

	<b>Works Information</b>	<b>Generation</b>
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Title:

**Lethabo Turbine Control System  
Hydraulic Accumulator Works  
Information**

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## **1. INTRODUCTION**

This document contains the works information for the Lethabo Turbine Control System Hydraulic Accumulator Installation Project. The detail design was performed in-house as well as the sizing of the accumulator. The *Contractor* shall be responsible for the procurement, supply and installation of the components required as part of the scope of work.

## **2. SUPPORTING CLAUSES**

### **2.1 SCOPE**

This document covers the applicable work to be done, as well as the requirements and specifications regarding the work.

#### **2.1.1 Purpose**

The aim of this document is to provide the *Contractor* with all the details required to perform the work as defined in the scope.

#### **2.1.2 Applicability**

This document shall apply to the Lethabo Turbine Control System Hydraulic Accumulator Installation Project and to the *Contractor* for the *Works*.

### **2.2 NORMATIVE AND INFORMATIVE REFERENCES**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

#### **2.2.1 Normative**

Not applicable

#### **2.2.2 Informative**

<b>Document title</b>	<b>Document number</b>
[1] Occupational Health and Safety Act of 1993	OHSACT
[2] Standard Specification for the Categorization and Conformity Assessment Pressure Equipment – Pressure Equipment Regulations	SANS 347

**Table 1 – Applicable Standards and Codes**

<b>Document title</b>	<b>Document number</b>
[3] Metallic products. Types of inspection documents	BS EN 10204
[4] Metallic industrial piping	BS EN 13480
[5] Seamless steel tubes for pressure purposes-Technical	BS EN 10216-5

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delivery conditions Part 5 : Stainless steel tubes	
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**Table 2 – Applicable Eskom Documents**

Document title	Document number
[6] Eskom Design Review Procedure	240-53113685
[7] Coding and Labelling Standard	240-40643427
[8] Specification for the Identification of the Contents of Pipelines and Vessels	240-114767031
[9] Steam Turbine Protection Functions - Requirements and Control Standard	240-56030575
[10] Standard for Welding Requirements on Eskom Plant	240-106628253
[11] High Energy Pipework Standard for Eskom Power Plants	240-56239129
[12] Standard for Non-Destructive Testing (NDT) on Eskom Plant Processes on Eskom Plant Standard	240-83539994
[13] Engineering Drawing Standard-Common Requirements	240-86973501
[14] Material Specification and Certification Guideline for Power Generation Plant	240-84513751
[15] Procurement of High Pressure Pipework and Boiler Tubing Material Standard in the Generation Division	240-87733094
[16] Supplier Quality Management Specification	240-105658000
[17] Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings	240-106365693
[18] Structural Design and Engineering Standard	240-56364545
[19] Constructability Assessment Guideline	240-107981296

## **2.3 DEFINITIONS**

### **2.3.1 Disclosure Classification**

**Controlled disclosure:** controlled disclosure to external parties (either enforced by law, or discretionary).

**Table 3 – Definition of Terms**

Term	Definition
Latest	When referring to a revision of a document or standard, this shall mean the Most recent version of same to have been published before contract placement.
Nozzle	Refers to a nozzle on a branch on a pipe as applicable.

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Term	Definition
Stub	Refers to a stub on a branch on a pipe as applicable.

## 2.4 ABBREVIATIONS

Abbreviation & Acronyms	Description
AIA	Authorised Inspection Authority
CAR	Corrective Action Reports
FRF	Fire Resistant Fluid
NCR	Non-conformance Report
NDT	Non Destructive Test
OHS	Occupational Health and Safety
PER	Pressure Equipment Regulations
PMA	Particular Material Appraisal
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Procedure
WPS	Welding Procedure Specification

## 3. WORKS INFORMATION

### 3.1 GENERAL REQUIREMENTS

1. The *Contractor* is responsible for the procurement, supply, installation and commissioning of all items stipulated in section 3 of this document (hereafter referred to as “*the Works*”) according to the applicable codes and standards and the requirements in this document. In addition, the *Contractor* shall be responsible for the disposal of all waste material resulting from the installation of the new equipment. All waste to be disposed as per the Lethabo Power Station Waste Management Work instruction (LBE 22004) and according to waste regulations.
2. All requirements in this document also apply to any subcontractor appointed by the *Contractor* if applicable.
3. Areas where cutting or welding are to be done shall be thoroughly cleaned beforehand.
4. It is the *Contractor's* responsibility to ensure that all items installed/modified as per this document shall work as required. Any additional work or items to be installed to fulfil this requirement is the responsibility of the *Contractor* and shall be held to the same requirements as items specified in this document.
5. The *Contractor* shall provide training to the station personnel regarding the operating and maintenance of the accumulator and safety block.

### 3.2 SAFETY REQUIREMENTS

1. The *Contractor* shall comply with the latest revision of the Eskom Generation Plant Safety Regulations and stipulations of the Occupational Health and Safety (OHS) Act.

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### 3.3 WELDING REQUIREMENTS

1. The following requirements are applicable for all welding:
  - a. All welding shall be performed in accordance with 240-106628253 Standard for Welding Requirements on Eskom Plant.
  - b. All welding documentation shall be subject to acceptance by an Eskom Welding Engineer and Welding Inspector, in accordance with all current Eskom standards.
2. The specifications in this document are made without knowing the location of all welds on pipework. It is the *Contractor's* responsibility to inspect areas near where work is to be done to ensure that weld proximity is not a concern (4 times wall thickness distance between weld toes).

### 3.4 NDT REQUIREMENTS

1. The *Contractor* is responsible for performing all Non-destructive Testing (NDT) as specified in this document and as required by law or applicable health and safety standard.
2. NDT shall only be performed by an Employer approved NDT company's level 2 NDT technicians. The Eskom NDT standard to be followed is 240-83539994 Standard for Non-Destructive Testing (NDT) on Eskom Plant.
3. NDT shall be done on all welds and shall consist of 100% surface and 100% volumetric testing where possible and shall be indicated as such in the Quality Control Procedure (QCP). The criteria of BS EN 5817, Class B shall apply.

### 3.5 MATERIAL REQUIREMENTS

1. The *Contractor* is responsible for supply of all material and consumables required for the completion of the Works.
2. Materials installed as part of the *Works* shall be grade 316 L stainless steel. The EN designation is X2CrNiMo17-12-2 (EN number 1.4404).
3. Material procurement and certification shall be in accordance with 240-87733094. Unless otherwise specified in this document, EN 10204 "3.1" material certificates are required as a minimum.
4. All gaskets and seals shall be compatible with FRF.
5. Material selections, where specified in this document, are made taking price and availability into account. These serve as a guideline and the *Contractor* is encouraged to select alternative materials to reduce cost or lead times. The following rules apply:
  - Alternative material shall be pressure equipment grade material of an applicable EN, BS or ASME standard and shall have specified properties at the applicable design temperature.
  - The material shall be one frequently used by the *Employer* for pressure equipment on the turbine plant.
  - The material selection is subject to approval by the *Employer's* engineer and it is solely his discretion to accept alternatives. The *Contractor* may motivate his selections.
  - Minimum allowable thickness calculations shall be done to ensure that the material selection is acceptable for the specific design conditions.
6. In terms of EN 13480, materials not in an EN-harmonised standard require the pressure equipment manufacturer (the *Contractor*) to supply a Particular Material Appraisal (PMA).
7. This PMA shall form part of the *Works* documentation.
8. All costs relating to production of a PMA (including possible testing) are for the *Contractor*.

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### **3.6 PIPING REQUIREMENTS**

1. All pipework modifications and new pipework installations are to be executed in accordance with the latest revision of EN 13480.
2. Where pipes of different wall thicknesses are welded, the requirements of 240-56239129, High Energy Pipework Standard for Eskom Power Plants Section 3.16 applies.

### **3.7 FITTINGS/COUPLING REQUIREMENTS**

1. Banjo fittings may only be used for the NB15 line connections to the safety blocks but not on the NB32 line connections.
2. The union coupling or banjo fitting shall be forged from stainless steel and shall be of a pressure rating equal or higher than the pressure rating of the relevant piping/system. All new piping is rated schedule 40 therefor the minimum rating for the fittings/couplings shall be schedule 40 or higher.
3. All selected couplings or fittings shall be suitable for use in an environment where FRF (Castrol Anvol PE46 XC) is used.

### **3.8 QUALITY REQUIREMENTS**

1. The Eskom Supplier Quality Management: Specification 240-105658000 shall be followed for all quality requirements.
2. No work shall be done without a QCP that is accepted by the *Employer*. A QCP shall therefore be submitted to the *Employer* for each item installed as per Section 3.12, before that part of the work is to be commenced. The *Employer* requires 5 days for QCP approval.
3. Each QCP shall contain a space, separate from the individual intervention points, where the names of the nominated quality representative from each party shall print their names and sign next to it; this is to aid signature identification.
4. Intervention points shall be signed as the work progresses and no back-dating shall be allowed.
5. Notification for interventions to be in writing and to be done at least 24 hours in advance for interventions on Lethabo site and at least 72 hours in advance for work outside Lethabo site.
6. QCP's and related documentation shall be subject to comment and acceptance by the *Employer's* quality control personnel.
7. QCP's shall make provision for signatures for interventions by at least the *Contractor's* Quality Control (QC) representative, the *Employer's* engineering department and the site Authorised Inspection Authority (AIA) representative.
8. The following minimum hold points shall be included for the *Employer's* Quality Control department:
  - Initial acceptance of QCP's
  - Marking of cut lines
  - Final inspection
  - Review of NDT reports
  - Conformity check on material certificates and heat numbers
  - PMA reviews (if applicable)
  - Final data book review
  - Alignment and fit-up of piping before any welding.

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9. Where this document is not clear about the location of an item to be installed or work to be done, or the details of work to be done, it is the *Contractor's* responsibility to determine the correct location or details of work from the *Employer's* engineering representatives, and the *Contractor* shall only act upon confirmation by receipt of an Engineering Instruction via the Project Manager. Incorrectly positioned items, or incorrect work done (where Engineering Instructions were not issued) shall be moved, removed, replaced, changed and/or reinstalled as applicable by the *Contractor* at his cost.
10. The *Contractor* is responsible for determining whether items as stipulated by this document shall fit into the existing plant. If not, the *Contractor* is to propose a solution, which shall be subject to the *Employer's* acceptance.

### **3.9 DESIGN REQUIREMENTS**

The following system parameters are applicable:

- Fluid : FRF (Castrol Anvol PE46 XC)
- Piping design pressure:
  - 4.2MPa (supply piping -SC11)
  - 0.3MPa (return piping - SC29)
- Design temperature: 70°C

#### **3.9.1 Drawings**

1. For all drawings, the requirements of 240-86973501 apply.
2. The *Employer* shall provide the *Contractor* with the "As Required" isometric drawing, refer to Appendix B.
3. If for any reason changes need to be made to the "As Required" isometric drawings the *Contractor* shall inform the *Employer* of those changes for acceptance before any work shall commence.
4. After the *Works* have been completed, detailed "As-built" drawings shall be provided by the *Contractor*.
5. "As-built" drawings are subject to the *Employer's* comments and acceptance.
6. Pipework drawings shall be presented on isometrics containing piping specifications and dimensions for easy reference. Dimensioning shall show all lengths and angles.
7. To aid in the production of the drawings, the *Contractor* may request copies of the existing equipment's original drawings from the *Employer's* library, however, the availability and accuracy of current plant drawings cannot be guaranteed and it remains the responsibility of the *Contractor* to produce the design drawings according to the requirements. Any costs associated with this, including measurements taken of the equipment, shall be for the *Contractor*.
8. The following general requirements apply to the drawings:
  - The drawings to be good quality engineering drawings which are to be squad-checked by the *Contractor's* QC representatives and be free of errors and omissions.
  - Space to be provided for Employer acceptance, as well as AIA approvals.
  - Weld positions shall be indicated on weld maps for all welds, from where each weld shall be traceable to the weld specific Welding Procedure Specification (WPS).
9. All drawing revisions shall be provided as paper copies or in .pdf format. Final as-built drawings shall be provided as paper copies and .pdf. All paper copies shall be in the original (in all cases at least A3) size.

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### 3.10 PRESSURE EQUIPMENT REQUIREMENTS

1. For work done on pressure equipment, the *Contractor* shall act as the manufacturer, with the relevant responsibilities assigned in terms of the Pressure Equipment Regulations (PER). For existing pressure equipment, the *Contractor* shall only be responsible for his area of work, and not the entire pressure equipment.
2. The *Contractor* shall supply the relevant PER certificates and material certificates for the accumulators and safety blocks.

### 3.11 DOCUMENTATION REQUIREMENTS

1. All documents supplied by the *Contractor* shall be of good quality and are subject to the Employer's acceptance. Documents such as QCP's, Method Statements and other documents impacting the work shall be accepted by the *Employer* at least 1 week prior to commencement of the *Works*.
2. Each revision of a document or drawing shall be accompanied by a list of the comments made by the *Employer* and the response/corrective action taken by the *Contractor*. Changes shall be recorded in a revision table contained on/in each drawing/document.
3. Documents and drawings include the *Employer's* drawing number as allocated by the *Employer*. Blocks of numbers may be periodically requested by the *Contractor*.
4. The *Contractor* may have his own document or drawing number on the document or drawing, but where reference is made among documents and/or drawings, the *Employer's* number shall be used.
5. The *Contractor* shall compile a complete data book containing the following as a minimum:
  - All cutting instructions
  - All inspection reports
  - All detailed design drawings and sub-assembly drawings
  - NDT procedures and operator qualifications
  - Signed NDT reports
  - Repair procedures
  - Weld procedures (WPS's and Procedure Qualification Records (PQR's)) and welder qualifications
  - Weld summary that gives full traceability between the weld maps, NDT reports, the welder and the
  - WPS used.
  - All weld maps
  - Material summary that gives full traceability between drawings and material certificates
  - All mechanical and chemical test reports as per EN 10204, for pipes / valves and fittings
  - A section that includes copies of all relevant qualifications and approvals of NDT, Quality Assurance
  - (QA), QC, and any artisan / welder performing as required by Employer's specifications and / or statutory requirements.
  - The manufacturer's / repairer's certificate as defined in PER.
  - Any documentation that was generated to perform an activity to be fully trace-able by paper trail – throughout the activity from inception to completion.
  - Pipe ovality reports.

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- All Non-conformance Reports (NCR's)/Corrective Action Reports (CAR's)
  - Technical specifications
  - Operating and maintenance manuals for the accumulator
6. Furthermore, each safety block shall be supplied with a data book that is traceable to the specific safety block, containing the following as a minimum:
- QCP for the valve
  - Material list and material certificates according to EN 10204.
  - WPS and welding documentation as applicable
  - Inspection reports and procedures
  - NDT reports and procedures
  - Pressure test certificates (with calibration certification)
  - Maintenance and operating manual or similar documentation
  - Leak test report, if applicable
  - Technical specifications

### **3.12 COMMISSIONING REQUIREMENTS**

1. The *Contractor* shall be responsible for the commissioning of the new equipment with the assistance of the *Employer's* personnel.
2. The *Contractor* shall provide the commissioning and test plan for the *Employer's* review before any tests are performed. As a minimum the operation of the accumulator shall be tested by performing a control oil pump changeover test, on each of the units, to confirm that the control oil pressure is sustained successfully.
3. The operation of the safety block shall be tested and demonstrated to the *Employer's* personnel by the *Contractor*.

### **3.13 MECHANICAL WORK TO BE DONE**

The *Contractor* shall supply and install the following on each of the six (6) units:

- 1 x Accumulator (56 litre) and associated bracketing and ancillaries for mounting purposes
- 1 x Safety block
- 1 x union coupling to connect safety block to NB32 stainless steel pipe
- 1 x union coupling/banjo fitting to connect safety block to NB15 stainless steel pipe
- 5m x NB32 schedule 40 stainless steel piping (as per the unit specific isometric drawings)
- 4 x 90° NB32 schedule 40 stainless steel bends
- 1 x NB32 schedule 40 stainless steel nozzle/stub
- 6m x NB15 schedule 40 stainless steel piping (as per the unit specific isometric drawings)
- 3 x 90° NB15 schedule 40 stainless steel bends
- 1 x NB15 schedule 40 stainless steel nozzle/stub

**Note:** In case there aren't any 56 litre accumulators available in the market then the *Contractor* shall notify the *Employer* of the available size accumulators. The *Employer* shall then advise on the way forward.

In total:

- 6 x Accumulators (56 litre) and associated bracketing and ancillaries for mounting purposes
- 6 x Safety blocks

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- 6 x union couplings to connect the safety block to the NB32 stainless steel piping
- 6 x union couplings/banjo fittings to connect the safety block to the NB15 stainless steel piping
- 30m x NB32 schedule 40 stainless steel piping
- 24 x 90° NB32 schedule 40 stainless steel bends
- 6 x NB32 schedule 40 stainless steel nozzles/stubs
- 36m x NB15 schedule 40 stainless steel piping
- 18 x 90° NB15 schedule 40 stainless steel bends
- 6 x NB15 schedule 40 stainless steel nozzles/stubs

### **3.13.1 Accumulators**

The accumulators supplied by the *Contractor* shall conform to the following specifications:

- Design: Bladder type, bottom repairable
- Max operating pressure: Accumulator with maximum operating pressure >4.2 MPa
- Max operating temperature: 70°C
- Size: 56 litres
- Port size: DN32 to DN50 (Sizes out of this range will not be accepted)
- Gas port: Standard
- Connection to accumulator: standard adapter
- Material:
  - Fluid port- Stainless steel
  - Shell- Stainless steel
  - Bladder- phosphate ester resistant (e.g. Butyl)

The accumulators have been classified as Category IV according to SANS 347.

### **3.13.2 Safety blocks**

The safety blocks supplied by the *Contractor* shall conform to the following specifications:

- Design: Basic safety valve with manual operated pressure release valve
- Fluid: Phosphate ester
- Max operating pressure: Higher than the max operating pressure of the accumulator
- Max operating temperature: 70°C
- Size: Main shut-off valve DN32 (minimum)
- Connection to pipe: Union coupling or Banjo fitting
- Connection to accumulator: standard adapter
- Material:
  - Block- Stainless steel
  - Seals- phosphate ester resistant (e.g. EPDM)
- Accessories: Lockable main shut-off valve

## **CONTROLLED DISCLOSURE**

### 3.13.3 Piping

- The *Contractor* shall install the piping as per the “as required” pipe isometric drawings provided.
- The new nozzles/stubs shall be stainless steel bar as per section 3.5 above and shall be welded according to a qualified PQR and WPS. The QPR and WPS shall be approved by an Eskom welding engineer before work commences.
- The weld shall be a fillet weld of the appropriate size (leg length and throat thickness). The fillet weld and prep angle should be such that when the ID is drilled that it is a full penetration weld and that the root is removed. (see Figure 1 for illustrative purposes only)
- 100% surface tests to be done on all welds

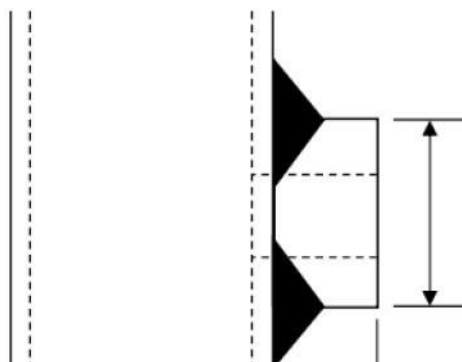


Figure 1: Side view of stub

#### 3.13.3.1 Supply line to accumulator

- The accumulator shall be connected to the turbine control fluid delivery piping SC11 (NB125) downstream of the T-piece (NB125/50) on the horizontal pipe run upstream of the control fluid filters, refer to Appendix B for the “as required” isometric drawings.
- A permanent nozzle/stub shall be welded to the NB125 pipe to weld connect the new NB32 pipe which shall be connected to the pressure port of the safety block via a union coupling. The safety block shall be connected to the fluid port of the accumulator via a standard connection/adaptor which will be sourced from the accumulator/safety block supplier.
- The “as required” isometric drawings of the piping can be found in Appendix B, below is an example of the Unit 1 “As required” isometric drawing for the supply line highlighting the new piping to be installed.

**CONTROLLED DISCLOSURE**

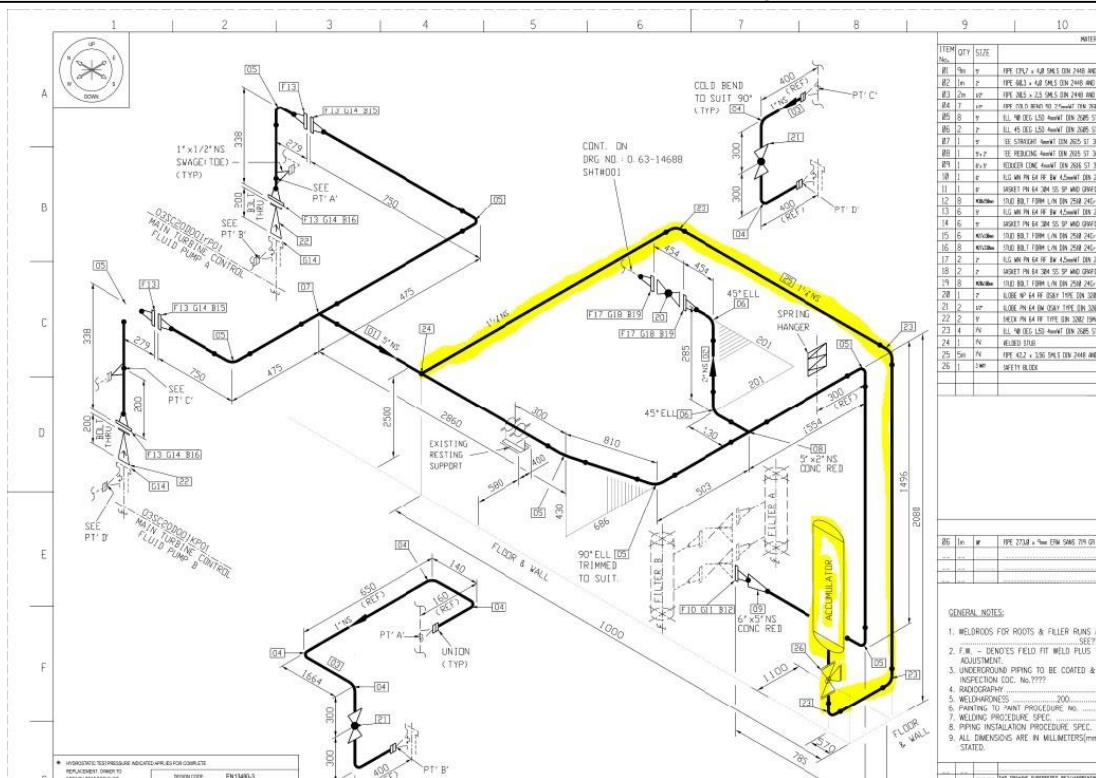


Figure 2: Unit 1 “As required” isometric drawing- supply line

### 3.13.3.2 Drain line to control fluid tank

- Standard safety blocks cater for a drain port as well as at least one pressure measuring port. The drain port of the safety block shall be connected by a NB15 pipe to the bypass line SC29 (NB50) of the fluid heater, just after the bypass isolating valve (SC28S106) on the horizontal pipe run, which interconnects with the main oil return line before the control fluid tank. The Contractor shall weld- in a permanent nozzle/stub on the bypass line (SC29) in order to connect the new NB15 drain line.
- The pipe can be connected to the safety block by means of a butt weld union with female thread or a banjo fitting depending on the drain port size of the safety block.
- The updated isometric drawings of the piping can be found in Appendix B, below is an example of the Unit 1 “As required” isometric drawing for the drain/relief line highlighting the new piping to be installed.

**CONTROLLED DISCLOSURE**

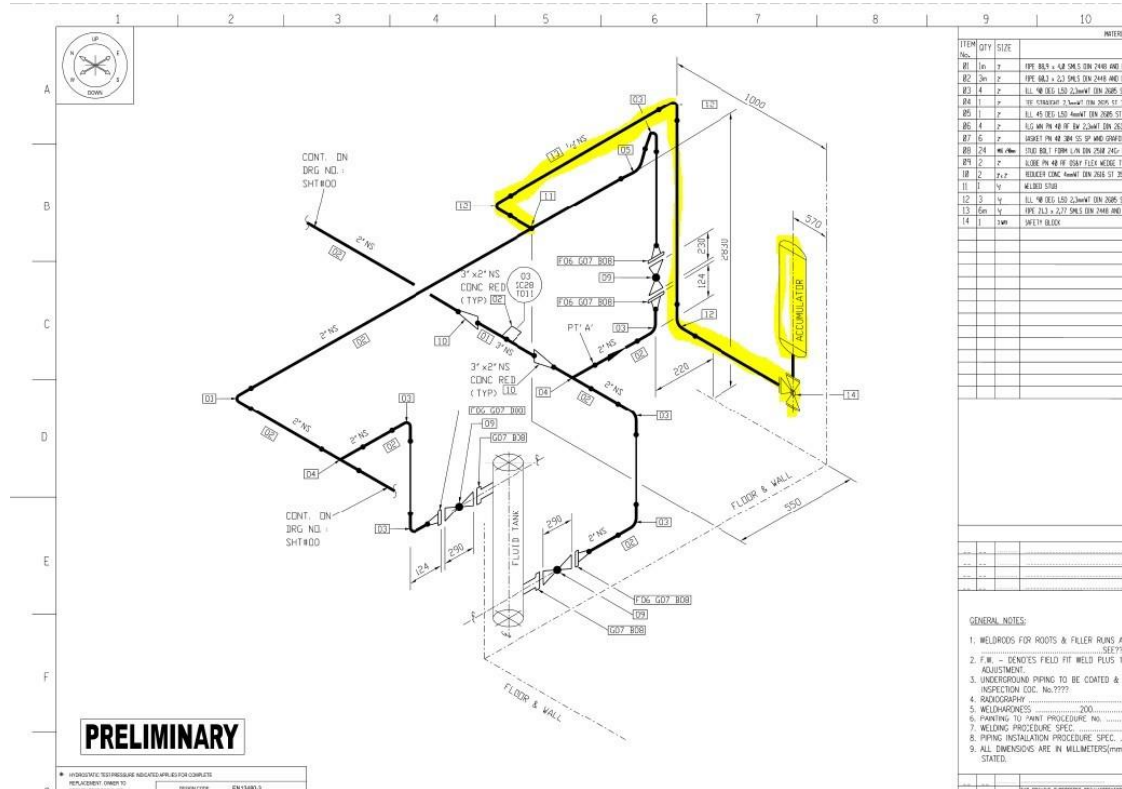


Figure 3: Unit 1 “As required” isometric drawing- drain line

### 3.13.4 Bracketing

- The accumulator shall be mounted to the wall which shall limit long pipe runs as well as prevent pipe work from interfering with maintenance activities on surrounding equipment, refer to Figure 4 and Appendix B.
- The accumulator shall be mounted by using standard mounting components which can be sourced from the accumulator supplier itself. Typically consist of a base bracket for support as well as clamps to restrain the accumulator in the vertical position but might differ from supplier to supplier.
- These components are secured to the wall by means of rawl/expansion bolts. The sizes of bolts shall be dictated by the size of bracket used.
- The *Contractor* shall scan the concrete wall, to confirm the position of the reinforcement prior to installing the steel frame/bracket. This will ensure that the steel reinforcement is not damaged during the installation.

**CONTROLLED DISCLOSURE**



**Figure 4: Location of accumulator**

### **3.14 TECHNICAL EVALUATION CRITERIA**

#### **3.14.1 Mandatory criteria**

- The tenderer to provide proof of relevant experience (at least 3 verifiable references)

#### **3.14.2 Qualitative criteria**

The Tenderer shall provide the following during the tender submittal:

- Accumulator specifications
- Safety block specifications
- Method statement for the installation of the accumulators.
- The tenderer to confirm and provide evidence that all spares are supported locally and readily available.
- The tenderer to confirm that the relevant PER certificates and material certificates for the accumulators and safety blocks shall be provided
- CV's of the individuals that will be involved in the installation and commissioning
- Project schedule

Note: The minimum threshold shall be 70% for the technical evaluation criteria.

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#### **4. AUTHORISATION**

This document has been seen and accepted by:

<b>Name</b>	<b>Designation</b>

#### **5. REVISIONS**

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>

#### **6. DEVELOPMENT TEAM**

Not applicable

#### **7. ACKNOWLEDGEMENTS**

Lethabo Turbine Engineering

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## APPENDIX A: VENDOR DOCUMENT SUBMITTAL SCHEDULE

Item	Submittal items		Format of presentation			Project milestone											
			Hard copy	Soft copy	Contract award	Ordering of long lead items	Prototype approval	Design freeze	Manufacturing and assembly	Factory acceptance test	Factory release	Delivery	Installation	Site acceptance testing	Commissioning	Completion	
1		Quality Assurance															
1.1		Quality assurance manual with works instruction and procedures	X	X	X												
1.2		Document management process and procedure	X	X	X												
1.3		Quality control plan or inspection and test plan (QCP/ITP)	X	X	X												
1.5		Performance test plans and procedures		X							X						
1.6		Performance test report	X	X							X						
1.9		Leak test plans and procedures		X							X						
1.10		Leak test report	X	X							X						
1.11		Corrosion and preservation procedures		X								X					
1.12		Mechanical completion certificate	X	X										X			
1.13		Cold Commissioning Procedure		X												X	
1.14		Cold Commissioning Report	X	X												X	
1.15		Hot Commissioning Procedure		X												X	
1.16		Hot Commissioning Report	X	X												X	
1.17		Completion certificate	X	X													X
2		Technical documentation															
2.1		Assessment reports		X				X									
2.3		Operating & Maintenance manuals	X	X				X									
2.4		Technical specification of accumulator and safety block		X		X											
2.5		Component lists and description		X			X										
2.6		Final test evaluation report	X	X			X										
2.9		Technical manuals and datasheets	X	X			X										
3		Design drawings and documents															
3.1		General arrangement drawings	X	X				X									
3.2		Pipe isometric drawings	X	X				X									
3.3		Detail drawings of accumulator and safety block		X								X					
4		Project management															
4.1		Project program schedule		X	X												
4.2		Training program schedule		X				X									

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Item	Submittal items	Format of presentation		Project milestone											
		Hard copy	Soft copy	Contract award	Ordering of long lead items	Prototype approval	Design freeze	Manufacturing and assembly	Factory acceptance test	Factory release	Delivery	Installation	Site acceptance testing	Commissioning	Completion
4.3	Project responsibility matrix		X	X											
4.4	Project organogram structure		X	X											
<b>5</b>	<b>Safety, health and environment</b>														
5.1	SHE file		X	X											
5.2	Weekly statistics and man-hours		X	X											
5.3	Risk assessment report		X				X					X	X		
<b>6</b>	<b>Training, maintenance and operating documentation</b>														
6.1	Training course documentation	X	X				X								
6.2	Engineering training manual	X	X				X								
6.3	Operating training manual	X	X								X				
6.4	Maintenance training manual	X	X								X				
6.5	Works instructions	X	X								X				
6.7	List of recommended spares		X												X
6.8	Equipment certificates	X	X												X
6.9	Maintenance strategy		X								X				
6.10	Equipment catalogues		X												X

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## **APPENDIX B: "AS REQUIRED" ISOMETRIC DRAWINGS**

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