be pumped.

- When selecting the location, be sure to allow adequate space for operation as well as for maintenance operations involving dismantling and inspections of parts.

- Head room is an important consideration as an overhead lift of some type is required.

3. PART ASSEMBLIES

It is the responsibility of the installer to ensure that the motor is assembled to the pump and lined up.

CHECK ALIGNMENT
Prior to grouting, an initial alignment check in accordance with the alignment section of this document shall be performed to verify that coupling spacing and final alignment can be achieved without modifying the hold down bolts or the machine feet. This is necessary to ensure that the baseplate was not damaged during the transportation.

4. FOUNDATION

PUMP INSTALLATION AND FOUNDATION
There are many methods of installing pump units to their foundations. The correct method depends on the size of the pump unit, its location and noise vibration limitations. Non-compliance with the provision of correct foundation and installation may lead to failure of the pump and, as such, would be outside the terms of the warranty.

The foundation should be level and sufficiently rigid and substantial to prevent any pump vibration and to permanently support the baseplate at all points. The most satisfactory foundations are made of reinforced concrete. These should be poured well in advance of the installation to allow sufficient time for drying and curing.

5. INITIAL ALIGNMENT

Shaft alignment must be checked again after the final positioning of the pump unit and connection to pipe work, as this may have disturbed the pump or motor mounting positions. If hot liquids (above 80 Deg C) are being pumped, alignment should be checked and reset with the pump and motor at their normal operating temperature.

CAUTION

PUMP ALIGNMENT AND THERMAL EXPANSION
The pump and motor will normally have to be aligned at ambient temperature and should be corrected to allow for thermal expansion at operating temperature.

5.1 Alignment Methods

Ensure pump and driver are isolated electrically and the half couplings are disconnected

CAUTION

Align the motor to the pump, not the pump to the motor

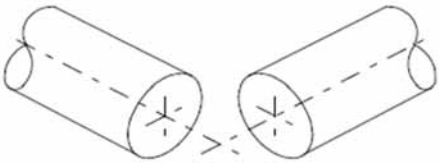
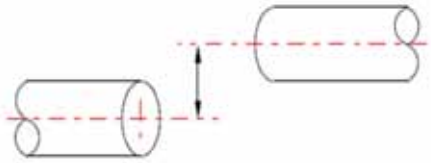
CAUTION

Adjustment to correct the alignment in one direction may alter the alignment in another direction. Always check in all directions after making any adjustment.

CAUTION

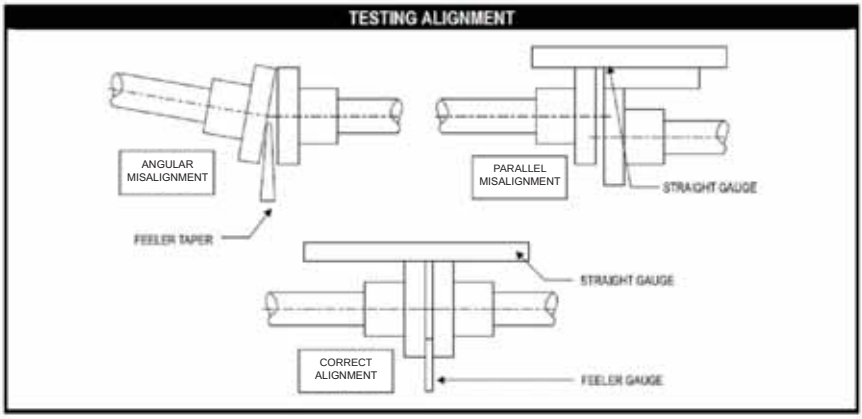
ALWAYS REMEMBER “A FLEXIBLE COUPLING IS NOT A UNIVERSAL JOINT”

Correct alignment is essential for the smooth operation of the pump. There are two types of misalignment between the pump shaft and the drive shaft, which are:

	
Angular misalignment - Shaft with axis concentric, but not parallel	Parallel misalignment - Shaft axis parallel, but not concentric

This misalignment is checked by using a straight edge or any other device as shown in figure given below. A spacer type flexible coupling is used to connect pump shaft to the driver. By using spacer type of coupling, the complete rotating unit can be removed from the volute without removing pump casing or rotor and without disconnecting piping connections. However other types of coupling can be supplied on request.

Section 5.....Installation



The alignment is achieved by adding or removing shims under the motor feet and also moving the motor horizontally as required. In some cases where the alignment cannot be achieved it will be necessary to move the pump before recommencing the above procedure.

5.2 Shims

The shims between the equipment feet and mounting surface should be clean and dry. This is especially critical for pumps in service for some time and need to be realigned. Water, dirt and rust may change the height of the shim pack over a period of time. Shims should be made large enough to support the weight of the equipment on its mounting foot. Do not use many thin shims as this may result in a spongy mounting. Move the equipment vertically by adding or removing the calculated thickness of shims.

6. ASSEMBLE COUPLING

a) Assemble coupling as per the manufacturer's instructions.
b) Install coupling guard

7. PIPING

CAUTION **DO NOT USE PUMP AS A SUPPORT FOR PIPING**

7.1 Piping Good Practice

a) In order to minimise friction losses and hydraulic noise in the pipework it is a good practice to choose pipework that is one or two sizes larger than the pump suction and discharge.
b) Typically main pipework velocities should not exceed 2 m/s suction and 3 m/s on the discharge.

7.2 Suction Piping

a) The inlet pipe should be one or two sizes larger than the pump inlet bore and pipe bends should be as large radius as possible.
b) Double bends must be avoided in suction line and a straight run of pipe, equal to 8 or 10 times the

pipe diameter is desired directly upstream of the suction nozzle.
c) Keep the suction pipe free of all air pockets.
d) Pipework reducers should have a maximum total angle of divergence of 15 degrees.
e) The piping should be inclined up towards the pump inlet with eccentric reducers incorporated to prevent air locks.
f) Flow should enter the pump suction with uniform flow, to minimise noise and wear.

7.3 Bypass Line

Operation at low flows results in pump horsepower heating the liquid. A bypass may be required to prevent vaporisation and subsequent pump damage

7.4 Discharge Piping

a) Install a check valve and an isolation valve in the discharge piping. The check valve will protect the pump against excessive pressure when the pump stops. It will also prevent the pump from running backwards.
b) The check valve should be installed between the isolation valve and the pump nozzle in order to permit its inspection.
c) Never throttle pump on suction side and never place a valve directly on the pump inlet or outlet nozzle.
d) Pipework reducers should have a maximum total angle of divergence of 15 degrees.

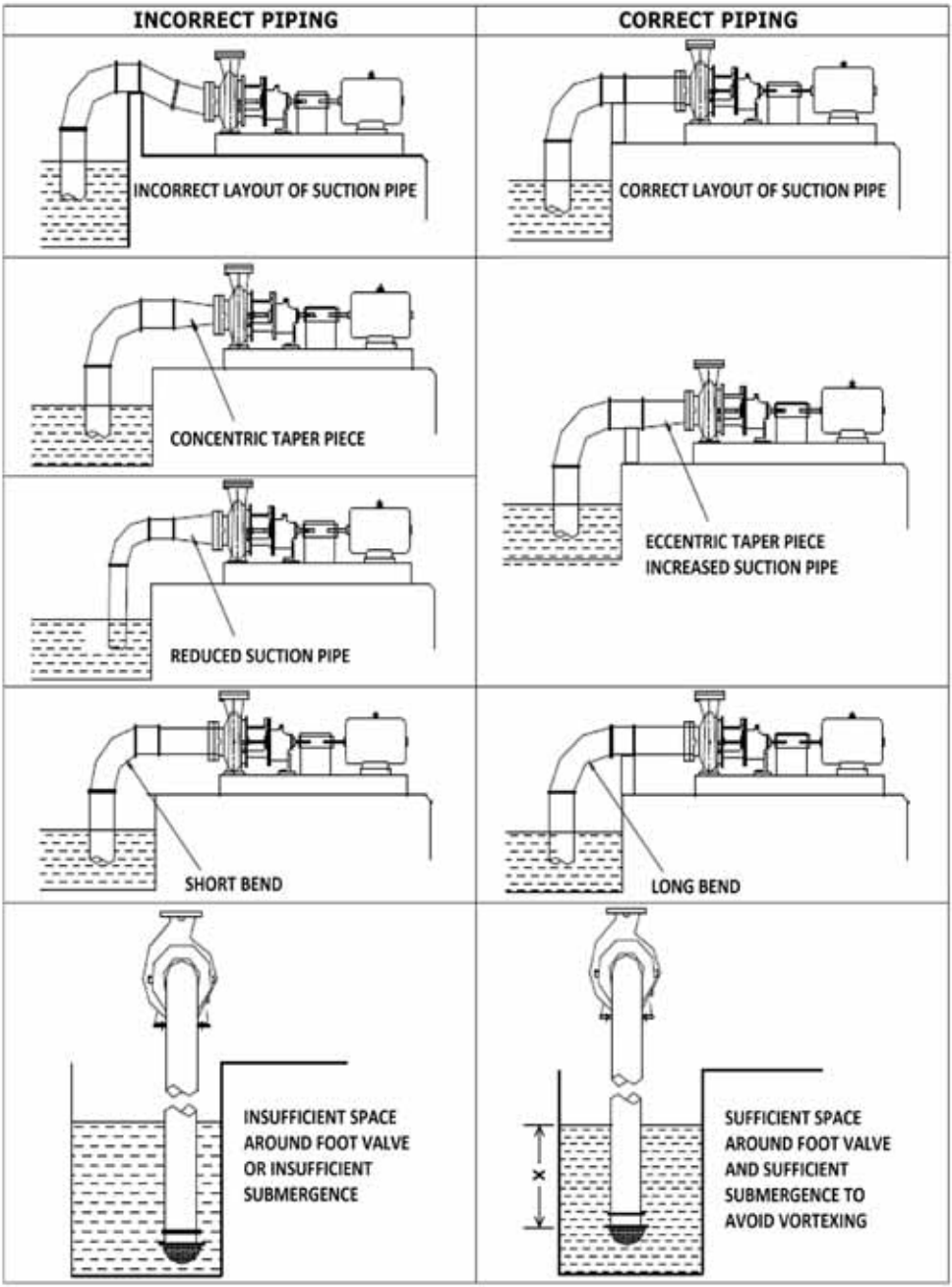
8. ELECTRICAL CONNECTIONS

a) Electrical connections must be made by a qualified Electrician in accordance with relevant local national and international regulations.
b) The motor must be wired up in accordance with the motor manufacturers instructions (normally supplied within the terminal box) including any temperature, earth leakage, current and other protective devices as appropriate. The identification nameplate should be checked to ensure the power supply is appropriate.
c) A device to provide emergency stopping must be fitted.
d) For electrical details on pump sets with controllers see the separate wiring diagram.
e) Check the Direction of rotation of the motor before connecting the motor to the pump.

9. PROTECTION SYSTEMS

a) The following protection systems are recommended particularly if the pump is installed in a potentially explosive area or is handling a hazardous liquid. If in doubt consult Pentair Southern Cross.
b) If there is any possibility of the system allowing the pump to run against a closed valve or below minimum continuous safe flow a protection device should be installed to ensure the temperature of the liquid does not rise to an unsafe level.
c) If there are any circumstances in which the system can allow the pump to run dry, or start up empty, a protection device should be fitted to stop the pump or prevent it from being started. This is particularly relevant if the pump is handling a flammable liquid.
d) To prevent excessive surface temperatures at bearings it is recommended that the pump be fitted with an internal cooling loop.

Section 5.....Installation



10. FINAL CHECKS

a) Is the baseplate leveled?
b) Check Foundation Bolts?
c) Check the tightness of all bolts in the suction and discharge pipework.
d) Piping Installed - Correct Vent, Gauge, Valve, Suction Strainer Locations?
e) All Flange Bolting Correctly Torqued with appropriate gaskets in place?
f) After connecting piping to the pump, rotate the shaft several times by hand to ensure there is no binding and all parts are free.
g) Recheck the coupling alignment, as previously described, to ensure no strain on coupling is due to pipe. If pipe strain exists, correct piping.
h) Coupling guard correctly installed?

Section 6.....Commissioning and Operation

1. SAFETY INSTRUCTIONS FOR COMMISSIONING & OPERATION

• Do not touch any moving or rotating parts.

• Guards must be in place before operating the equipment.

• Check that the pump is primed. Pump should never be run dry as the pumped liquid acts as a lubricant for the close running fits surrounding impeller and damage will be incurred.

• Failure to supply the stuffing box or mechanical seal with cooling of flush water may result in damage and premature failure of the pump.

• Do not touch surfaces, which during normal running will be sufficiently hot to cause injury. Allow sufficient time for cooling before maintenance. Be cautious and note that other parts of the pump may become hot if a fault is developing.

• In addition to local or site regulations for noise protection, Pentair Southern Cross recommend the use of personal ear
protection equipment in all enclosed pump rooms and particularly those containing diesel engines. Care must be taken to ensure that any audible alarm or warning signal can be heard with hearing protection worn.

These operations must be carried out by fully trained and qualified personnel

2. PRE-COMMISSIONING PROCEDURE AND CHECKLIST

The following steps should be followed at initial start up and after the equipment has been overhauled:
a) Confirm correct pump is fitted into the designated functional location.

b) Prior to installing the pump, flush the suction side of the system to remove all deposit (slag, bolts etc). Remove all pre-commissioning screens and replace with operational units.

c) Ensure the pump and piping is clean. Before putting the pump into operation, the piping should be thoroughly back flushed to remove any foreign matter which may have accumulated during installation. Take all possible care not to contaminate your system.

d) Inspect all nozzle connections for
i. Missing bolts or loose bolts
ii. Missing gaskets
iii. Flange alignment / Misalignment

e) Check Pipe work for
i. Correct sizing
ii. Any suction restrictions
iii. Make sure that all hold down bolts are in place and pulled down

Section 6.....Commissioning and Operation

f) Check drive coupling for
- i. Correct Alignment
- ii. The presence of preload caused by misalignment
- iii. All fasteners are tight
- iv. Coupling has been fitted correctly
- v. Coupling guard is correctly fitted and firm.
- vi. Check that keys are secured in the correct position and locked down
- vii. Turn shaft by hand and check for running clearance

g) For oil lubricated Pumps, fill the bearing housing with the appropriate oil to the correct level. Bearings must receive a small amount of oil prior to starting to ensure adequate lubrication at start up. See section 3 for details.

h) For Grease lubricated pumps, fill about 15 gms for grease to ensure adequate lubrication at start up. See section 3 for details.

i) Install suction strainer if required.

j) Check that the Electrical connection is completed and signed off
- i. Have the safety lock out device removed.
- ii. Bump start pump to check for correct orientation. If rotation is not correct refer to motor manual for appropriate connections to change rotation. Take appropriate precaution before working on the motor.

k) If a Mechanical Seal is fitted, check
- i. Quench or Flush is operational before startup
- ii. Check that seal is located correctly
- iii. Check that seal is locked to the shaft
- iv. Remove setting Tabs

The unit must not be operated unless coupling guard is securely and completely bolted in place. Failure to observe the warning could result in injury to operating personnel

3. PRIMING

No pumping action occurs unless the pump casing is filled with liquid. Pump casing and suction pipe must therefore be completely filled with the liquid and thus all air removed before the pump is started. Several different priming methods can be used depending on the kind of installation and service involved.

(a) Liquid level above pump level Pump is set below liquid level of source of supply so that liquid always flows to pump under positive head.

(b) Priming with foot valve
- i. When pump is installed on suction lift with foot valve at the end of suction line, fill pump with water from some outside source till all air is expelled and water flows through air vent.

ii. When there is liquid under some pressure in the discharge pipe, priming can be effected by bypassing the pressure liquid around the check and isolation valve. Of course, the initial priming must be affected from some outside source.
NOTE: In this case, the foot valve must be capable of withstanding pump pressure and possible surge.

(c) Priming by ejector: An ejector operated by steam, compressed air or water under pressure and connected to air vent on top of casing can be used to remove air from and prime the pump on suction lift installations.

(d) Priming by dry vacuum pump: a hand or power pump sucks in all the air from the casing and the Suction pipe, and thus primes the system.

4. LUBRICATION

Refer section 3. Re-lubricate as indicated in this Section 3.

5. RUNNING

On account of its simple construction, the centrifugal pump requires practically no attention while running. Lubrication of the bearings and manipulation of the glands are the only things that need attention from the operator.

6. PUMPS FITTED WITH WEAR RINGS

Casing and impeller wear rings are fitted in the casing and impeller to reduce the quantity of water leaking back from the high pressure side to the suction side. When these wear rings are worn out, the clearance becomes greater and more water passes back into the suction. They must be replaced from time to time to restore the pump efficiency to its normal value.

7. PUMP STARTUP

a) Close discharge valve if valve is not already closed. Crack open the valve to assure minimal flow.
b) Prepare the driver for start up in accordance with the driver manufacturer's instructions.
c) Prime pump and ensure suction valve is open.
d) If pump re-circulating line is used, ensure it is open, clear and free of obstructions.
e) Turn on cooling liquid and assure correct flow exists (to cooler, insert gland etc.) as specified.
f) Double check pump rotation by starting unit momentarily. The direction of input shaft rotation is clockwise when facing pump shaft from coupling end. Ensure that the pump coasts down to a gradual stop.
g) Start the driver and bring it up to speed.
h) As soon as the pump is up to rated speed slowly open discharge valve.
i) This will avoid abrupt changes in velocity and prevent surging in the suction line.
j) Perform the operating checks

8. PUMPS FITTED WITH MECHANICAL SEAL

a) Before pumping dirty liquids it is advisable, if possible, to run in the pump mechanical seal using clean liquid to safeguard the seal face.
b) External flush or quench should be started before the pump is run and allowed to flow for a period after the pump has stopped.
c) Never run a mechanical seal dry, even for a short time.

9. STOP / START FREQUENCY

This depends on the driver manufacturers' recommendation. Check actual capability of the driver and control/starting system before commissioning.

10. DURING RUNNING THE PUMP

Check the following and regulate, if necessary
a) The pump is running smooth.
b) The flow of sealing liquid (if external liquid is provided for sealing purpose) is uninterrupted.
c) If packed gland is used, Leakage through stuffing box is normal. There should be leakage of 60-80 drops per minute.
d) The bearings are not getting heated up excessively.
e) Head and capacity developed by the pump is as specified.
f) Power consumption is within the limit.
g) Ensure that there is no mechanical friction in the pump.
h) Check suction and discharge pressure gauges.
i) Check for excessive leakage at seal areas.
j) Check for unusual noises.
k) Check for vibrations.
l) Stop the pump immediately, if any defects are noticed. Do not start the pump unless the defects are rectified. Report immediately to the supplier if it is not possible to rectify the defects.

11. STOPPING AND SHUTDOWN

a) The centrifugal pumps can be shut down by switching off the power to the motor, with open or closed flow regulating valve. If there are no provisions against water hammer, it is recommended to close the flow regulating valve at pump discharge prior to stopping the pump, but ensure that the pump runs in this condition for no more than a few seconds.
b) Avoid the use of instantaneous shut-off valves, such as solenoid valves. These can cause severe pump damage.
c) If a non-return valve is not fitted, or the isolating valve at the discharge side is not completely closed, it may happen that during the shut-down the pump shaft will rotate in the opposite direction than is normal: in such cases absolutely avoid restarting the pump until the pump shaft has stopped rotating.
d) After the first start-stop and if necessary, check pump/motor alignment and make sure that no external forces or moment rest on pump or piping.
e) In the event the pump is shut down for an extended period of time it is recommended to completely drain the pump to prevent the possibility of freezing in the winter time and/or the possibility of corrosion due to stagnant liquid left in the pump.

Section 7.....Maintenance and Servicing

1. SAFETY INSTRUCTIONS WHILE MAINTENANCE & SERVICING

• Before attempting any maintenance on a pump particularly if it has been handling any form of hazardous liquid, it should be ensured that the unit is safe to work on. The pump must be flushed thoroughly with suitable cleaner to purge away any of the product left in the pump components. To avoid any risk to health it is also advisable to wear protective clothing as recommended by the site safety officer especially when removing old packing which may be contaminated.

• Check and ensure that the pump operates at below the maximum working pressure specified in the manual or on the pump nameplate and before maintenance, ensure that the pump is drained down.

• Be aware of the hazards relating to the pumped fluid, especially the danger from inhalation of noxious and toxic gases, skin and eye contact or penetration. Obtain and understand the hazardous substance data sheets relating to the pumped fluid and note the recommended emergency and first aid procedures.

• Isolate the equipment before any maintenance work is done. Switch off the mains supply, remove fuses, apply lock-outs where applicable and affix suitable isolation warning signs to prevent inadvertent reconnection. In order to avoid the possibility of maintenance personnel inhaling dangerous fumes or vapors, it is recommended that the maintenance work be carried out away from the pump locations by removal of bearing housing and shaft assembly to a suitable to a suitable maintenance area.

2. MAINTENANCE CHECKLIST

Preventive maintenance schedule is the periodical checks and precautions by which possibilities of failure and breakdown are made very remote.

2.1 Daily Checks

a) Pressure gauge reading.
b) Bearing temperature.
c) Leakage through stuffing box.
d) Noise and vibration.
e) Voltage and current.
f) Constant flow of external sealing liquid if provided.
g) Check all lubricant levels
h) On grease lubricated pumps, check running hours since last recharge of grease or complete grease change.

2.2 Periodical Maintenance

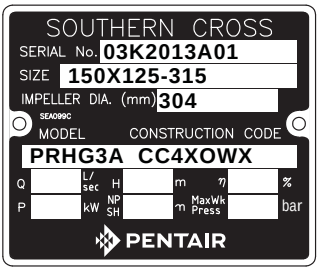
i) Replenish the grease.
j) Change the stuffing box packing.
k) Check the alignment of the pump set.
l) Calibrate the measuring instruments.
m) Check all paint or protective coatings.
n) Check all power/instrument cable glands for tightness.
o) Check the sealing connections for leakage etc.

Section 7.....Maintenance and Servicing

2.3 Overhauling:
With normal daily operating spell, the pump will be due for overhaul after about 5000 working hours. This work should be done by skilled personnel.

3. SPARE PARTS

3.1 Ordering of spares
The pump size and serial number are shown on the pump nameplate. When ordering spares the nameplate should be referred and following information should be quoted:
1) Pump serial number
2) Pump size
3) Part name — (refer to spares parts list)
4) Part number — (refer to spares parts list)
5) Number of parts required



Pentair Southern Cross supplied spares should only be used as replacements. Any change to the original design specification (modification or use of a non-genuine part) will invalidate the pump's safety and warranty liability with Pentair Southern Cross.

3.2 Recommended spares
For start-up purposes:

PARTS	QTY
Seal and bearing kit	1
Mechanical seal or packing gland	1
Impeller washer	1
Casing 'O' ring	1

For normal maintenance:

PARTS	QTY
Seal and bearing kit	1
Wear rings (If installed in original pump)	2
Meachanical seal or packing gland	1
Shaft	1
Impeller	1
Impeller washer	1
Casing 'O' ring	1

4. MAINTENANCE SCHEDULE – 'ISO' PUMPS
The below schedule provides a suitable timetable to monitor pump and system performance, and will provide a guide to pending maintenance requirements by comparing the current situation with previous recordings.
Extreme or unusual operating environments should be taken into consideration, and shorter maintenance intervals are recommended.

Section 7.....Maintenance and Servicing

ITEM	PERIOD	ACTION
Bearings	Monthly	Check bearing temperatures by thermometer. If bearing temperature is above 80 Deg. C, it may be because of too much, or insufficient lubrication. If necessary, check the condition of the bearings. Regreasable bearings should be supplied with fresh grease of the recommended grade. Check for lubricant leaks. Replace seals if leaking.
	3 Monthly	Oil lube bearings should be supplied with fresh oil of the recommended grade. Check old oil for metal particles or water. Check shaft for excessive free play.
Seal or Gland	3 Monthly	Check mechanical seal for leaks. Replace if leaking. Check packing for excessive leaks, and adjust or repack if necessary with the recommended grade and style of packing. When replacing packing, ensure that the lantern ring is aligned with the lubricant supply drillings. When repacking or replacing seals, check the condition of the shaft or sleeve. Replace if badly worn or corroded, and fit new bearings and seals. Check seal or gland flush piping for leaks, and repair or replace.
	Yearly	Check seal for wear, and replace if necessary. Check flush piping for scaling or blockages and clean and replace.
Flexible Coupling	6 Monthly	Check alignment of pump and motor. Re-align if necessary. Check for coupling wear and replace worn flexible element if necessary. Where frequent adjustment of alignment is necessary, check for cause (eg pipe loading, foundation failure, loose fasteners etc). If pipe loads are suspected, unbolt piping at suction and discharge flanges and check for mis-alignment. Check pipe supports and pack or adjust as required.
Pressure & Flow Recordings	3 Monthly	Check inlet and discharge pressure and rate of flow. Record these values and compare with previous recordings. A change in reading may indicate a fault in the system, wear or blockage in the pump. Investigate, and rectify as appropriate, as continued operation may result in untimely plant shutdown.
Valves & Fittings	6 Monthly	Check that ancillary fittings operate correctly. Improper function may cause premature pump failure.
Rotating Element	Yearly	Remove the rotating element and inspect for wear, scale buildup, or blockages. Clean unwanted deposits from components, as buildup will result in loss of performance. Check impeller running clearance. Replace defective components.

Section 7.....Maintenance and Servicing

6. DISMANTLING PROCEDURE

6.1 Tools required

A typical range of tools that will be required to maintain these pumps is listed below:

TOOL		WHERE USED
Open ended spanners (wrenches) to suit up to 2" (M50) screws/nuts		Undoing bearing cover
Tension wrench		Pretensioning impeller nut
Socket spanners (wrenches)		Undoing impeller nut
Socket sizes 28, 38, 48, 50 and 60 A/F		
Metric Allen keys (up to 10mm)		General disassembly
Screw driver set		Removing and assembling seals/gaskets
Soft mallet		Soft loosening assembled parts
Metal wedges		removing impeller off tapered pump shaft
Dial indicator		Checking impeller run-out
Shaft Locker		Holding shaft while undoing impeller nut

Section 7.....Maintenance and Servicing

If spacer type coupling has been fitted between the pump and driver, the pump casing can remain bolted to the suction and discharge pipes.

1. Remove the back plate to casing bolts. Jacking screw holes are provided in the back plate, to facilitate removal of the bearing housing shaft element.

2. Unscrew the impeller nut and remove the Nord-lock washer. Screw the impeller nut back on the shaft by hand and drive a pair of wooden wedges gently between the impeller and back plate, being careful not to distort the impeller. Remove the impeller nut and lift off impeller. Lift out impeller key.

3. Remove the bearing housing to back plate bolts and remove the back plate.

Some pumps do not have separate bearing housing to back plate bolts and these would have been removed in step (1).

4. Remove the bearing cover to bearing housing bolts. By tapping on the end of the shaft with a piece of wood, the shaft, bearing assembly and bearing cover can be removed.

A pump which has become worn in the body or impeller may be repaired by fitting bronze wear rings. These rings, with full instructions for machining the pump parts and fitting rings are obtainable from the nearest Southern Cross Dealer.

7. RE-ASSEMBLY PROCEDURE

Re-assemble the pump by following the procedure below, paying particular attention to the following:
1. Ensure gasket surfaces are clean.
2. Ensure shaft seal is fitted according to manufacturer's instructions.

Section 7.....Maintenance and Servicing

8. BEARING HOUSING ASSEMBLY

Step 1	Step 2	Step 3	Step 4
			
Fit oil slinger and wet end bearing inner race to shaft then place in appropriate press setup (>30t). *Note bearing orientation. Flange end towards center of shaft*	Slide on a drive end bearing so that the large face of the inner race is towards the impeller end of shaft as shown. Press assembly together.	After pressing first bearing, fit and press second drive bearing. *Note: Second bearing faces opposite direction*	Securely mount bearing housing before assembly.

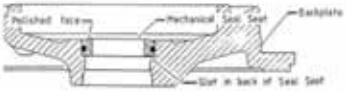
Step 5	Step 6	Step 7
	 	
Fit lock washer and nut. Tighten nut then lock.	Fit shaft from driven end	Fit outer race to previously pressed on inner race.

Step 8	Step 9
	
Fit oil seal to bearing cap.	Fit bearing caps to bearing housing.

Section 7.....Maintenance and Servicing

9. FITTING MECHANICAL SHAFT SEALS

Never use excessive force during installation;
Surroundings for seal installation require a high degree of cleanliness.
Seal face and seat should be checked for possible damage before installation.

Step 1	Step 2	Step 3	Step 4
			
OIL OR GREASE MUST NEVER BE USED as an assembly agent	Fit the stationary seat into the machined recess in the pump back-plate making sure the rubber cap is properly fitted over the seat with the rubbing face exposed. Cover the rubbing face with a cardboard washer and using plenty of clean water or liquid soap as lubricant, feed the seat slowly and without interruption into position in the pump back-plate (If necessary use a distance sleeve)		Check that the seat is fully inserted and at right angles to the shaft axis

Step 5	Step 6	Step 7	Step 8
			
Thoroughly clean the rubbing faces of the stationary seat and rotating element with alcohol and paper tissues (not cloth) and do not touch the faces with bare fingers	Install the rotating assembly of the mechanical seal onto the shaft by place the carbon face onto the shaft so it contacts the mechanical seal seat. Use soap as lubricant.	Push the rotating assembly onto the shaft using a slow clockwise turn until the seal face contacts the stationary seat	Finally the spring should be carefully compressed as the impeller is installed

Section 7.....Maintenance and Servicing

10. FITTING THE IMPELLER

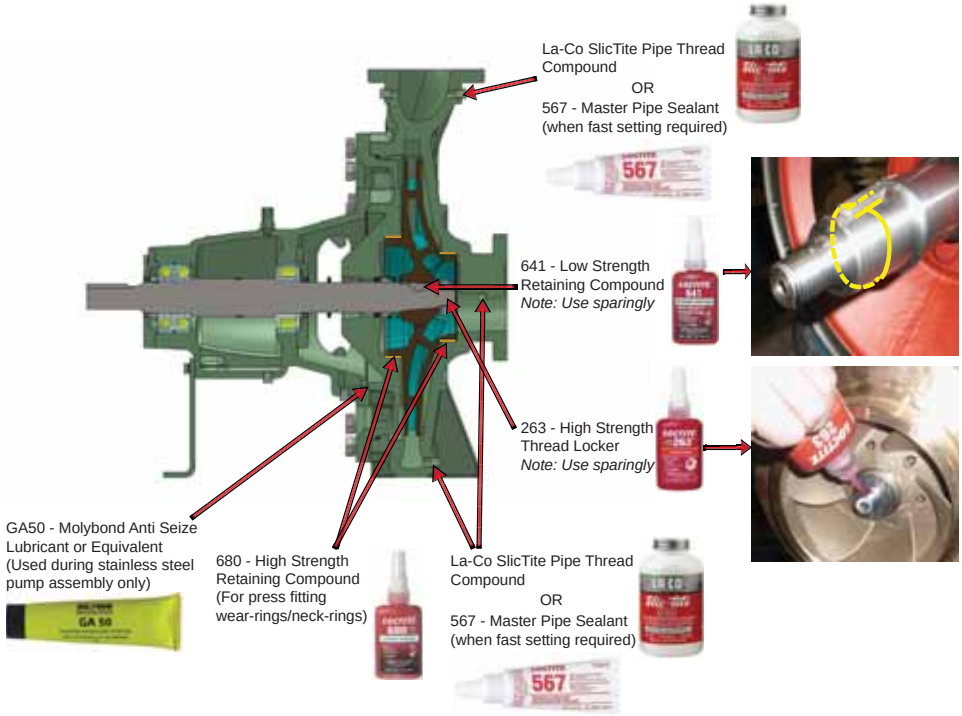
Step 1	Step 2	Step 3	Step 4
			
Apply Loctite 641 on the shaft taper	Loctite 641 should be applied as shown in the above picture *(Use Sparingly)*	Apply Loctite 263 on the shaft thread *(Use Sparingly)* and place Mechnical Seal spring in place	Place the Impeller on the Shaft Taper
Step 5	**Step 6**	**Step 7**	**Step 8**
			
Clean Tapered Stainless steel Custom designed Nuts and Nord-Lock Washers	Place the Lock-washer and Impeller nut on the shaft	Tighten nut to the specified torque.	Clean up excess loctite around the nut and shaft

11. SOCKET SIZES AND RECOMMENDED TORQUE

ISO-PRO PUMP	IMPELLER NUT TIGHTENING TORQUE - Nm (ft.lbs)	SOCKET SIZES A/F (mm)
Group 1	80 (60)	28
Group 2	100 (75)	38
Group 3	360 (265)	50
Group 4	750 (550)	60

Section 7.....Maintenance and Servicing

12. GENERAL GUIDE TO USING ADHESIVES, SEALANTS AND LUBRICANTS DURING PUMP ASSEMBLY



Section 8.....Pump Troubleshooting

1. PUMP TROUBLESHOOTING

When investigating trouble with Pentair Southern Cross pumps, always remember that pumps have been tested at the factory and are mechanically correct when sent out. Discounting the possibility of damage during transit, most of the trouble in the field is due to faulty installation. Investigation shows that the majority of troubles with centrifugal pumps result from faulty conditions on the suction side.

2. BREAK DOWN-CAUSE-CHECK POINTS

In case of breakdown we recommend the location of the fault by using the following table:

BREAKDOWN POINTS	CHECKPOINTS													
Pump does not deliver	1	7	8	9	10	11	12	13	14	15	17	18	19	23
	25	26	56	57	58									
Pump delivers at reduced capacity	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	15	17	18	19	20	21	22	56	57	58				
Delivery performance deteriorates	1	3	7	9	10	11	12	13	14	15	16	19	22	23
	24	53	57	62										
Pump delivers too much	16	56	57	58										
Delivery is interrupted	1	3	6	7	8	9	10	11	12	13	14	15	16	19
	22	23	25	26	56	57	58	62						
After stopping pump runs in reverse direction	52													
Very noisy	1	2	5	6	7	8	11	12	13	15	19	20	22	54
	55	56	57	62										
Unsteady running of pump	19	20	22	31	32	33	35	36	37	38	39	40	43	44
	47	48	49	50	51	54	55	58						
Stuffing box leaks excessively	24	27	28	29	30	31	47	48	49	53				
Fumes from stuffing box	22	23	24	25	26	27	28	29	30	41	42	43		
Pump rotor locked in standstill position	22	45	46	50										
Pump is heating up and seizing	23	24	25	26	27	28	29	30	40	41	42	45	47	48
	49	50	54											
Bearing temperature increases	19	20	21	22	31	32	33	34	35	36	37	38	39	40
	41	42	43	44	45	46	47	48	49	51	54	55	58	
Motor will not start	14	22	60											
Motor gets hot or burns out	14	22	27	28	40	43	50	55	56	57	58	59	60	61
Motor is difficult to start	14	22	27	28	45	46	50	58	59	60				

Section 8.....Pump Troubleshooting

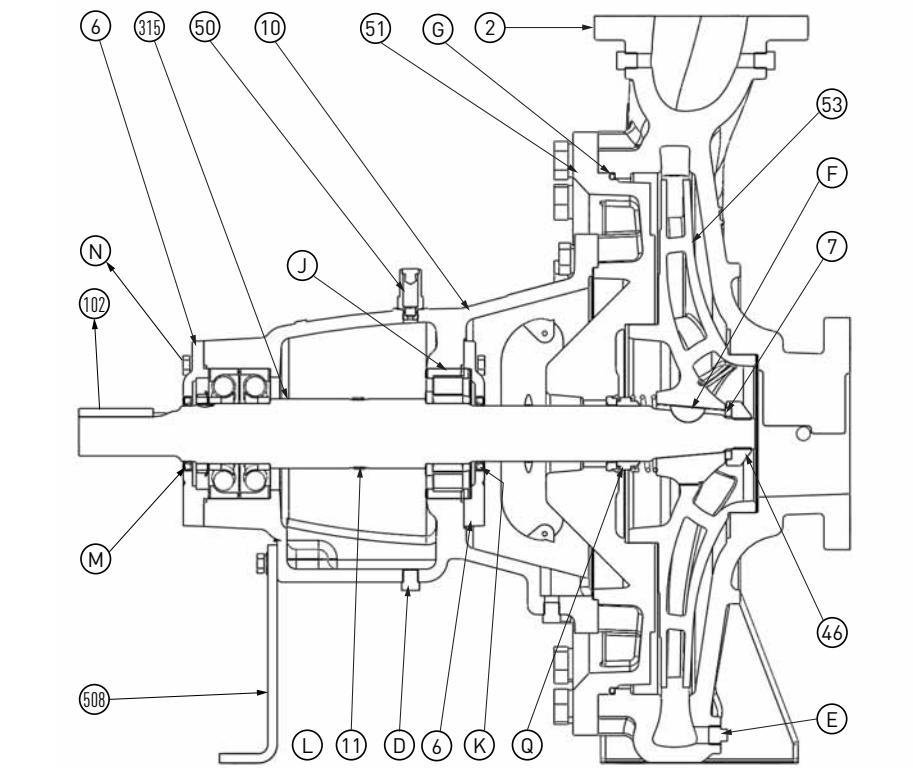
3. DESCRIPTION OF CHECK POINTS:

1	Suction pipe, foot valve choked.	32	Specified oil level not maintained.
2	Nominal diameter of suction line too small.	33	Insufficient lubrication of bearings.
3	Suction pipe not sufficiently submerged.	34	Bearings over-lubricated.
4	Too many bends in the suction line.	35	Oil/Grease quality unsuitable.
5	Clearance around suction inlet not sufficient.	36	Bearing incorrectly fitted.
6	Shut off valve in the suction line in unfavourable position.	37	Axial stress on bearings (no axial clearance for rotor).
7	Incorrect layout of suction line (formation of air pockets).	38	Bearings dirty.
8	Valve in the suction line not fully open.	39	Bearings rusty (corroded).
9	Joints in the suction line not leak-proof.	40	Axial thrust too great because of worn casing rings, relief holes obstructed.
10	Air leaking through the suction line and stuffing box etc.	41	Insufficient cooling water supply to stuffing box cooling.
11	Suction lift too high.	42	Sediment in the cooling water chamber of the stuffing box cooling.
12	Suction head too low (difference between pressure at suction connection and vapour pressure too low).	43	Alignment of coupling faulty or coupling loose.
13	Delivery liquid contains too much gas and/or air.	44	Elastic element of coupling worn.
14	Delivery liquid too viscous.	45	Pump casing under stress.
15	Insufficient venting.	46	Pipeline under stress.
16	Number of revolutions too high.	47	Shaft runs untrue.
17	Number of revolutions too low.	48	Shaft bent.
18	Incorrect direction of rotation (electric motor incorrectly connected, leads of phases on the terminal block interchanged).	49	Rotor parts insufficiently balanced.
19	Impeller clogged.	50	Rotor parts touching the casing.
20	Impeller damaged.	51	Vibration of pipe work.
21	Casing rings worn out.	52	Non-return valve gets caught.
22	Separation of crystals from the flow of pumping liquid (falling below the temperature limit/ equilibrium temp).	53	Contaminated delivery liquid.
23	Sealing liquid line obstructed.	54	Obstruction in delivery line.
24	Sealing liquid contaminated.	55	Delivery flow too great.
25	Lantern ring in the stuffing box is not positioned below the sealing liquid inlet.	56	Pump unsuitable for parallel operation.
26	Sealing liquid omitted.	57	Type of pump unsuitable.
27	Packing incorrectly fitted.	58	Incorrect choice of pump for existing operating conditions.
28	Gland tightened too much/slanted.	59	Voltage too low/power supply overloaded.
29	Packing not suitable for operating conditions.	60	Short circuit in the motor.
30	Shaft sleeve worn in the region of the packing.	61	Setting of starter of motor too high.
31	Bearing worn out.	62	Temperature delivery liquid too high.

4. ORDERING PARTS:

Please refer to spare parts list provided.

5. CROSS SECTION AND PARTS LIST



ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
2	Volute Casing	102	Shaft Key	J	Bearing - Impeller End
6	Bearing Cover	301	Bearing Housing	K	Dust Seal - Impeller End
7	Impeller Lock Washer	315	Shaft	L	Oil Level Plug *(NS)*
11	Oil Thrower	508	Support Foot	M	Dust Seal - Pulley End
14	Water Slinger	D	Oil Drain Plug	N	Bearing - Pulley End
46	Impeller Nut	E	Casing Plug	P	Gland Flushing Plug *(NS)*
50	Oil Breather	F	Impeller Key	Q	Mechanical Seal
51	Backplate	G	Casing O-Ring	R	Packed Gland *(NS)*
53	Impeller			*(NS)*	*Part Not Shown*

NOTES

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PENTAIR

Southern Cross

Telephone 131 PUMP

www.southerncross.pentair.com

A division of Pentair Flow Control Pacific Pty Ltd
A.B.N. 83 000 922 690

E-2 Challenger Valves

Series WSSE, LSSE, USSE & CBFV2103

CHALLENGER
VALVES AND ACTUATORS

Installation

Operation

Maintenance

www.challengervalves.com.au

Series WSSE, LSSE, USSE & CBFV2103

Index

Series WSSE, LSSE, USSE & CBFV2103

1. INTRODUCTION

1.1 DESIGN FEATURES

Available in wafer, lugged or double flanged body.
Flange holes comply with AS2129 E & ANSI Class 125/150 dimensions.
Cast-in top plate with ISO5211 mounting dimensions provides direct-mounting of Challenger HQ, HP actuators and manual operators.
The face-to-face dimensions are designed to comply with ISO5752, BS5155.
Wafer body features two alignment holes for ease of installation.
Through-shaft design.
Disc-to-seat interface provides bubble-tight shut-off with reduced torque and extended service life.
Factory tested to 110% of full rated pressure in both directions before shipping.

1.2 FLANGE AND PIPE COMPATIBILITY

Challenger" Butterfly Valves are designed to fit between the following piping flanges:
AS2129 Table E Wafer Pattern
AS2129 Table E Lugged Pattern
ANSI 125 Cast iron flanges
ANSI 150 Steel flanges
*Special requirements can be accommodated

Note: When installing valves in schedule 80 piping, make sure the valve is properly centered between the pipe flanges to prevent disc edge damage since the clearance between the disc O.D. and the pipe I.D. is reduced. If there is a compatibility question, compare the minimum pipe I.D.

1.3 OPERATING PRESSURES

DN NOMINAL DIAMETER		50 (2") - 2000 (80")	50 (2") - 2000 (80")	Mm (inch)
PN NOMINAL PRESSURE		10	16	bar
TESTING PRESSURE	BODY	15	24	
	SEALING	11	17.6	
°C WORKING TEMPERATURE		EPDM –20°C - 110°C NITRILE –10°C - 80°C		
SUITABLE MEDIUM		Water, Sewage, Sea Water, Air etc		

1.4 PRODUCT STORAGE

The valves should be stored with the disc in the partially open position. The valves should be stored indoors in a clean, dry, well-ventilated place away from corrosive materials and protected from excessive dust and dirt. The valves should be stored on a rack or pallet off the floor and arranged to prevent damage during handling. Keep valves out of direct sunlight and in a cool location to prolong elastomer life.
Valves should be protected to prevent damage to the flange faces, disc sealing edge and operator.

Series WSSE, LSSE, USSE & CBFV2103

CHALLENGER VALVES AND ACTUATORS

1.5 PRODUCT MARKING

All “Challenger” Butterfly Valves are equipped with an identification tag attached to the valve neck. This tag provides the model number, max pressure rating and valve materials. The valve neck also provides the size of the valve.

2. INSTALLATION INFORMATION

“Challenger” butterfly valves are designed for use between the faces of the following flanges, flat, raised face, slip-on or weld-neck flanges at the pressure indicated on the nameplate. **Flange gaskets should not be used**. Consideration should be given to the proper piping alignment prior to the installation of any cast iron lug bodied valve. All “Challenger” butterfly valves are bi-directional with the ability to control flow equally in either direction. All “Challenger” Lugged Series butterfly valves may be used for dead-end service in either direction at their full pressure rating.

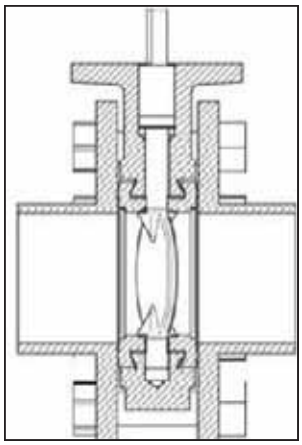
2.1 INSTALLATION INSTRUCTIONS

Step 1. Check to make sure that the pipe flange and valve sealing faces are clean and free from any debris (pipe scale, welding slag, etc.).
Step 2. Check the valve nameplate to ensure that the pressure and valve materials are correct for the application.

WARNING! Butterfly valves should never be installed where service conditions could exceed the valve ratings. Failure to heed warning may result in personal injury or property damage.

Step 3. The seat sealing face on the butterfly valves is wider than the valve body providing a leak proof seal when compressed between pipe flanges. Therefore, no flange gaskets are required when installing any butterfly valve.
Step 4. To prevent damage to the disc sealing edge before installation, position the disc in the “partially open” position (Figure 1) so that the disc is still contained within the valve body.

FIGURE 1. VALVE IN PARTIALLY OPEN POSITION



Series WSSE, LSSE, USSE & CBFV2103

CHALLENGER VALVES AND ACTUATORS

INSTALLATION INSTRUCTIONS

Step 5. Spread the pipe flanges apart allowing the valve to be supplied easily in between the flanges.

Step 6. Centre the valve between the flanges and loosely install all flange bolts. On the wafer valve, the flange bolts that pass through the alignment lugs should be installed first.

Step 7. Slowly open the valve to the full open position (see figure 2) and back to the partially open position ensuring that the disc moves freely without any obstruction. If no obstruction is encountered, return the valve to full open position and hand tighten all flange bolts using the bolt tightening sequence shown in figure 3.

FIGURE 2. VALVE IN FULL OPEN POSITION

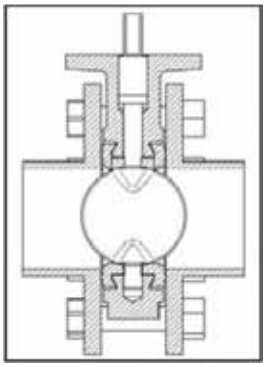
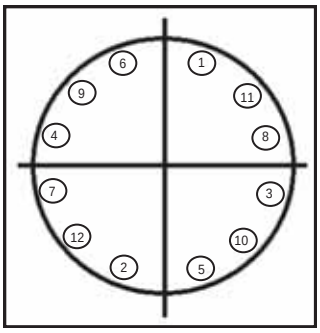


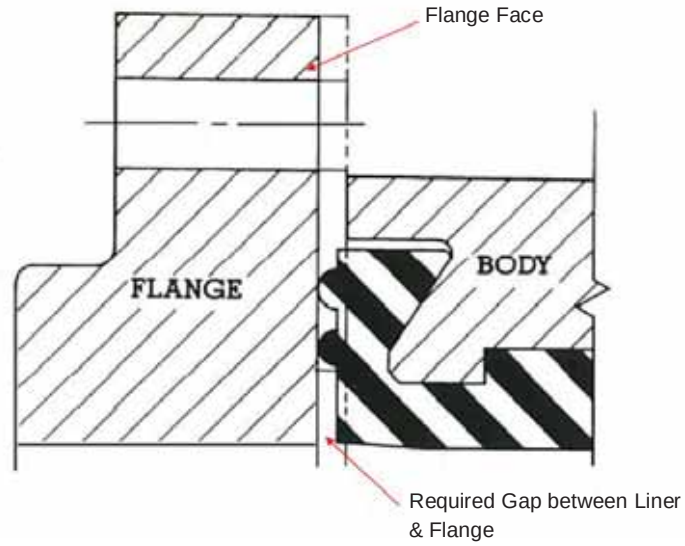
FIGURE 3. BOLTING SEQUENCE



Step 8. Rotate the disc from the fully open position to the fully closed position and make sure that the valve is properly centred and the disc edge does not make contact with the pipe ID.
Return the disc to the full open position and tighten the flange bolts following the bolt tightening sequence shown in Figure 3. Do not fully tighten each flange bolt all at once. Tighten each bolt incrementally . several times. Continually cycle the valve from fully open to fully closed to ensure that there is proper disc clearance.

Step 9. Bolts on flanges are not to be tightened to the extent where the flange is in contact with the body of the valve. The unique O-Ring sealing design allows positive sealing without the over tightening of the bolts. Over tightening of the bolts results in excessive valve torques restricting operation of the valve and potentially damaging the rubber seal. A gap should be visible after the bolts are tightened (see figure 4).

FIGURE 4. O-RING SEALING DESIGN



Upon flange loading the Double Moulded O-Ring surface area has been calculated to provide sufficient compression to firmly lock and secure liner into mechanical dovetail joint, ensuring effective sealing and reduced torques.

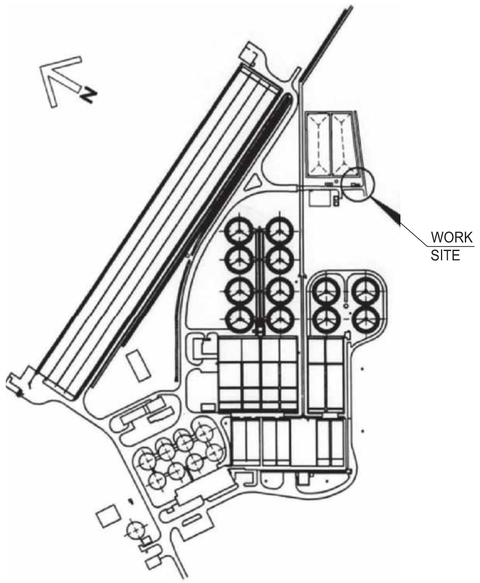
Series WSSE, LSSE, USSE & CBFV2103

CHALLENGER VALVES AND ACTUATORS

3. MAINTENANCE AND REPAIR

Challenger" butterfly valves are designed for extended service with minimal wear and servicing. No regular lubrication is required. Prior to any replacement or repair, the valve must be removed from the line following these precautions:
The pipeline on either side of the valve must be depressurized and drained.
Ensure that the disc is in the partially open or full closed position before removing the valve from the line.
DO NOT remove an actuator or operator from the valve while the line is still pressurized.

F-1 As Built



SITE PLAN

SCALE - NTS

PIPES AND FITTINGS

M1. ALL SUCTION PIPES AND FITTING SHALL BE OF PE100 MATERIAL AND A MINIMUM PRESSURE CLASS PN12.5 (SDR 13.6).

M2. ALL PE PIPES AND FITTINGS SHALL BE ELECTRO FUSION OR BUTT WELDED JOINTED.

M3. THE SUCTION PIPE SHALL BE FULLY JOINED ONLY AT THE OPTIMUM TEMPERATURE OF 25 DEGREES CELSIUS.

M4. THE EMPTY SUCTION PIPE SHALL NOT BE EXPOSED TO HOT SUN FOR A CONSIDERABLE PERIOD OF TIME TO ALLOW TEMPERATURE RISE BEYOND THE DESIGN LIMIT. THE COMPLETE SUCTION PIPE AFTER SUCCESSFUL TESTING SHALL BE FILLED WITH PRODUCT WATER AS SOON AS PRACTICAL, OTHERWISE CONTROL MEASURES MUST BE PUT IN PLACE TO LIMIT THE TEMPERATURE RISE IN THE EMPTY PIPE.

M5. AS A RESULT OF DIFFERENTIAL GROUND SETTLEMENT, THE PIPE SUPPORTS REQUIRE REGULAR HEIGHT ADJUSTMENT AT THE THREADED ROD/ANCHOR BOLTS TO RESTORE THE SUCTION PIPE TO ITS ORIGINAL ALIGNEMENT.

M6. PIPE SUPPORT RING GASKET SHALL BE OF LOW FRICTION MATERIAL. THE COEFFICIENT OF FRICTION < 0.25 (FLEXISTRUT FSM2600B OR SIMILAR)

CONCRETE

C1. ALL CONCRETE WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 AND AS 3610.

C2. CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 40MPa, GRADE S40 WITH 25% ASH/SLAG BINDER REPLACEMENT, UNO.

C3. BLINDING OR MASS CONCRETE SHALL BE GRADE N15, UNO.

C4. SLUMP SHALL BE AS APPROPRIATE FOR PLACEMENT AND THE MAXIMUM SHALL BE 120mm.

C5. THE DESIGN EXPOSURE CLASSIFICATION TO AS3600 IS "B". THE MINIMUM CLEAR CONCRETE COVER FOR FOOTING SLABS SHALL BE 50mm, UNO.

C6. ALL REINFORCEMENT SHALL BE TIED AT EVERY SECOND JUNCTION OR CLOSER AS REQUIRED.

C6. ALL REINFORCEMENT BARS SHALL BE SUPPORTED FIRMLY AT NO GREATER THAN 1m CENTRES BOTH WAYS BY APPROVED BAR CHAIRS. PLASTIC TIPPED WIRE BAR CHAIRS ARE NOT ALLOWED.

C7. REINFORCEMENT SYMBOLS ARE AS FOLLOWS:

N DENOTES GRADE 500 TO AS 4671

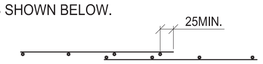
RL/SL DENOTES WIRE FABRIC TO AS 4671

W DENOTES HARD DRAWN PLAIN WIRE TO AS 1303

C8. MINIMUM LAP/ANCHORAGE LENGTH FOR REINFORCING BARS SHALL BE:

BAR	LAP / ANCHORAGE	BAR	LAP / ANCHORAGE
N12	400	N24	1000
N16	600	N28	1300
N20	750	N32	1600

C9. ALL REINFORCING FABRIC/MESH SHALL BE SUPPLIED IN FLAT SHEETS AND LAP AS SHOWN BELOW.



C10. ALL EXPOSED EDGES AND CORNERS SHALL BE PROVIDED WITH 25mm FILLETS OR CHAMFERS.

C11. ALL CONCRETE SHALL BE MECHANICALLY COMPACTED TO A HOMOGENOUS MASS AND COMPLETELY FILLED THE FORMWORK.

C12. FORMED SURFACE SHALL BE FINISHED TO CLASS 3 SMOOTH FINISH TO AS3610. UNFORMED SURFACE SHALL BE WOOD FLOATED AND ALL EDGES FINISHED BY A SMOOTH EDGE TOOL.

C13. CURING OF CONCRETE SHALL BE CARRIED OUT BY KEEPING THE SURFACE WET FOR PERIOD OF 3 DAYS AND PREVENTION OF MOISTURE LOSS FOR A TOTAL OF 7 DAYS. APPROVED CURING COMPOUND COULD BE USED IF IT IS COMPATIBLE WITH THE FINISHING.

GENERAL

G1. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE RELEVANT GENERAL ARRANGEMENT DRAWINGS.

G2. ALL SET OUT AND DIMENSIONS ARE IN MILLIMETERS AND TO BE CONFIRMED/VERIFIED ON SITE. DO NOT SCALE DIMENSIONS FROM DRAWINGS.

G3. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH RELEVANT SAA CODES AND CODE OF PRACTICE OF RELEVANT AUTHORITY.

G4. ALL EXISTING STRUCTURES SHALL BE MAINTAINED IN A STABLE CONDITION DURING CONSTRUCTION. PROVIDE PROPPING AND SHORING IF REQUIRED.

G5. ALL ABBREVIATIONS ARE IN ACCORDANCE WITH AS HB24-SYMBOLS AND ABBREVIATIONS FOR BUILDING AND CONSTRUCTION.

DESIGN

D1. THE DESIGN OF THE FOOTING SLABS IS BASED UPON GROUND MOVEMENT OF 50mm CENTRE HEAVE AND EDGE HEAVE.

D2. BASED UPON THE DIFFERENCE IN LIQUID LEVEL OF THE LAGOON AND PIPE INVERT, THE ADOPTED OPERATING PRESSURE FOR THE SUCTION PIPE IS 30kPa. THE TEST AND DESIGN PRESSURE IS 45kPa.

D3. THE DESIGN TEMPERATURE VARIATION IN THE SUCTION PIPE WHEN CHARGED WITH PRODUCT WATER IS +20 AND -15 DEGREES CELSIUS. THE SUCTION PIPE SHALL BE FULLY JOINED ONLY AT THE OPTIMUM TEMPERATURE OF 25 DEGREES.

D4. THE DESIGN IS BASED UPON A MAXIMUM FUTURE DIFFERENTIAL SETTLEMENT OF 100mm BETWEEN THE NEW FOOTING SLABS AND EXISTING VALVE PIT AND PUMP FOUNDATION.

FOUNDATION

F1. THE FOUNDATION MATERIAL SHALL HAVE AN ALLOWABLE BEARING PRESSURE OF 150kPa, UNO.

F2. THE FOUNDING MATERIALS SHALL BE COMPACTED TO 98% STANDARD COMPACTION TO AS1289.E1.1 OR PROOF ROLLED BY A 2 TONNE ROLLER.

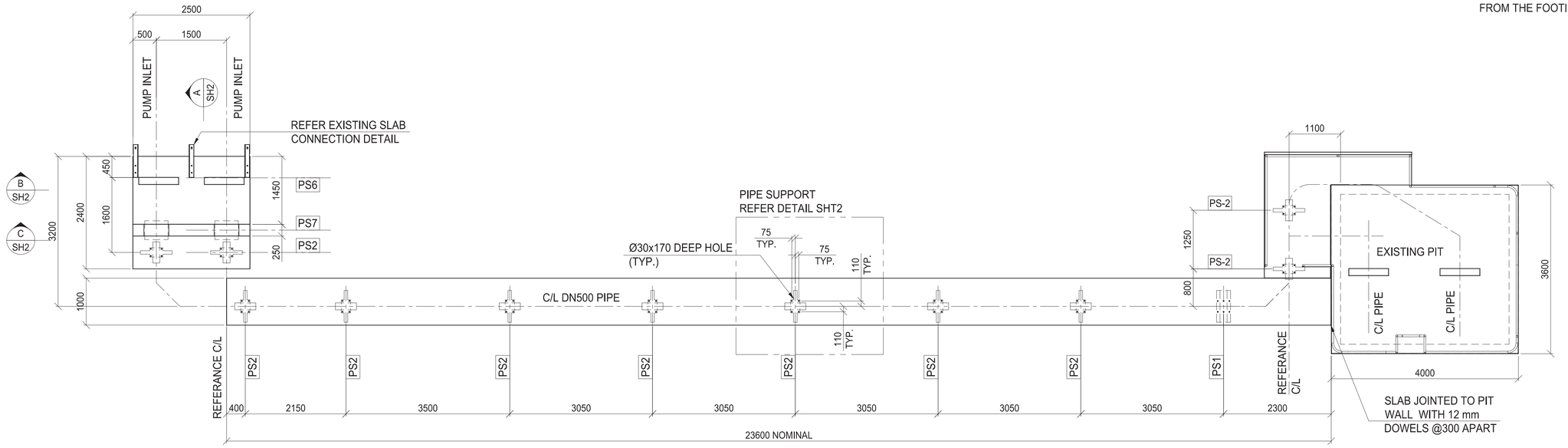
F3. DYNAMIC COMPACTION IS PROHIBITED ON THIS SITE.

F4. ALL SOFT POCKETS SHALL BE REPLACED WITH MASS CONCRETE OR ENGINEERING FILL WITH A PLASTIC INDEX LESS 30%.

F5. ALL EXISTING FOOTINGS SHALL BE KEPT IN A STABLE CONDITION DURING EXCAVATION AND CONSTRUCTION.

F6. EXPOSED FACE OF THE FOUNDATION MATERIALS SHALL BE PROTECTED FROM DETERIORATION/WEATHERING BY BLINDING CONCRETE AS SOON AS PRACTICAL.

F7. GRADE SITE SUCH THAT SURFACE WATER IS DRAINED AWAY FROM THE FOOTING SLABS.



PLAN - FOOTING SLABS

SCALE 1:50

AS CONSTRUCTED

AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED:	DATE:
NAME of SIGNATORY:	B KK SHUEN
RPEQ No. or LICENCE:	12902
COMPANY NAME:	BERNARD SHUEN AND PARTNERS
START DATE:	FINISH DATE:

evoqua WATER TECHNOLOGIES

Evoqua Water Technologies Pty Ltd

ABN 52 165 060 168

15 Blackman Crescent, South Windsor NSW 2756, AUSTRALIA
Tel: +61245776800 Fax: +61245770078

160 Herring Road, Macquarie Park NSW 2113, AUSTRALIA
Tel: +611300661809 Fax: +611300661708

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

QUEENSLAND UrbanUtilities

No.	DATE	AMENDMENT	RPEQ	RPEQ NO.	APPROVED	QUU
1	12/5/15	AS BUILT	B K S	19902	EA	QUU
0	16/2/15	FOR CONSTRUCTION	B K S	19902	EA	QUU

FUNDING		
DESIGN W.O. No.	PB011035	
CONSTRUCTION W.O. No.	PB011797	
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	

DRAFTED	V.N.K.		
DRAFTING CHECK	B KK SHUEN		
CAD FILE	486/5/8-0358-001.DWG		
B KK SHUEN	12902	04/02/2015	
Q.U.U. FILE No.	191/255/0863/063/2012		
DESIGN CHECK	R.P.E.Q. No.	DATE	

P.CURTIS	10419	10/10/2014	
DESIGN	R.P.E.Q. No.	DATE	
E.AGANOVIC		4/02/2015	
APPROVED BY	SIGNATURE	DATE	
CONSTRUCTION MANAGER	SIGNATURE	DATE	

ASSET/PROJECT

LUGGAGE POINT STP
MFRO ABS
PIPE REPLACEMENT

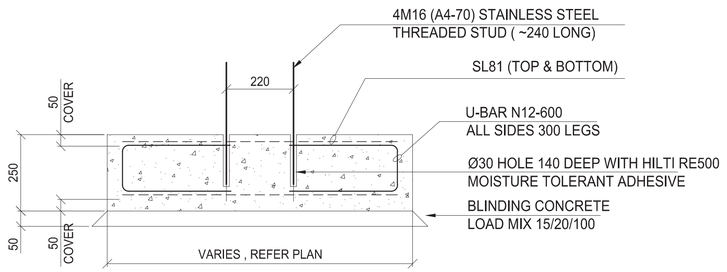
DRAWING TITLE

PIPE SUPPORT SLAB
PLAN AND TYP. SECTION
SCALE:AS NOTED ON A1 SHEET

SHEET No. 1 OF 2

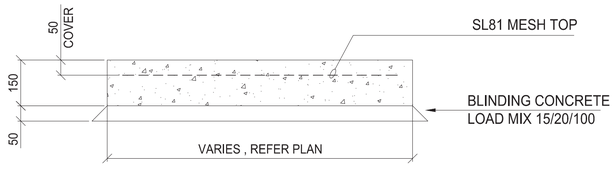
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/8-0358-001

AMEND. 1



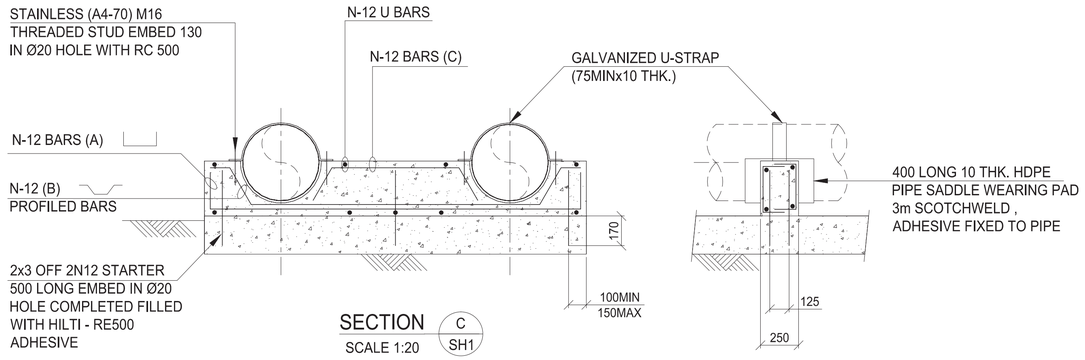
TYPICAL SECTION - FOOTING SLABS

SCALE 1:10



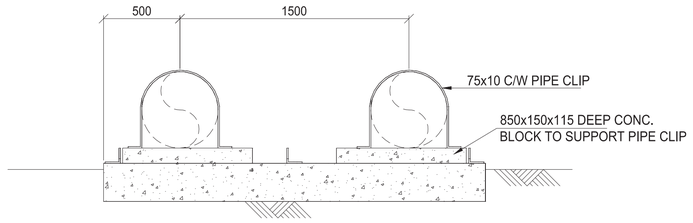
TYPICAL SECTION - WALKWAY SLAB

SCALE 1:10



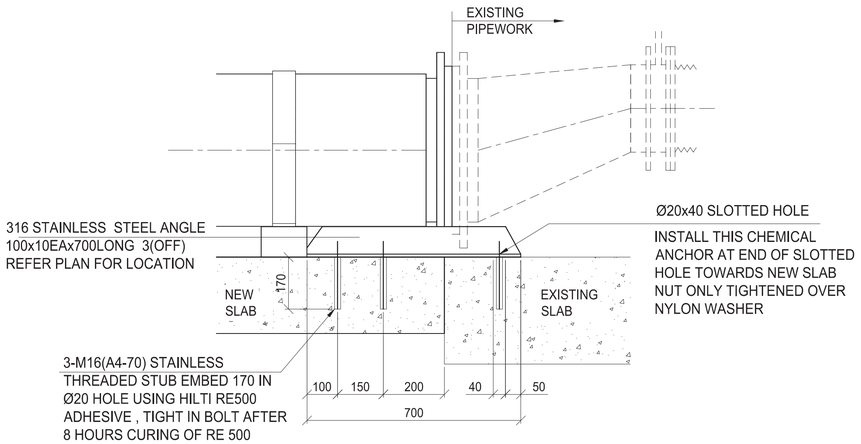
SECTION C / SH1

SCALE 1:20



SECTION B / SH1

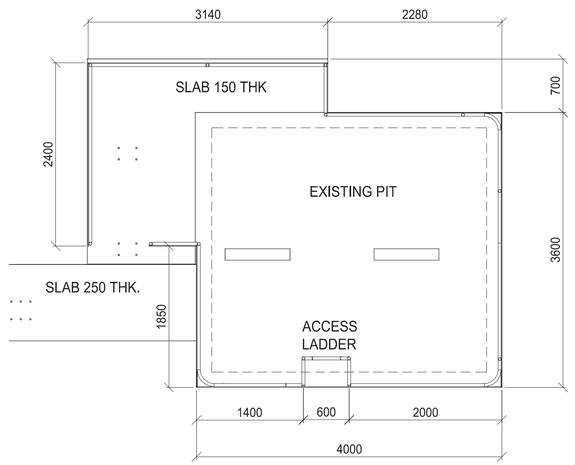
SCALE 1:20



SECTION A / SH1

SCALE 1:10

EXISTING SLAB CONNECTION DETAIL



PLAN - HANDRAIL DETAIL

SCALE 1:40

AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

SIGNED:	DATE:
NAME of SIGNATORY:	B KK SHUEN
RPEQ No. or LICENCE:	12902
COMPANY NAME:	BERNARD SHUEN AND PARTNERS
START DATE:	FINISH DATE:

EVOQUA WATER TECHNOLOGIES

Evoqua Water Technologies Pty Ltd
ABN 52 165 060 168
15 Blackman Crescent, South Windsor NSW 2756, AUSTRALIA
Tel: +61245776800 Fax: +61245770078
160 Herring Road, Macquarie Park NSW 2113, AUSTRALIA
Tel: +611300661809 Fax: +611300661708

NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

QUEENSLAND UrbanUtilities

AS CONSTRUCTED

No.	DATE	AMENDMENT	RPEQ	RPEQ NO.	APPROVED	QUU
0	12/5/15	AS BUILT	B K S	19902	EA	QUU

FUNDING		DRAFTED	V.N.K.	P.CURTIS 10419 10/10/2014	E.AGANOVIC 04/02/2015
DESIGN W.O. No.	PB011035	DRAFTING CHECK	B KK SHUEN	DESIGN R.P.E.Q. No. DATE	APPROVED BY SIGNATURE DATE
CONSTRUCTION W.O. No.	PB011797	CAD FILE	486/5/8-0358-001.DWG	B KK SHUEN 12902 04/02/2015	
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	Q.U.U. FILE No.	191/255/0863/063/2012	DESIGN CHECK R.P.E.Q. No. DATE	CONSTRUCTION MANAGER SIGNATURE DATE

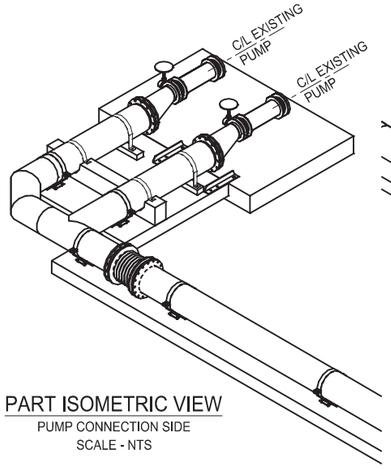
ASSET/PROJECT
LUGGAGE POINT STP
MFRO ABS
PIPE REPLACEMENT

DRAWING TITLE
PIPE SUPPORT SLAB
SECTION DETAILS
SCALE:AS NOTED ON A1 SHEET

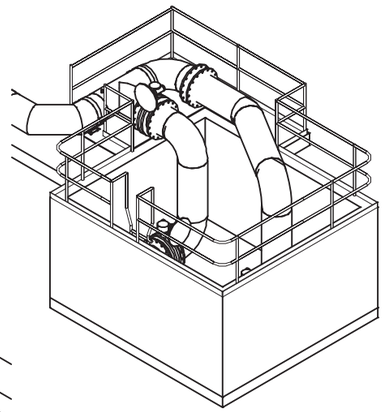
SHEET No. 2 OF 2

QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/8-0358-001

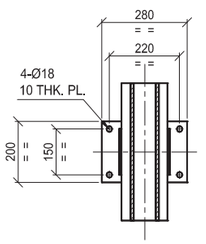
AMEND. 0



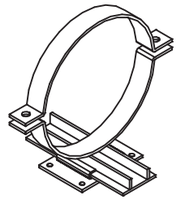
PART ISOMETRIC VIEW
PUMP CONNECTION SIDE
SCALE - NTS



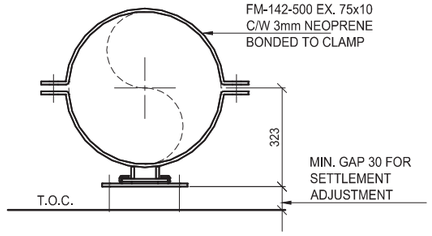
PART ISOMETRIC VIEW
PIT SIDE
SCALE - NTS



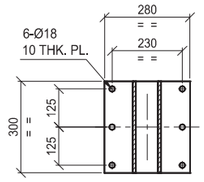
HOLD DOWN PLATE



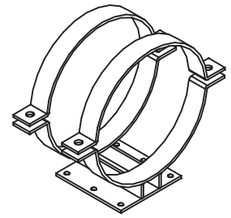
ISOMETRIC VIEW



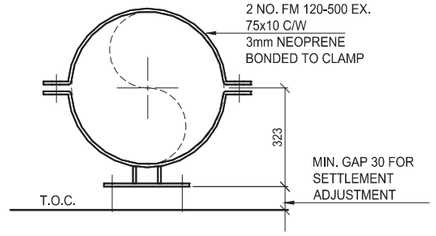
PS2 PIPE SUPPORT - SLIDE GUIDE
SCALE 1:10



HOLD DOWN PLATE

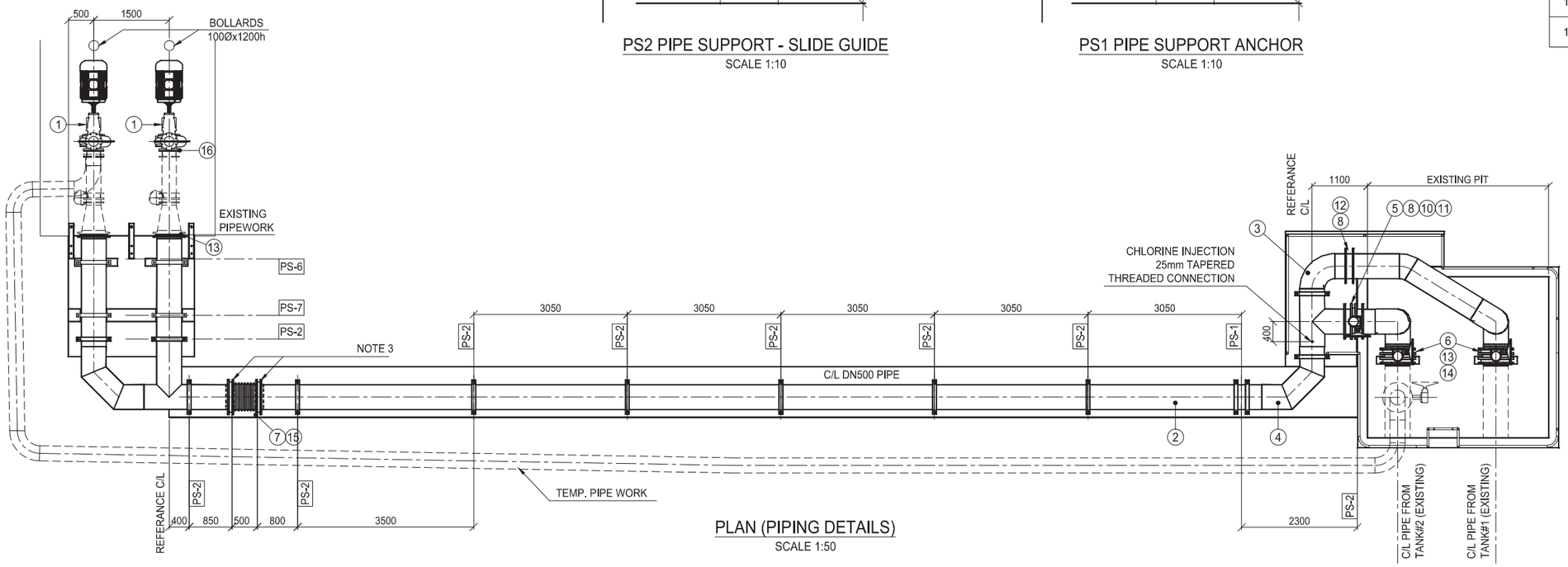


ISOMETRIC VIEW



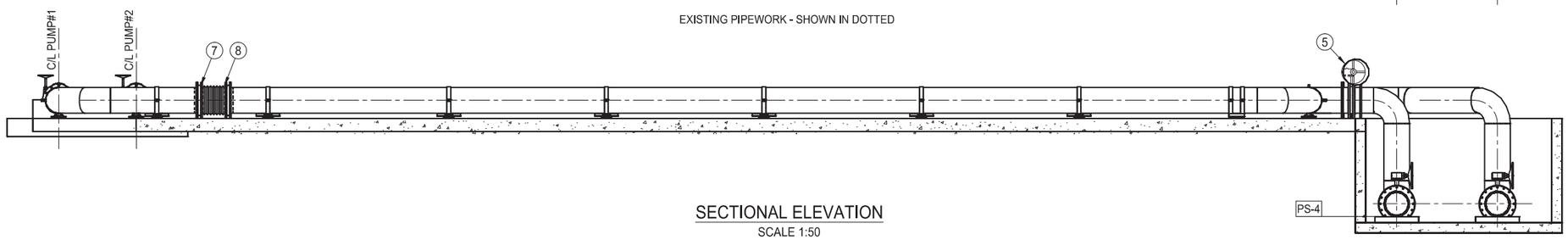
PS1 PIPE SUPPORT ANCHOR
SCALE 1:10

BILL OF MATERIAL			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	PUMP - SX PRO4 C/W CMG MOTOR, PENTAIR	CAST IRON , VARIOUS	2
2	PE PIPE - 500mm	PN12.5, SDR13.6	30m
3	ELBOW	PN16, SDR11	6
4	SEGMENTED BEND	PN16, SDR11	2
5	BUTTERFLY VALVE- MANUAL, USSE CHALLENGER	CAST IRON , VARIOUS	1
6	DN450 BUTTERFLY VALVE C/W ACTUATOR , USSE, CHALLENGER	CAST IRON , VARIOUS	2
7	EXPANSION JOINT, RADCOFLEX FE500	STAINLESS STEEL	1
8	STUB FLANGE WITH BACKING RING 500mm	316SS, TABLE 'D'	2
9	PIPE SUPPORTS - REFER SCHEDULE	HDG	-
10	SPACER 500mm x 65mm	316SS, TABLE 'D'	2
11	BOLTS, M24 x 190mm	GALVANISED 4.6 GRADE	32
12	BOLTS, M24 x 240mm	GALVANISED 4.6 GRADE	16
13	BOLTS, M24 x 130mm	GALVANISED 4.6 GRADE	24
14	BOLTS, M24 x 90mm	GALVANISED 4.6 GRADE	24
15	BOLTS, M24 x 160mm	316 SS	-
16	BOLTS, M20 x 100mm	316 SS	-



PLAN (PIPING DETAILS)
SCALE 1:50

EXISTING PIPEWORK - SHOWN IN DOTTED



SECTIONAL ELEVATION
SCALE 1:50

PIPE SUPPORT SCHEDULE		
PS-1	500DN ANCHOR FM120-500	1
PS-2	500DN SLIDE GUIDE (FM142-500)	13
PS-3	STANDARD CLAMPS FOR VERTICAL PIPE ONLY	2
PS-4	MASS CONCRETE SUPPORT AT ELBOW OF VERTICAL LEGS OR EXISTING	2
PS-5	NOT USED	1
PS-6	CONCRETE BASE (850x150x115h) WITH CLIPS	2
PS-7	CONCRETE BULKHEAD WITH CLIPS & PIPE SADDLE PADS	2

NOTES :
1. ALL NUTS, BOLTS, & FASTENERS ARE 316SS CLASS 80.
2. ALL CHEMICAL SET ANCHORS ARE 316SS, CLASS 70.
3. BELLOWS BOLTS M24 X 160 STAINLESS WITH GALVANISED WASHER AT GALVANISED FLANGE FACE ON PIPE WORK.

AS CONSTRUCTED DETAILS

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RPEQ No. or LICENCE:	12902
COMPANY NAME:	BERNARD SHUEN AND PARTNERS
START DATE:	FINISH DATE:

evoqua WATER TECHNOLOGIES

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ABN 52 165 060 168
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NAME SIGNATURE DATE

QUEENSLAND URBAN UTILITIES DELEGATE
(AUTHORISED FOR 12 MONTHS FROM DATE SHOWN)

QUEENSLAND UrbanUtilities

AS CONSTRUCTED

No.	DATE	AMENDMENT	RPEQ	RPEQ NO.	APPROVED	QUU
1	12/5/15	AS BUILT	B K S	19902	EA	QUU
0	16/2/15	FOR CONSTRUCTION	B K S	19902	EA	QUU

FUNDING			
DESIGN W.O. No.	PB011035	DRAFTED	V.N.K.
CONSTRUCTION W.O. No.	PB011797	DRAFTING CHECK	B KK SHUEN
FUNDED BY Q.U.U. (✓)	EXTERNAL ( )	CAD FILE	486/5/8-0358-002.DWG
		Q.U.U. FILE No.	191/255/0863/063/2012

P. CURTIS	10419	10/10/2014	
DESIGN	R.P.E.Q. No.	DATE	
B KK SHUEN	12902	04/02/2015	
DESIGN CHECK	R.P.E.Q. No.	DATE	
E.AGANOVIC		04/02/2015	
APPROVED BY	SIGNATURE	DATE	
CONSTRUCTION MANAGER	SIGNATURE	DATE	

ASSET/PROJECT
LUGGAGE POINT STP
MFRO ABS
PIPE REPLACEMENT

DRAWING TITLE
PIPING GA DETAILS
SCALE:AS NOTED ON A1 SHEET

SHEET No. 1 OF 1
QUEENSLAND URBAN UTILITIES DRAWING No. 486/5/8-0358-002
AMEND. 1

G-1 Name Plate Photos


marathon™
Supplied by CMG Australia
www.cmggroup.com.au
IEC60034-1
3-MOT.NO. M34055003XGA Serial No. 12401401002 F16
Type XGA 250M4 IMB3 IP66 Duty S1 570 kg Ins.cl: F
V Hz kW A cosφ Conn r/min Eff
415 50 55 93.4 0.87 Δ 1485
400/690 50 55 96.5/55.9 0.87 Δ/Y 1480
60 101-101-96.5 0.87 Δ 1780
Voltage Range: Δ 380-420V 50Hz (440-480V 60Hz) Y 660-720V 50Hz
Brgs.DE: 6316C3 NDE: 6315C3 PTC 150°C


marathon
Supplied by CMG Australia
www.cmggroup.com.au
IEC60034-1
3~MOT.NO: M34055003XGA
Serial No: 8690132200 4
F16
Type XGA 250M4
IM B3
IP 55
Duty S1
570 kg
Ins.cl: F
V
Hz
kW
A
cosφ
Conn
r/min
Eff
415
50
55
93.4
0.87
Δ
1485
400/690
50
55
96.5/55.9
0.87
Δ/Y
1480
60
0.87
Δ
1780
Voltage Range: Δ 380-420V 50Hz (440-480V 60Hz)
660-720V 50Hz
Brgs.DE: 6316C3
NDE: 6315C3
PTC 150°C


Southern Cross
SERIAL No.
SIZE
IMPELLER DIA. (mm)
SEA099C
MODEL
CONSTRUCTION CODE
Q
P
L/sec
kW
H
NP SH
m
m
η
MaxWk Press
%
bar
PENTAIR


Southern Cross
SERIAL No.
SIZE
250X200-315
IMPELLER DIA. (mm)
314
MODEL
CONSTRUCTION CODE
PENTAIR