

 Eskom	Technical Specification	Technology
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1. INTRODUCTION

This document provides the technical specification that would form a part of the contract for the MJC (multi jet controller) valve replacement project. The requirements entail the design, installation and commissioning of the new diaphragm type MJC's. The new diaphragm MJC valves must be easily accessible as well in-situ testable and maintainable. The spray pattern of the nozzles must also be reviewed and, depending on the outcome of the review, redesigned if necessary.

This technical specification provides the necessary detail to outline the scope of work for the design, installation, commissioning and testing of diaphragm MJC's at Tutuka Power Station as well as updating all drawings to reflect the plant as-built.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document provides details of the technical specification for the Tutuka Power Station Multi Jet Controller replacement and modification. This document includes standards and guidelines that should be adhered to.

The technical specification is applicable to the following areas:

- Fire Pump house
- Daily Issue Oil Store
- Compressor House
- Service Transformers
- Diesel Generators
- Boiler Burner Fire Protection (Unit 1-6)

2.1.1 Purpose

The document provides the technical specification for the replacement of the clack type MJC valves to the new diaphragm type MJC valves. This document shall describe the scope of supply and services required by potential Contractors and also describe technical requirements that need to be met.

2.1.2 Applicability

This document applies to Tutuka Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

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

2.2.1 Normative

2.2.1.1 Specifications

- | | | |
|-----|---------------|--|
| [1] | 15ENG GEN-281 | Required Operation Capability for Replacement of Clack Type MJC Valves |
| [2] | 15ENG MN-676 | Tutuka AKZ Coding Procedure |
| [3] | 240-105020315 | Standard for Low Pressure Valves |
| [4] | 240-106628253 | Standard for Welding Requirements on Eskom Plant |

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[5]	240-109607332	Abbreviation Standard for Labelling of Plant at Power Stations
[6]	240-123801640	Standard for Low Pressure Pipelines
[7]	240-53113685	Design Review Procedure
[8]	240-53114002	Engineering Change Management (ECM) Procedure
[9]	240-54179170	Technical Documentation Classification and Designation Standard
[10]	240-54937439	Fire Protection/Detection Assessment Standard
[11]	240-54937450	Fire Protection and Life Safety Design Standard
[12]	240-54937454	Inspection, Testing and Maintenance of Fire Protection Systems Standard
[13]	240-56356376	On-Site Commissioning for Low pressure Systems Standard
[14]	240-56737448	Fire Detection and Life Safety Design Standard
[15]	240-65459834	Project Documentation Deliverable Requirement Specification
[16]	240-66920003	Documentation Management Review and Handover Procedure for Gx Coal Projects
[17]	240-76992014	Project / Plant Specific Technical Documents and Records Management Work Instruction
[18]	240-83539994	Eskom NDT Personnel Approval (NPA) for Quality Related Special Processes on Eskom Plant Standard
[19]	36-681	Generation Plant Safety Regulations
[20]	474-11450	Fire Protection Automatic Water Control Valve Qualification Evaluation report
[21]	ISO 6182	Fire Protection – Automatic Sprinkler Systems
[22]	ISO 9001	Quality Management Systems
[23]	NFPA 15	Standard for Water Spray Systems for Fire Protection
[24]	SA0592	FM Global Risk Report Tutuka Power station February 2003
[25]	240-56364545	Structural Design and Engineering Standard
[26]	240-86973501	Engineering drawing Standard
[27]	SANS 10100	Structural Use of Concrete
[28]	SANS 2001-BS1	Construction works Part BS1: Site Clearance
[29]	SANS 2001-CC1	Construction works Part CC1: Concrete works (structural)
[30]	SANS 920	Steel bars for concrete reinforcement
[31]	SANS 1024	Welded steel fabric for reinforcement of concrete
[32]	SANS 121	Hot dip galvanised coatings on fabricated iron and steel articles
[33]	SANS 282	Bending dimensions and scheduling of steel reinforcement for concrete
[34]	SANS 10144	Detailing of steel reinforcement for concrete
[35]	SANS 10140	Identification Colour Marking
[36]	SANS 10160	General procedures and loadings
[37]	SANS 10162-1	Structural use of steel (hot rolled)

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[38] SANS10162-2 Structural use of steel (cold formed)

2.2.1.2 Drawings

[39] 21.61/55404 Fire Control Pump House
[40] 21.61/55501 Daily Oil Issue Store Fire Protection P&ID
[41] 21.61/55459 LP Services Diesel Motors Fire Protection System P&ID
[42] 21.61/55585 Unit 1 & 4 Diesel Generator Fire Protection System P&ID
[43] 21.61/55586 Unit 2 & 5 Diesel Generator Fire Protection System P&ID
[44] 21.61/55587 Unit 3 & 6 Diesel Generator Fire Protection System P&ID
[45] 21.61/55417 Sheet 2 Unit 1 Service Transformers Fire Protection P&ID
[46] 21.61/55418 Sheet 2 Unit 2 Service Transformers Fire Protection P&ID
[47] 21.61/55419 Sheet 2 Unit 3 Service Transformers Fire Protection P&ID
[48] 21.61/55420 Sheet 2 Unit 4 Service Transformers Fire Protection P&ID
[49] 21.61/55421 Sheet 2 Unit 5 Service Transformers Fire Protection P&ID
[50] 21.61/55422 Sheet 2 Unit 6 Service Transformers Fire Protection P&ID
[51] 21.61/55417 Sheet 3 Unit 1 Boiler Burners Fire Protection P&ID
[52] 21.61/55418 Sheet 3 Unit 2 Boiler Burners Fire Protection P&ID
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[54] 21.61/55420 Sheet 3 Unit 4 Boiler Burners Fire Protection P&ID
[55] 21.61/55421 Sheet 3 Unit 5 Boiler Burners Fire Protection P&ID
[56] 21.61/55422 Sheet 3 Unit 6 Boiler Burners Fire Protection P&ID

2.2.2 Informative

[57] SANS 719 Electric welded low carbon steel pipes for aqueous fluids (large bore)
[58] 15ENG GEN-372 Tutuka Multi Jet Controller Replacement EMAP
[59] 240-43400017 Plan Technical Effort
[60] 240-43898151 Perform Verification and Validation
[61] 240-53114026 Eskom Project Engineering Change Management Procedure
[62] 240-86973501 Engineering Drawing Standard
[63] 474-10560 Fire Protection Clack Type MJC Valves Evaluation Report
[64] BS 4504 Flanges
[65] SANS 10287 Automatic Sprinkler Installations for Fire Fighting Purposes
[66] SANS 1091 National colour standard
[67] SANS 1123 Pipe Flanges
[68] SANS 121 Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods

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- [69] SANS 1808-31 Valves Water Supply and Distribution System Components: Automatic Control
- [70] SANS 198 supply systems Functional-control valves and safety valves for domestic hot and cold water
- [71] SANS 62 exceeding 150mm Steel pipes part 1: Pipes suitable for threading and of nominal size not

2.3 DEFINITIONS

Definition	Description
Fire Protection	Method of providing for fire control of fire extinguishment
Head detection element	For the purposes of this report the heat detection element is referring to a quartzoid bulb and fusible link
Multi Jet Control Valve	A control valve that opens to multiple (or a group) of open head sprayers
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures. Facilities, services, and other support facets.
Engineering Work	The application of specific scientific disciplines in the process of developing, designing, maintaining and operating assets with full cognisance of their design and design limitations in order to improve the lives of people.
Owners Engineer	When Eskom acts as the Owners Engineer on a project/package/plant/system/asset, the reviewer(s) shall review the design documentation issued by the Design Authority to ensure that; the design satisfies the stakeholder requirements (i.e validation of design deliverables against stakeholder requirements). General technical oversight is provided over the design.
Work Breakdown Structure	A deliverable-orientated hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organises and defines the total scope of the project.

2.3.1 Disclosure Classification

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

2.4 ABBREVIATIONS AND ACRONYMS

Abbreviation	Description
CoE	Centre of Excellence
EOD	Electrical Operating Desk
EPC	Engineer, Procure and Construct
FM	Factory Mutual
MJC	Multi Jet Controller
NFPA	National Fire Protection Association

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Abbreviation	Description
NRV	Non Return Valve
P&ID	Piping and Instrumentation Diagram
PFD	Process Flow Diagram
QA	Quality Assurance
ROC	Required Operational Capacity
SANS	South African National Standards
UL	Underwriters Laboratories
VDSS	Vendor Document Submission Schedule

2.5 ROLES AND RESPONSIBILITIES

- Eskom Engineering will act as the Owners Engineer throughout the life cycle of this project.
- Eskom Engineering is responsible for reviewing all of the Contractors designs and ensuring that the designs comply with the functional specification requirements as well as with Eskom Standards and other international applicable standards.
- The Contractor is accountable for all design work (calculations, drawings)
- The Contractor is accountable for the procurement and installation of the diaphragm valves.
- The Contractor is accountable for confirming the amount and size of valves required prior to order any valves.
- The Contractor is accountable for confirming whether the existing pipework and associated flanges conform to SANS [71] or BS [64] standards. All new piping to conform to pipework standards of existing plant.
- The Contractor is accountable for updating all drawings to reflect the plant as-built.

2.6 PROCESS FOR MONITORING

Eskom Design Review Procedure [7] will be followed for this project. The successful contractor must allow for the design review procedure in their project schedule.

2.7 RELATED/SUPPORTING DOCUMENTS

N/A

3. TECHNICAL SPECIFICATION

3.1 SYSTEM DESCRIPTION - EXISTING PLANT OVERVIEW

The fire protection for the plants is currently being protected by clack type and diaphragm MJC valves as outlined in this section.

The clack-type MJC valves have been found to be inaccessible, unreliable and not in-situ serviceable or testable. This finding lead to an action for all the clack-type MJC valves to be replaced at Tutuka Power Station [24]. The areas on the plant where clack type MJC's are installed include:

- Fire Pump house
- Daily Issue Oil Store

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- Compressor House
- Service Transformers
- Diesel Generators
- Boiler Burner Fire Protection (Unit 1-6)

The affected areas are detailed below from 3.1.1.

3.1.1 Fire Control Pump House

Each diesel fire pump oil tank and engine is protected by a clack type MJC valve.

The pump house has a total of four clack type MJC valves each having 50NB inlet.

Figure 6-1 shows the location of these clack type MJCs.

3.1.2 Daily Issue Oil Store

The area to the south of the store is protected by two clack type MJC valves. The middle of the store is divided into top and bottom areas. Each area has the same fire protection configuration. The top area is protected by three clack type MJC valves as is the bottom. The north of the store room is also divided into top and bottom areas. The top area has four clack type MJC valves and the bottom area has two clack type MJC valves.

The store has a total of fourteen clack type MJC valves. Six valves have 40NB inlet and other eight valves have 65NB inlet.

Figure 6-2 shows the location of these clack type of MJCs.

3.1.3 LP Services Pump House

Each diesel compressor is protected by one clack type MJC valve. The demin diesel motors are protected by two clack type MJC valves. The diesel storage tank is protected by two clack type MJC valves. One is situated at the top and one is situated at the bottom.

The LP services area has a total of six clack type MJC valves. Three of the valves have 65NB inlet, two have 50NB inlet and one has 40NB inlet.

Figure 6-3 shows the location of these clack type MJCs.

3.1.4 Diesel Generators

There are seven diesel generators in total and are coupled as follows:

- Station Diesel Generator
- Unit 1 and 4 Diesel Generators
- Unit 2 and 5 Diesel Generators
- Unit 3 and 6 Diesel Generators

Each generator is protected by four clack type MJC valves except for the station diesel generator which has six.

Thus, the diesel generators have a total of 30 clack type MJCs each having a 50NB inlet.

Figure 6-4 and Figure 6-5 show the locations of these MJCs.

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3.1.5 Service Transformers

Each unit has four service transformers located at ground level. Each transformer is protected by three clack type MJC valves.

Thus, the total number of clack type MJC valves protecting all the unit service transformers is 72 each having a 100NB inlet.

Figure 6-6 show the locations of these MJCs.

3.1.6 Boiler Burners

Each unit has a total of 24 boiler burners and each boiler burner is protected by a MJC valve. Some boiler burners are protected by clack type MJC valves while others are protected by diaphragm type MJC valves. Figure 6-7 and Figure 6-12 shows the location and type of MJC for each boiler burner ("C"=Clack type, "D"=Diaphragm). Each clack type valve has a 32NB inlet.

Table 3-1 summarises the number of each type of MJC per boiler.

Table 3-4 summarises the location and type of MJC for each boiler burner.

Note: the contractor is required to verify the values provided in Tables 3-1 to 3-4.

Table 3-1: Number of each MJC type per boiler

	Clack Type	Diaphragm Type
Unit 1	24	0
Unit 2	24	0
Unit 3	2	22
Unit 4	1	23
Unit 5	1	23
Unit 6	24	0
Total	76	68

3.1.7 Summary of valve type and inlet size (contractor to confirm)

Table 3-2: Valve Location and Type

Location	Number of Clack Type MJCs	Number of Diaphragm Type MJCs
Fire Pump House	4	0
Daily issue Oil Store	14	0
LP Services Pump House	6	0
Diesel Generators	30	0

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Service Transformers	72	0
Boiler Burners	76	68
Total	202	68

Table 3-3: Valve Location and Size

Location	Inlet Size (NB)					Total
	32	40	50	65	100	
Fire Pump House	4					4
Daily issue Oil Store		6		8		14
LP Services Pump House		1	2	3		6
Diesel Generators			30			30
Service Transformers					72	72
Boiler Burners	76					76
Total	80	7	32	11	72	202

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Table 3-4: Summary of location and type of boiler burner MJC valves

	UNIT	FRONT BURNERS				BACK BURNERS			
		B1	E1	B2	E2	B4	E4	B3	E3
33m Level	Unit 1	C	C	C	C	C	C	C	C
	Unit 2	C	C	C	C	C	C	C	C
	Unit 3	D	D	D	D	D	D	D	D
	Unit 4	D	D	D	D	D	D	D	D
	Unit 5	D	D	D	D	D	D	D	D
	Unit 6	C	C	C	C	C	C	C	C
		C1	F1	C2	F2	C4	F4	C3	F3
26m Level	Unit 1	C	C	C	C	C	C	C	C
	Unit 2	C	C	C	C	C	C	C	C
	Unit 3	D	D	C	D	D	D	C	D
	Unit 4	D	D	D	D	D	C	D	D
	Unit 5	D	D	D	D	D	D	D	D
	Unit 6	C	C	C	C	C	C	C	C
		A1	D1	A2	D2	A4	D4	A3	D3
18m Level	Unit 1	C	C	C	C	C	C	C	C
	Unit 2	C	C	C	C	C	C	C	C
	Unit 3	D	D	D	D	D	D	D	D
	Unit 4	D	D	D	D	D	D	D	D
	Unit 5	D	D	D	D	D	D	D	C
	Unit 6	C	C	C	C	C	C	C	C

C=Clack Type MJC
D=Diaphragm Type MJC

3.1.8 Operating Philosophy

The MJCs are designed to operate at 79°C. If the system is activated the water will flow through an alarm valve causing a gong to sound, a separate pressure switch will send a signal to the EOD to alert them of the activation of the fire system.

3.2 WORK TO BE PERFORMED

3.2.1 Preferred type of contract

The preferred contract for design, supply, installation, testing and commissioning of newly installed valves is Engineer, Procure and Construct (EPC).

3.2.2 Scope of Work

The scope of work for the project entails design, supply, installation, testing, and commissioning of upgraded fire protection system. This includes but is not limited to:

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- Complete detailed design of protection system (drawings [isometric, P&ID, general arrangement, as built, node diagrams, mechanical hook up], hydraulic calculations) for each area. The design is to include spray pattern review for associated nozzles.
- Supply of all data sheets of all equipment to Eskom for review and acceptance.
- The detail for fire protection in the following areas:
 - Fire Pump house
 - Daily Issue Oil Store
 - LPS Pump House
 - Diesel Generators
 - Service transformers
 - Boiler burners
- Design of new fire protection system for ease of access to valves and positioning of valves outside of fire zone. Where possible the amount of valves must be reduced so that one valve covers multiple areas.
- The design must include a spray pattern review of existing fixed protection installation fed from clack type MJC's. If the spray pattern review indicates insufficient coverage of the risk area existing fixed protection must be extended to provide full coverage.
- Contractor to confirm quantity and size of MJC valves to be provided
- Supply of the correct size and quantity of diaphragm valves required for the respective affected areas.
- System must include all trimming required for in situ testing and maintenance.
- Removal of the existing clack-type valves.
- Commission the newly installed diaphragm valves. All of the testing must be done in accordance with the requirements of [13][23].
- Supply test certificates, commissioning procedure, data sheets, testing procedures, maintenance manuals to Eskom.
- Update all relevant drawings to reflect plant changes. (refer to section 2.2.1.2 for drawings)

3.2.2.1 System performance requirements

The valves must activate at 79°C.

Equivalent nozzles to be provided as required.

New/extended nozzles to have spray density of 10.2mm/min for all systems, as required.

The design must include a spray pattern review of existing fixed protection installation fed from clack type MJC's. If the spray pattern review indicates insufficient coverage of the risk area existing fixed protection must be extended to provide full coverage.

3.2.3 Mechanical Requirements

3.2.3.1 Valves

All valves to comply with Eskom Standard for Low Pressure Valves [3] and [20].

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The contractor is responsible for supplying all MJC valves, adaptor mountings, fittings and associated actuators deemed necessary to ensure safe, reliable and efficient workable system. All MJC valves are supplied by a certified manufacturer whose equipment has been proven for similar or more demanding duties.

All valves are tested in accordance with the relevant codes and standards. MJC valves are to be approved at a minimum by one of the following bodies: FM (Factory Mutual) or UL (Underwriter Laboratories). Refer to [3] and [20] for valve qualification.

SANS 198 [70] that is specified as one of qualification standards is not suitable for Eskom's purposes of water based fire protection.

The general rule for design and choosing components is a use of national standards, but if they do not exist or there is a need for more stringent requirements then an international standard is used. In this case and as indicated above SANS 1808-31 [69] was not tailored for fire suppression systems specifically, but for water supplies in general, whereas ISO 6182 [21] is specifically for fire protection systems; therefore, the most suitable standard that will be fit for purpose is ISO 6182 [21]. Third party approval standards are for information and guidance, not to be reproduced and applied for certification of products and services without their consent. They are used with their internal procedures.

If ISO 6182 [21] is used as an alternative route from listed valves, it should be noted that each type of AWCV assembly has its specific relevant approval requirements as indicative in the following group of ISO 6182's:

- ISO 6182-2 Fire Protection - Automatic sprinkler systems – Part 2: Requirements and test methods for wet alarm valves, retard chambers and water motor alarms
- ISO 6182-3 Fire Protection - Automatic sprinkler systems – Part 3: Requirements and test methods for dry pipe test valve
- ISO 6182-5 Fire Protection - Automatic sprinkler systems – Part 5: Requirements and test methods for deluge valves
- ISO 6182-8 Fire Protection - Automatic sprinkler systems – Part 8 : Requirements and test methods for pre-action dry alarm valves

The MJC valves are to be diaphragm type. Their function must be able to be tested in situ (which means they need to be accompanied by suitable drain valves and isolation valves to allow for testing). The MJC valves must be positioned for ease of operation and maintenance as far as practically possible.

All MJC valves are to be furnished with nameplates, which are easily readable and of lasting construction (see plant coding).

MJC valves are functional tested at manufacturer's facilities and test certificates are maintained as part of the QA documentation.

3.2.3.2 Pipework

All pipework to comply with Eskom Standard for Low Pressure Pipelines [6]. All pipes and flanges to conform to the existing piping/flange standard used on site ([71] or [64]). All mild steel pipes and equipment to be pressure rated to a minimum of 1600kPa.

Pipework and fittings meeting the following requirements are deemed suitable for use in water based suppression system:

1. Minimum wall thickness of 3.25mm.
2. All pipes up to 50NB are screwed and anything above 50NB is flanged.

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3.2.3.3 Welding

Welding must comply with:

- 240-106628253, Standard for Welding Requirements on Eskom Plant [4]
- 240-83539994, Eskom NDT Personnel Approval (NPA) for Quality Related Special Processes on Eskom Plant Standard [18].

3.2.3.4 Corrosion Protection

All steel piping components are hot dipped galvanised in accordance with SANS 121, "Hot dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods"

3.2.3.5 Pipe Painting

All new installed piping is to be fully painted signal red (Colour number A11-SANS 1091 [66]).

All galvanised pipes to be primed accordingly prior to painting.

3.2.4 Civil Requirements

The installation/support of the fire protection system should not compromise the structural integrity of the surrounding structures (e.g. supporting beams, slab and columns). The Contractor is required to submit the connection details of the pipe supports for review. The Contractor is required to ensure that all works are in accordance with the relevant SANS and Eskom Standards.

3.2.5 Maintenance and Operating

The Contractor is to provide Eskom with the maintenance and operating procedure for the fire protection systems. The procedure is to include the recommended maintenance intervals and maintenance to be carried out on the fire system and components, test procedure and list of recommended spares to ensure reliable operation of the fire protection system.

3.3 QUALITY MANAGEMENT

The Contractor shall develop and implement a system for collation or quality verification records, including change management records, Inspection Test Plans, Manufacturing, Construction and Commissioning Record Books (Data Books) as specified in the Medupi Quality Specifications.

3.3.1 Data Books

Data Books shall be maintained by the Contractor to substantiate conformance to product specifications and requirements. All records shall be safely stored (easily retrievable) following the final completion of the works at takeover. These records shall include as a minimum:

- Quality Management documentation
- Safety clearances (to be granted prior commissioning)
- Construction, layout and component approvals
- Routine test certificates
- Construction and as-built drawings and approvals
- Statutory certification

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- Data Books (Record Books)

The data books shall be reviewed by the employer for 10%, 30%, 50%, 70% and 100%.

All manufacturing and construction data books shall be completed and approved when the Contractor apply for final inspection at construction completion.

At takeover application, all manufacturing, construction and commissioning data books shall be completed and approved and handed over to the Employer.

3.3.2 Inspection and Testing

MJC's to be functional tested at manufacturer's facilities in accordance with [3] and [21].

Post installation testing must be in accordance with [13] and include, but not limited to:

- Flush new system
- Hydrostatic pressure test
- Full spray tests

Any gauges supplied for verification of pressure during official pressure testing shall be supplied with valid calibration certificates.

The *Contractor* shall include as a minimum the following activities and interventions on Inspection and Test Plans (ITP) for each of the FW and PW ring mains:

- Approval of ITP – hold point for *Contractor* and *Engineer*
- Approval of construction drawings – hold point for *Contractor* and *Engineer*
- Approval of method statements – hold point for *Contractor* and *Engineer*
- Confirmation of the Permit to Work (refer to 36-681 Generation Plant Safety Regulations [19]) – hold point for *Contractor*
- Approval of pipes – hold point for *Contractor* and *Engineer*
- Setting out – hold point for *Contractor* and *Engineer*
- Conduct specified pressure test – hold point for *Contractor* and *Engineer*
- NOD/NCR closed – hold point for *Contractor* and *Engineer*
- Data Book review – hold point for *Contractor* and *Engineer*
- Punch list – hold point for *Contractor* and *Engineer*
- Final inspection – hold point for *Contractor* and *Engineer*
- Hand-over – hold point for *Contractor* and *Engineer*

3.4 DOCUMENTATION MANAGEMENT AND CONFIGURATION MANAGEMENT

The contractor and Tutuka configuration management shall be responsible for the following during the design change:

- As-built plant drawings;
- Document Management
- Plant coding and Labelling;

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- Design change management.

3.4.1 Document Management

All documents supplied by the *Contractor* shall be subject to Eskom's approval. The language of all documentation shall be in English. The *Contractor* shall include the *Employer's* drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Subcontractors. Drawing numbers will be assigned by the Employer as drawings are developed.

3.4.1.1 Document Identification

The *Contractor* is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the delegated Eskom Representative. Eskom will pre-allocate document numbers on the VDSS and send back to the *Contractor* through the delegated Eskom Representative. The VDSS is revisable and changes must be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The Contractor's VDSS shall indicate the format of documents to be submitted.

3.4.1.2 Drawings Format and Layout

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of Engineering Drawing Standard [62]. Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy. All *Contractors* are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in pdf format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted.

3.4.1.3 Document Submission

All project documents must be submitted to the delegated Eskom Representative with transmittal note according to Project / Plant Specific Technical Documents and Records Management Work Instruction [17]. In order to portray a consistent image it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction. The *Contractor* is required to submit documents as electronic and hard copies and both copies must be delivered to the *Eskom Representative* with a transmittal note.

In addition, the Contractor shall be provided with the following standards which must be adhered to:

- Documentation Management Review and Handover Procedure for Gx Coal Projects [16].
- Project Documentation Deliverable Requirement Specification [15].
- Technical Documentation Classification and Designation Standard [9].

3.4.2 Engineering Change Management

All Design change management shall be performed in accordance to the latest revision of the Eskom Project Engineering Change Management Procedure [61] and the Employer shall ensure that Contractor is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer. All design reviews will be conducted according to the Design Review Procedure [7].

3.4.3 As-Built Plant Drawings

The contractor shall be responsible to update all existing drawings of the “as-built plant” with the new system information.

New drawings are to be supplied where changes have been made to the plant.

The following drawings/diagrams will be required:

- Datasheets of all new equipment
- Piping and Instrumentation drawings

3.4.4 Plant Coding & Labelling

3.4.4.1 Plant Coding

Plant Coding shall be undertaken by the employer and as such the service provider shall make available the following documentation to code:

Mechanical

- Piping and Instrumentation Diagrams (P&IDs)
- interface list
- process flow diagrams (PFDs)

Employer will only code the AKZ code defining Documentation listed above. The employer will assign a coding practitioner who will interact with the Service Provider in coding the plant as listed above. It may be required that the person be based at the Service provider's offices full time. The Service Provider will then be required to include allocated codes to all other designs and related documentation. It is also the responsibility of the Service Provider to consistently apply the AKZ codes throughout the rest of the technical documentation.

The Service provider shall ensure that all documentation is coded (as per the codes assigned by the Practitioner) prior submission to Employer for review.

Tutuka power station coding and plant labelling shall conform to the following Plant standards:

- Tutuka AKZ Coding Procedure [2]

3.4.4.2 Plant Labelling

It is the responsibility of the Contractor to manufacture and install labels according to station based labelling standard. Eskom to provide the labelling standard.

The Coding practitioner shall facilitate base-lining of all equipment lists from the contractor, and only baseline equipment lists shall be used as a basis for the production of labels. The Abbreviation Standard for Labelling of Plant at Power Stations [5] shall be provided to the Service provider as a reference for the creation of equipment lists.

Coding and labelling of components inside electrical and C&I panels shall be done by the Service provider.

3.4.5 Procedures, Guidelines & Other Documents

The applicable procedures, guidelines and other relevant documentation to commission, operate, maintain and engineer the plant/system shall be supplied with the system, by the contractor. This will include as a minimum the following:

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- Piping and instrumentation diagrams
- General arrangement and layout drawings
- System description providing all technical specifications
- Operating and control philosophy
- Data sheets and equipment lists
- Temperature rating of detection bulbs
- Testing and commissioning procedures.
- Quality Control Plan

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Bryson Ramarumo	Configuration Management
Kyle Enslin	Tutuka Fire System Engineer
Marlize Andre	Corporate Specialist - LPS
Mbali Mathebula	PEIC
Monyane Mokoena	Tutuka Auxiliary Engineering Manager
Nathi Mabaso	Tutuka Low Pressure Services Engineer
Richard Brayshaw	CoE Electrical
Shaun Barnard	Tutuka power station – Boiler Engineering
Suven Govender	LDE Structural Design CoE
Santosh Mahabeer	Supervisor: Structural Design CoE
Thabelo Mamphogoro	Tutuka Plant EDWL
Thabile Modungwa	Tutuka power station – Electrical Engineering
Uriev Ellapen	Tutuka power station – Electrical Engineering
Zamaswazi Luswazi	CoE Middle Manager Low Pressure Services

5. REVISIONS

Date	Rev.	Compiler	Remarks
April 2017	0.1	K. Enslin	Draft version

6. DEVELOPMENT TEAM

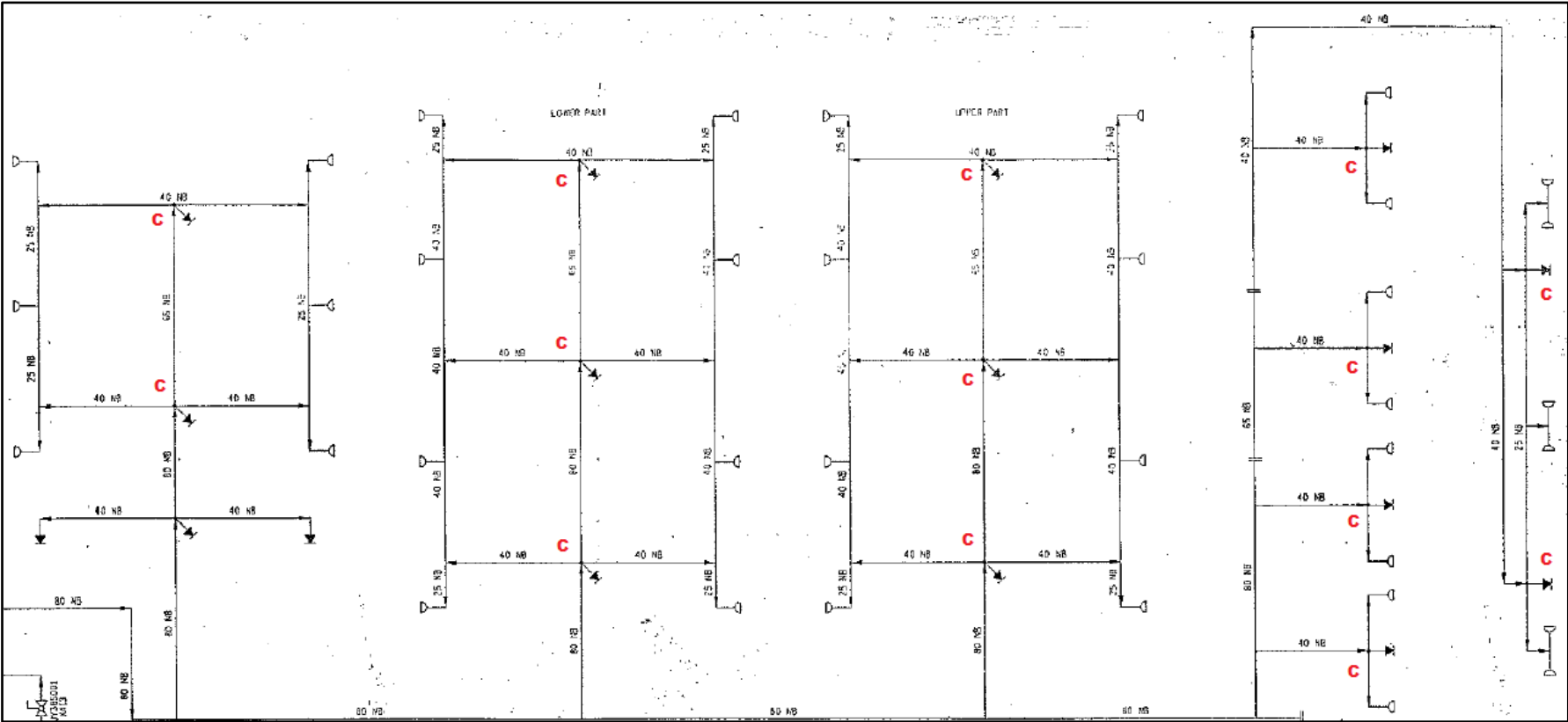
The following person(s) was involved in the development of this document:

- Kyle Enslin
- Marlize Andre

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Figure 6-1: Fire Pump House MJC Location [39]



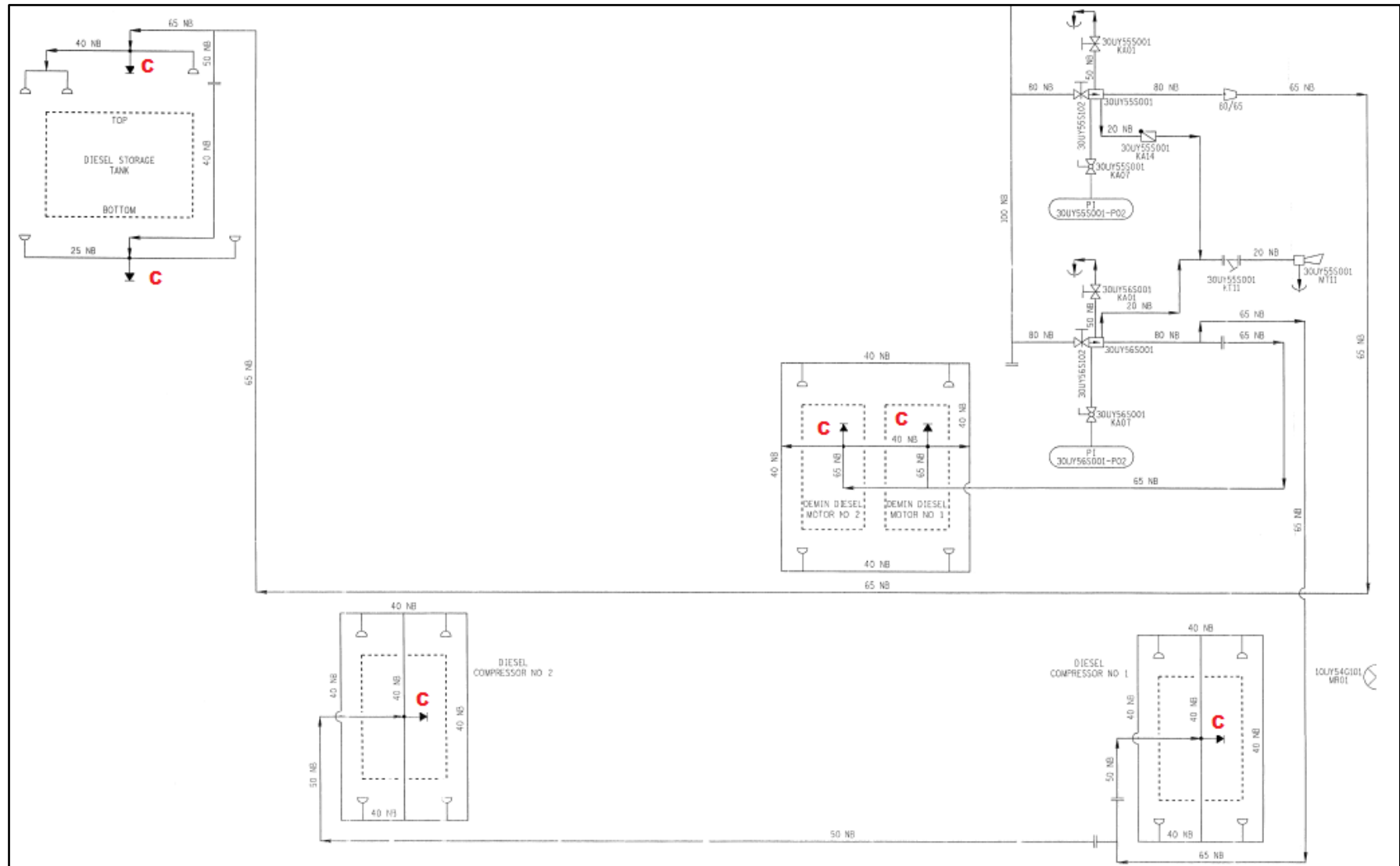


Figure 6-3: LPS House MJC Location [41]





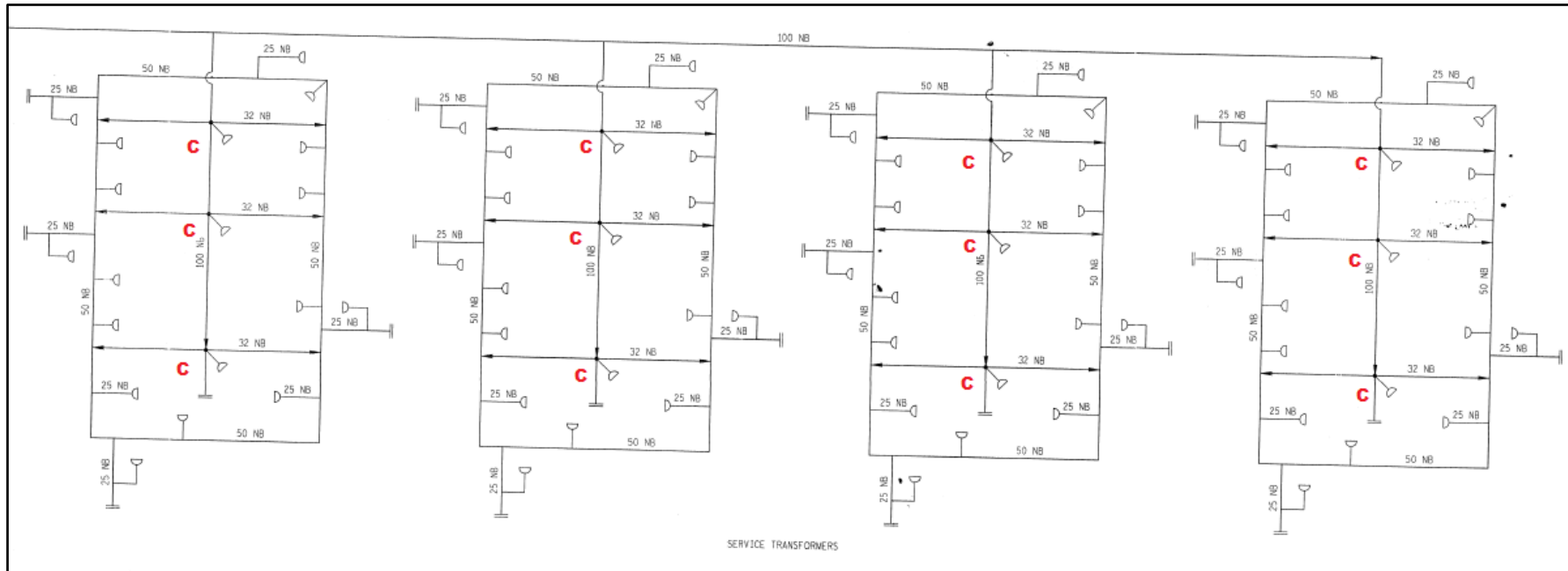


Figure 6-6: Unit 1-6 Service Transformers MJC Locations [45] [46] [47] [48] [49] [50]

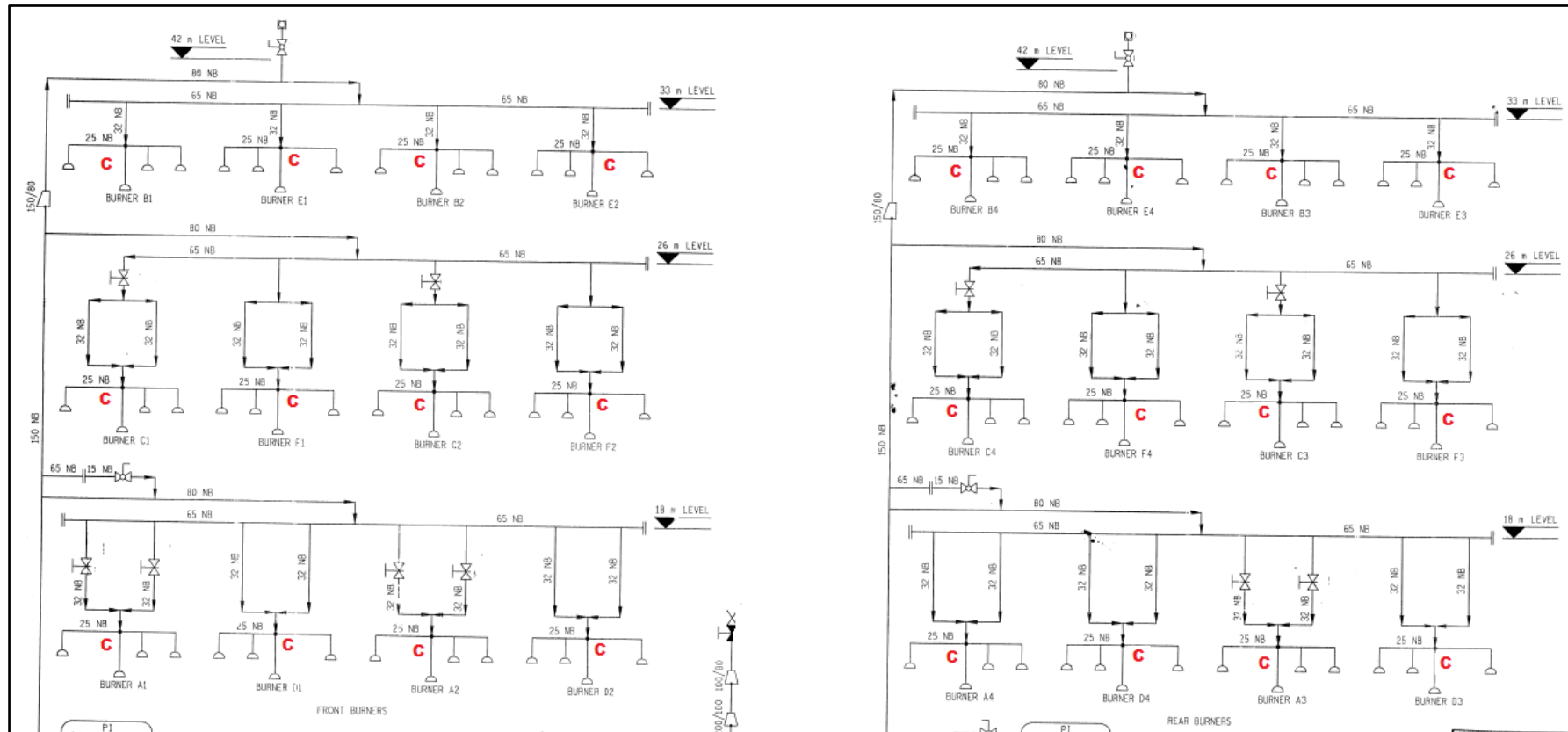


Figure 6-7: Unit 1 Boiler Burners MJC Locations [51]

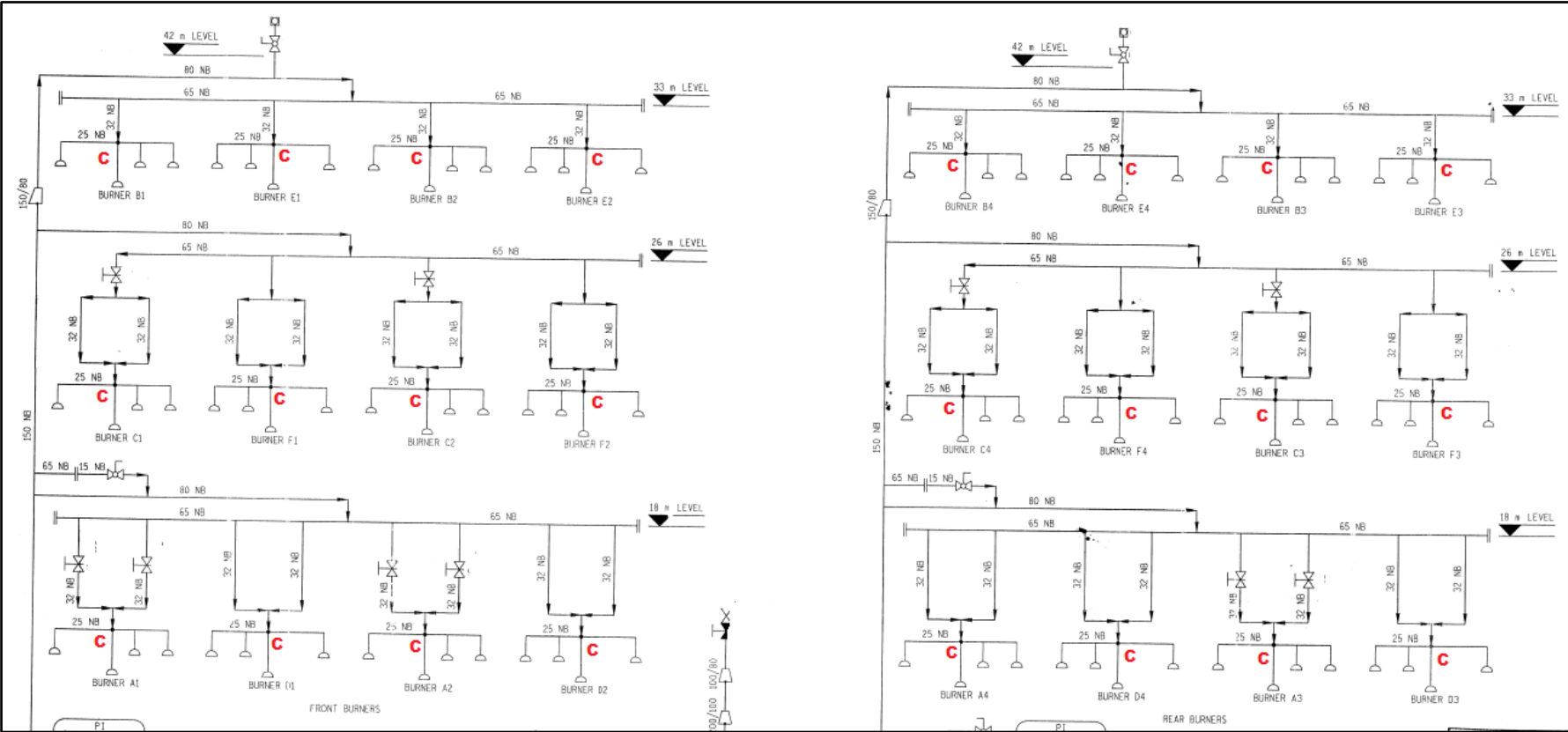


Figure 6-8: Unit 2 Boiler Burners MJC Locations [52]

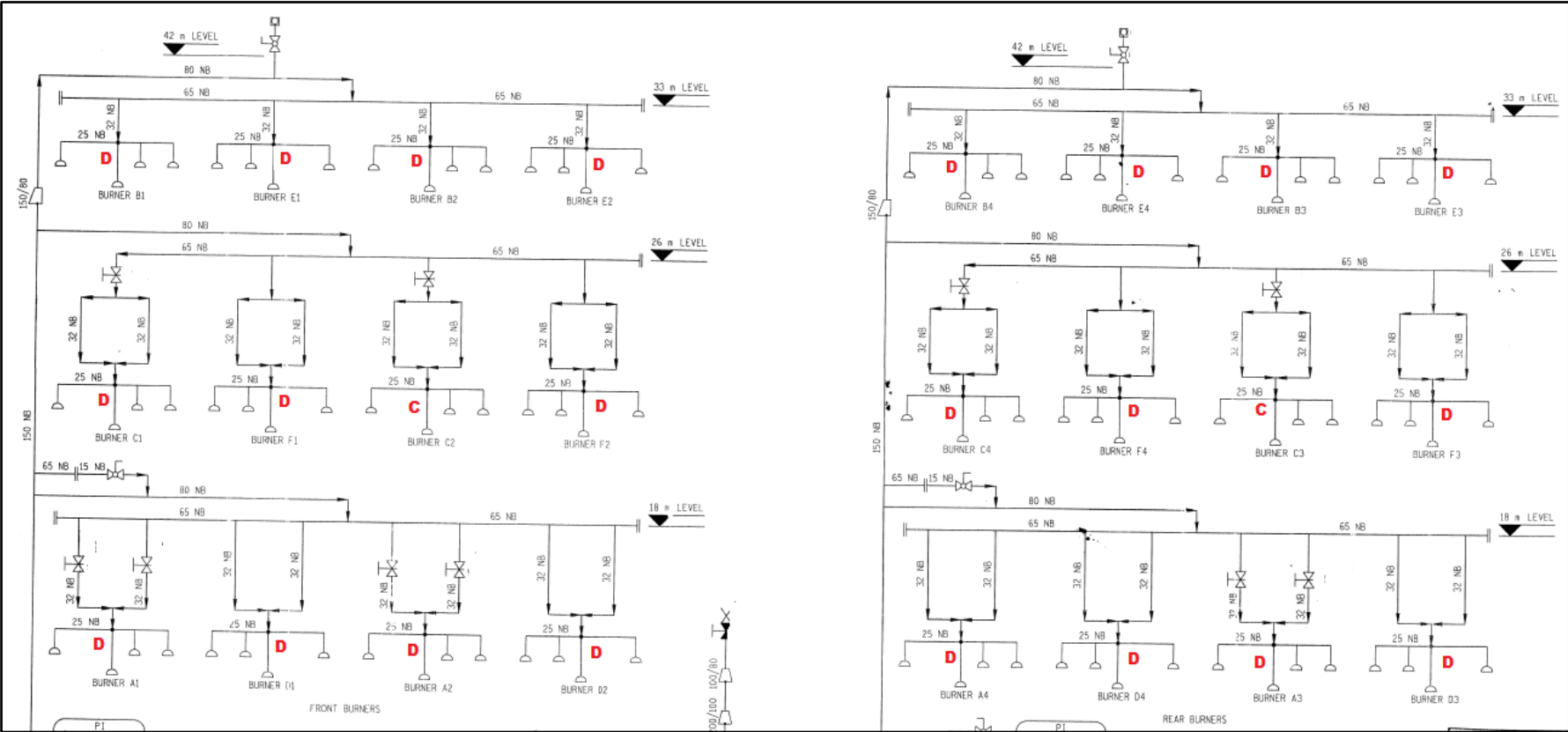


Figure 6-9: Unit 3 Boiler Burners MJC Locations [53]

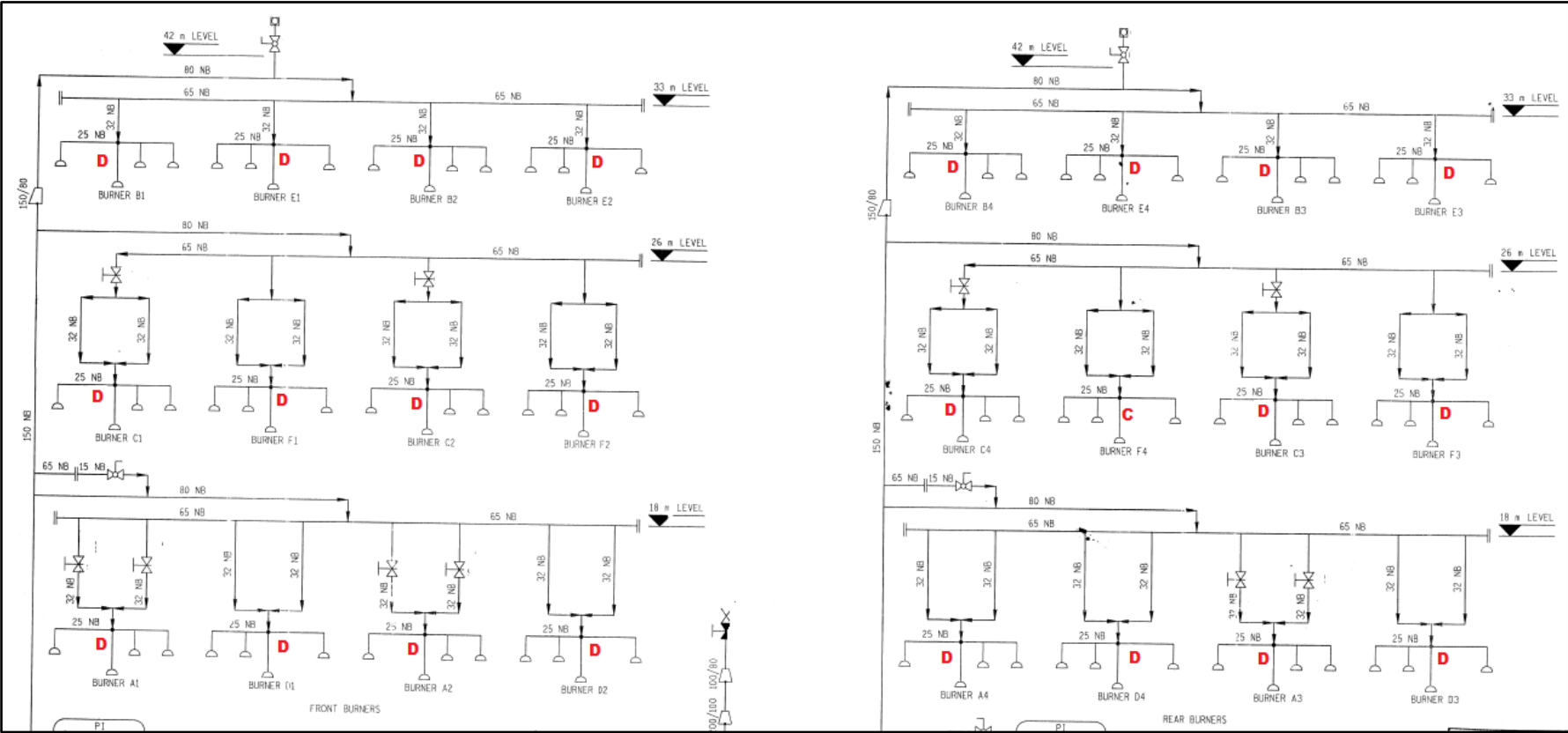


Figure 6-10: Unit 4 Boiler Burners MJC Locations [54]

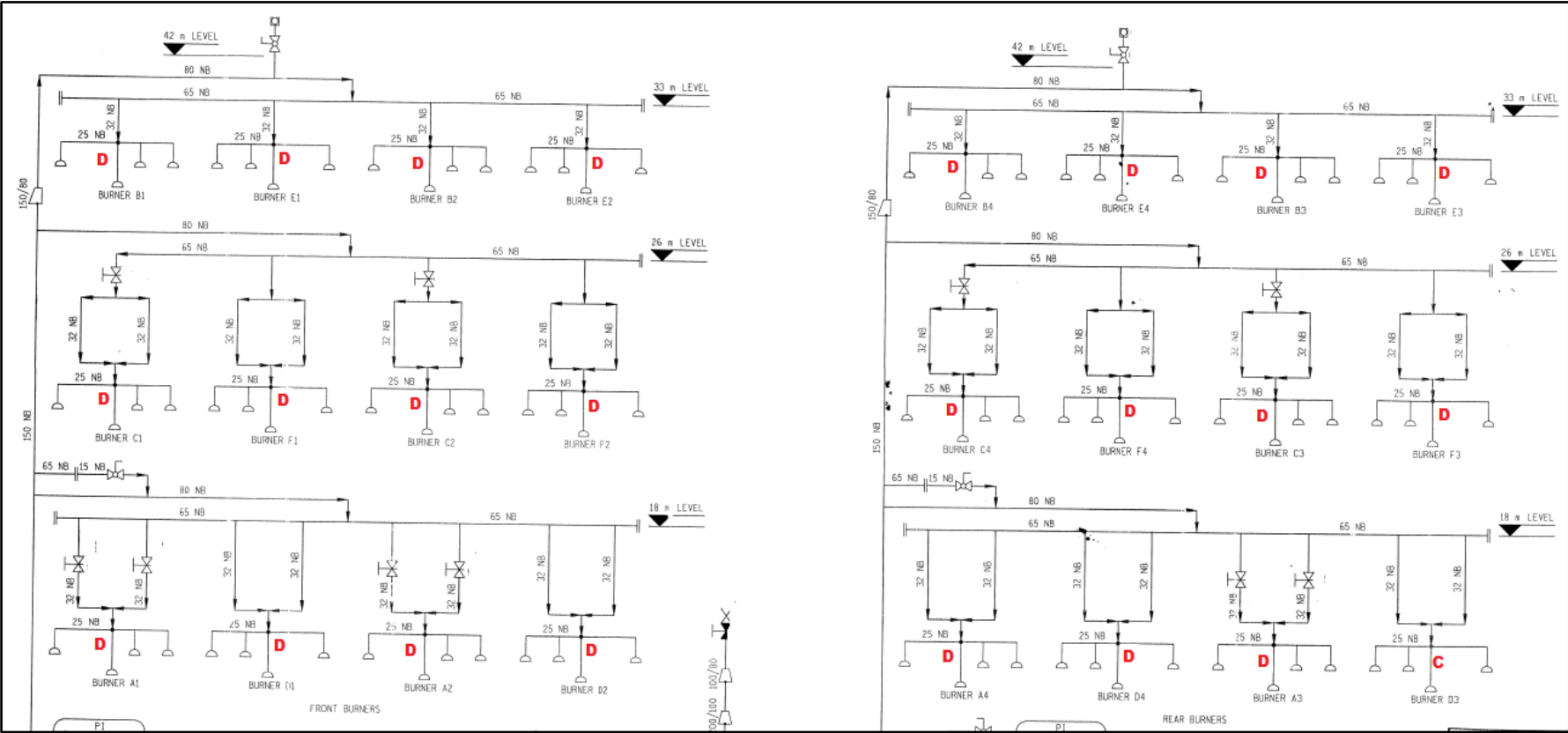


Figure 6-11: Unit 5 Boiler Burners MJC Locations [55]

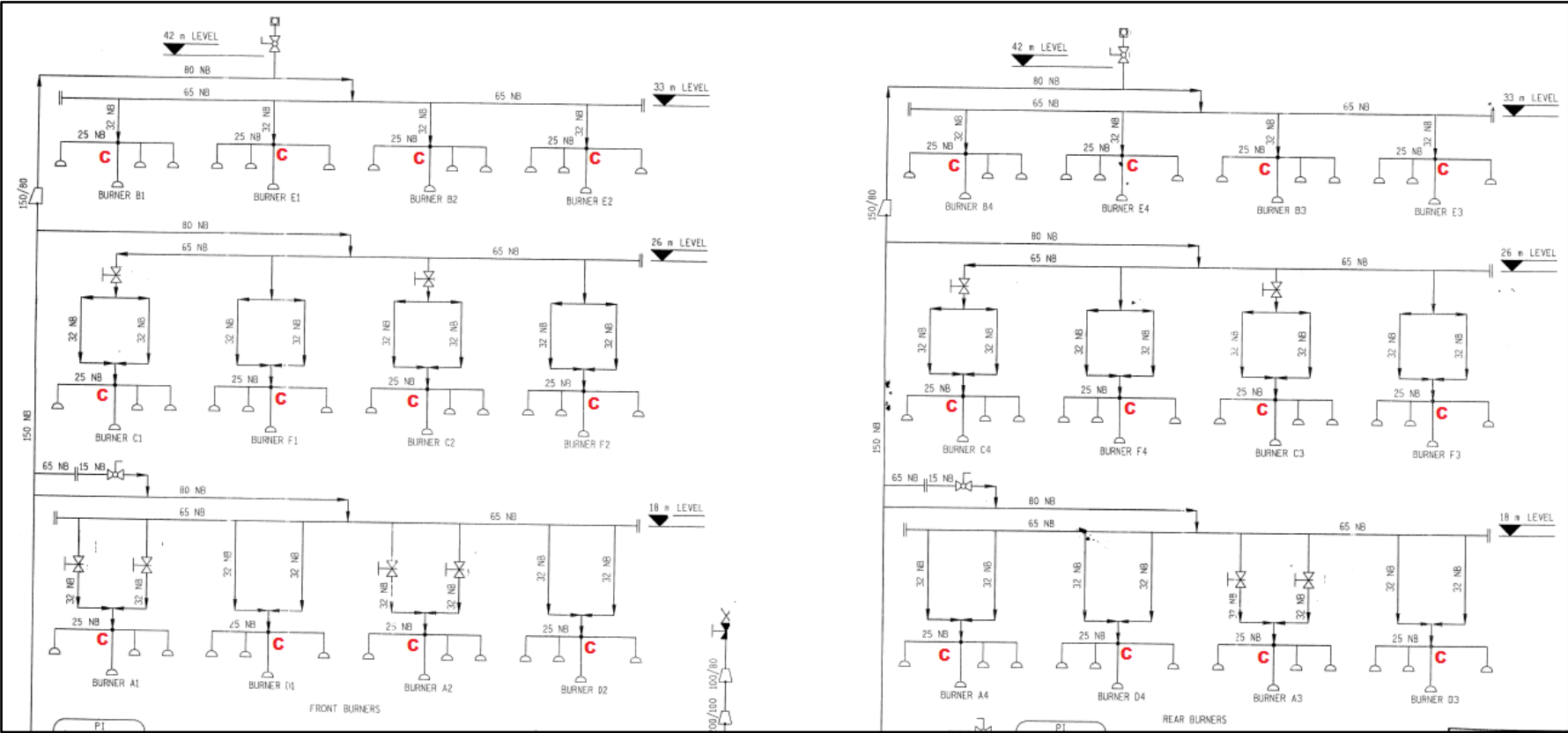


Figure 6-12: Unit 6 Boiler Burners MJC Locations [56]