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Works Method Statement WMS-02

Boilers

Delimara Power Station Delimara - Marsaxlokk

Rev.	Date	Details	Prepared by	Reviewed by	Approved by
03	31.05.2017	Review	Roberto Brustia	Mario Sabolo	Mario Sabolo
02	03.04.2017	Review	Roberto Brustia	Mario Sabolo	Mario Sabolo
01	27.03.2017	Review	Roberto Brustia	Mario Sabolo	Mario Sabolo
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00. Site description

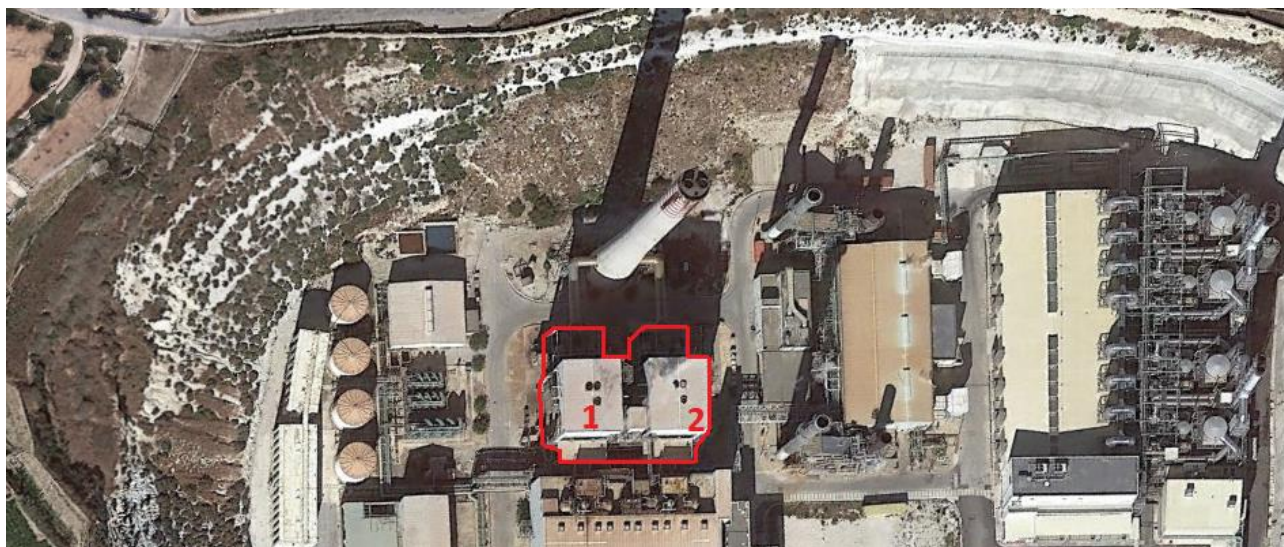
Delimara Power Station (DPS) is located on the Delimara Peninsula in Marsaxlokk Bay, on the south east coast of Malta. The site is located at an elevation of between 1.8m and approximately 6.0m metres above local sea level (ALSL).

The site comprises operational plant in the centre and south of site, and a workshop, administration buildings and a First Aid room in the north of site.


Below some pictures of the boilers involved in the decommissioning.



Delimara Power Station – Global view



Boilers – Global view

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01. Description of area - structure


The boilers are classified as of the "suspended" type. This two boilers have suspended furnaces where the pipework is secured on top to the furnace load-bearing structure.



Boilers Overview

The demolishing technique consists in step-by-step lowering the furnace body by using strand jacks located on top of the of the boiler structure top.

Before boilers lowering are necessary some activities classified as “preliminary” as shown afterwards. Works on the two boilers will be carried out concurrently.


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02. Safety precautions prior to works


- Switching off or protect all live equipment. All works shall be carried out according to Enemalta HSE Policies.
- Part of the road closer to the boilers will be closed during the dismantling, only access for workers will remain accessible at all times.
- Protection of elements in the immediate vicinity of the boilers through the use of metal elements or brick walls placed around same elements.
- Area just under the boilers will be cleaned following the dismantling of the two boilers and will be disposed of as waste. The area under the boilers will be cleaned manually and the collected materials will be placed in big bags.
- Safety tests and certification of all material and equipment to be used.
- Ground operators shall not pass, stand or work in the operating area of the mechanical equipment or suspended loads;
- The area immediately below the works shall be properly hoarded with suitable barriers and the transit and standing of people and vehicles shall be prohibited.
- Before carrying out any demolition operations, the site Supervisor of Works shall carefully assess the possibility that the demolition might cause the immediate or successive collapse of other parts.
- No other activities shall be carried out near the intervention area and access shall be permitted only to authorized staff.

03. Environmental Issue

- A precautionary approach is being taken, to segregate any hazardous components that might be detected during the course of works.
- Before starting the dismantling works of the boiler, HFO will be drained. The waste oils will be stored in a bunded location, with the proposed site being shown in the drawing DPS-XZ-189 (DPS Temp. Waste Management Sites).
- The contractor shall ensure that prior to decommissioning of the boiler all hazardous components that can be separated such as electrical/electronic circuits, oils, flyash, etc will be removed.

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- This will be followed by the removal of insulation from the various parts to demolished and disassembled (air channels, system pipes, furnaces). Following removal of all these parts, the boiler itself will be dismantled.
 - Insulation must be removed according to the removal procedures. It will be visibly inspected to determine whether it is contaminated or not with oils/flyash. Should contaminated insulation be identified, these will be segregated from the rest and disposed of as hazardous.
 - Insulation will not be thrown down from heights but will be removed and put in to specific big bags located near the working point. In a second time big bags will be put down at ground level by the operators. In this way propagation of insulation particles will be at minimum level.
 - Details of expected waste to be generated is provided in the Waste Management Plan.
 - In order to reduce dispersion of insulation (not calcium silicate, since this is found in the turbines), the boiler will be jacked and lowered to the ground, at which point the insulation will be removed manually at ground level without throwing it from high levels, causing dispersion of insulation fibres.
 - The flyash within the boiler will be first emptied from the bottom hoppers and collected in jumbo bags. The boilers were washed during the last major maintenance intervention. As such, it is not expected to find large amount of flyash deposits attached to the furnace side walls the state of the furnace walls will inspected by the environmental monitor, and if found to contain large amounts of flyash deposits against the sides, these furnace parts are transported to be washed up in the designated bunded area and waste water collected, left to evaporate and disposed of as hazardous waste.
 - Flyash handling will be carried out as per **POW, MS, RA DPS Phase 1 Demolition** submitted with the application.
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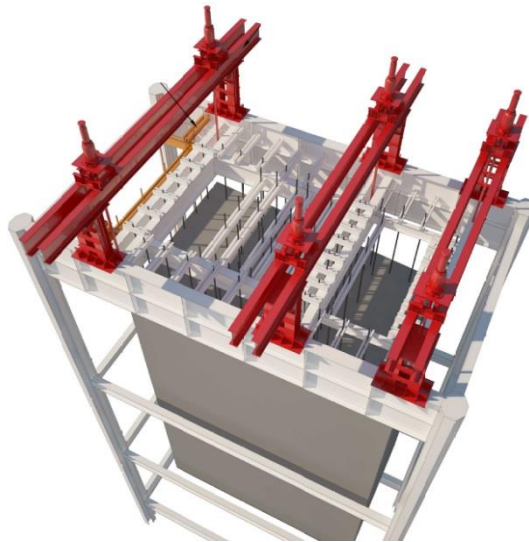
04. Works methodology

The two boilers in Boundary B will be removed together with the equipment within this area comprising 4 forced draught fans and corresponding motors, 2 clean drains tanks, 2 blow down tanks, steam lines, a lift, and Magnesium Oxide dosing skid.

Demolition of the boiler will consist of a step-by-step lowering of the body using strand jacks located on the scaffolding top.


Prior to decommissioning of the boiler all components such as circuits, oils, etc will be removed and resulting wastes separated, and treated as per WMP. This will be followed by the removal of insulation from the various parts to be demolished and disassembled (air channels, system pipes, furnaces,). Following removal of all these parts, the boiler itself will be dismantled.

Dismantling of the 2 boilers will be done layer by layer from the outermost to the innermost equipment.



Example of lowering system for a Boiler

MgO used to be dosed in low quantities into the fuel line, to avoid dust deposits on boiler tubes from solidifying. Any remaining MgO within the dosing system will be purged together with the limited volume of heavy fuel oil present within the system. This will be stored in IBCs in bunded area.

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05. Works description

The different decommissioning steps are described below.

PRELIMINARY ACTIVITIES – PLANT DEMOLITION

Only cables that have been cut from the power supply and a permit to work issued by Enemalta personnel and equipment shall be removed. The contractor shall not remove any cable which has not been cut from both ends by the Enemalta's engineers. Marking in red paint all the equipment (except cables and cable trays) that can be removed during the decommissioning activity, removal of the plant circuits, such as combustible gas, lubrication and valve control oil, cooling and injection water and disconnection of power electro-instrumental equipment disconnection.

Before commencing any work a Risk Assessment and safe work method statement (RA-SWMS) shall be submitted to Enemalta. The RA-SWMS will be signed by the contractor's H&S representative and shall be followed throughout during project execution. The RA-SWMS shall be updated during the course of the works and made available to Enemalta upon request.

PRELIMINARY ACTIVITIES – VITREOUS ARTIFICIAL FIBRE REMOVAL


The preliminary identification and marking of components to be removed will be followed by the removal of insulation. This step refers to all structures containing parts consisting of mineral/vitreous wool (VAF).

The mineral wool removal shall be carried out before any other disassembly operation.

The elements to be removed can be listed as insulation of all the systems to be demolished and disassembled (air ducts, system pipes, furnace).

The removal of mineral wool in a free area will be carried out by using suitable PPE for all the operating staff. However, unless otherwise established from the sampling and subsequent HAZMAT survey, the insulation will be treated as non-hazardous.

The following works shall be carried out prior to any operation of disturbance and/or handling of mineral wool elements:

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- 1) Hoarding of the Site area by using removable wire net (e.g. Orsogrill type), signs and labels for specific risks and the danger due to the work in progress, as well as the prohibition of access to staff not involved in the works.
- 2) Creation of specially provided access gates properly signalled by signs pursuant to regulations in force. Only GENERAL SMONTAGGI staff, and authorized ENE personnel in charge of the works, are allowed to enter the Site area.
- 3) Creation of a temporary deposit/accumulation area for insulation waste, characterised as per Waste Management Plan, insulation will be temporary stored on site inside jumbo bags to be ready for transportation to a permitted waste site.
- 4) Creation of a working area for mineral wool removal, by using warning tape and barriers/fencing as well as suitable signs.
- 5) Clearing, collection and packing of the different materials in the working areas.

PRELIMINARY DEMOLITIONS BEFORE LOWERING OF THE BOILERS

This activity consists in the demolition of all auxiliary parts of the furnace that might interfere with the subsequent lowering of the furnace central body.

Prior to the structural sectioning, the element to be removed is secured with bands or chains and, then, lowered with a tower crane or truck crane of sufficient capacity, positioned in the adjacent specially provided areas.


Hot cutting operations are carried out by operators working on an aerial platform, scaffoldings or parts of the structure not to be demolished. All hot works shall be covered by a hot work permit by the Contractor. The contractor's EM site manager or GS site manager supervises the proper performance of the operations and the application of the aforementioned safety measures.

CUTTING PRELIMINARY TO THE DEMOLITION OF THE BOILERS

It consists in removing the lower end of furnaces by hot cutting.

During the demolition of these parts, suitable measures shall be adopted to reduce the dispersion of crystalline silica, e.g. water spraying as described below.

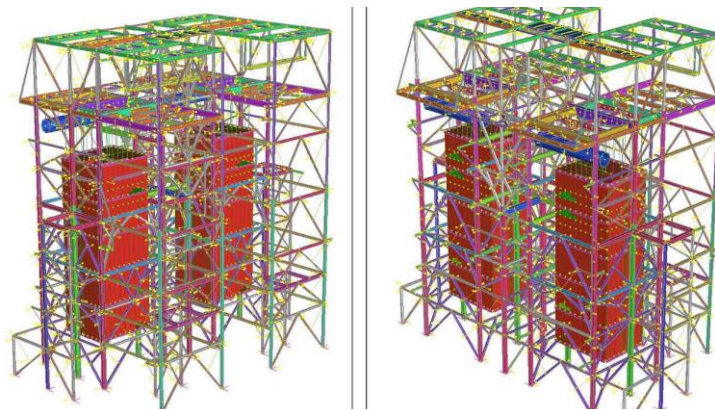
The reduction of dust produced by the demolition of any refractory linings shall be carried out by water mist sprays.

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FURNACE LOWERING

All the steps described below will be supported by static tests on the finished elements, by simulating the actual mechanical and loading conditions of all the elements included in the structure.

The picture below shows an example of the calculation model.



As already mentioned, Suspended Furnaces are characterized by a combustion chamber raised from the ground and suspended from the top beams of the load-bearing steel structures.

Furnace demolition

The first element to be removed is the roof framework in order to free the hanging devices and the dead space area.

Secondly, all external pipes and ducts will be removed before lowering the furnace.


This technique allows to reduce the furnace body weight by disassembling it directly from its original position, by cuts and removals, working directly from the surrounding walkways.

Then, the furnace will be progressively lowered to take the parts still to be dismantled at a height that allows to work in safety and limit the falling height of any removed fragments.

The furnace lowering is carried out by using specially provided strand jacks positioned on the top of the load-bearing structure and connected to the load-bearing harps through two cross beams.

The strand jack ropes will replace the existing suspension wires in holding the furnace, allowing the operators to fully remove the existing hanging devices.

The strand jacks will be pre-loaded before cutting the existing suspension bars.

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Upon operating the strand jacks, the furnace structure will move forward at a speed of few cm/second, which will be, therefore, statically irrelevant.

Furnace lowering

Lowering consists in removing the lower parts of the furnace and bringing it down by using hydraulic jacks. After the demolition of the lower part of the furnace by hot cutting the tubular structures, a superstructure is assembled on the roof and anchored to the top framework main beams that will host the pairs of strand jacks used for handling.

Said structures consist of two portals composed by coupled metal profiles with a double-T section with heated plates.

The portals are transversal to the furnace system and rest on the largest longitudinal beams of the coverage.

The portals are assembled on the ground and installed on the coverage by lifting them with a crane.


After securing the main beams through an anchoring system with threaded bolts that allows for moving longitudinally to the load-bearing beams for transversal centring, the cross beams are installed on the burner housing top or the floor of the dead space.



Said cross beams are inserted into specially provided vertical plates previously welded on the water distribution pipes in the wall vertical harps.

Once all the suspension cables have been assembled and equipped with a terminal, hanging is carried out. This system allows to fully free the original suspension wires from the load, moving the whole weight of the residual part of the furnace to the stand jack cables. Therefore, the static scheme for the furnace does not change, while the load application points for the roof beams are reduced.

Before lowering, vertical runners shall be arranged to constrain the structure against horizontal translations and allow for vertical translation, ensuring stability in all phases.

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REMOVAL OF THE FURNACE LOAD-BEARING STRUCTURES

Upon completion of the furnace lowering, the metal structures that supported the furnace shall be removed.

The metal frames will be lowered to the project height by slinging, hot cutting sectioning and subsequent lowering to the ground the framework parts.

Prior to the structural sectioning, the element to be removed is secured with slings or chains and, then, lowered with a tower crane or truck crane of sufficient capacity positioned in the adjacent specially provided areas. All lifting equipment shall be certified by a warranted engineer and certification provided to Enemalta.

06. Timeframes		
Steps	Time	
Removing Mineral Wool – Boiler 01	90	Days
Equipment installation – Boiler 01	25	Days
Demolition – Boiler 01	45	Days
Demolition Metal Structure – Boiler 01	20	Days
Waste disposal – Boiler 01	60	Days
Removing Mineral Wool – Boiler 02	30	Days
Equipment installation – Boiler 02	25	Days
Demolition – Boiler 02	45	Days
Demolition Metal Structure – Boiler 02	20	Days
Waste disposal – Boiler 02	47	Days

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07. Personnel and machinery earmark for use

Description	Number	
Lowering Equipment	01	Unit
Cranes	01	Unit
Excavators	02	Units
Machine operator	03	-
Helpers	02	-
Reclaimers	08	-