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Revisions

This document has been revised according to the following schedule:

Revision	Date Approved	Nature of Revision	Prepared by
00	22/11/2021	First Issue	MKM RAMOTLOU
01	01/02/ 2023	The exclusion crusher enclosure/ contamination in URS	MKM RAMOTLOU
02	See title page	Additioan of Distribution list and Authorization. Updating section 2.0 purpose	SR MNGOMA

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1.0 INTRODUCTION

The jaw crusher is required to reduce waste size of the cooled solid waste slag(s) of the low level nuclear waste, to smaller size particles, and then drum it so that it can comply with the acceptance criteria of the waste storage facility.

The user requirements specification (URS) will form part of the tender bid documents during procurement stage. The crusher is required to have an enclosure, which will keep all the dust and contamination during the crushing process within the enclosure. The dust control extraction system will be venting dust at a maximum velocity of 4 m/s. The crusher enclosure and dust control extraction system does not form part of this URS, however it will have a separate URS.

2.0 PURPOSE

The purpose of this user requirement specification is to provide details of the requirements for the design, manufacture and supply of a fully functional Jaw Crusher, along with all its accessories (see section 9.0). This equipment is required for crushing radioactive nuclear waste solid slag to 60mm particle size.

3.0 SCOPE

The scope of supply is to:

- a. Supply a jaw crusher design and auxiliaries (specified in Section 9),
- b. Design the jaw crusher
- c. Review the crusher design & have it acceptances by Necsa
- d. Develop a quality control plan for jaw crusher
- e. Procure materials for a jaw crusher
- f. Fabricate, manufacturing and assembly the jaw crusher
- g. Perform Non-destructive examination on applicable components of the jaw crusher
- h. Perform factory acceptance test (FAT)
- i. Deliver the jaw crusher to the Necsa site
- j. Install the crusher and perform a site acceptance test.
- k. Pre-commission, and commissioning the jaw crusher.
- l. Sign-off all installation and commissioning documents.
- m. Train the operators on how to operate the jaw crusher.
- n. A operating manual

Maintenance plan, commissioning and operating procedure , critical spares list and drawings i.e. assembly drawings; electrical drawing; instrumentation drawings; control systems drawings (hard copies & soft copies) form part of this scope of work for the project, and shall be supplied with the jaw crusher.

The above mentioned requirements in this document should satisfy and meet all the client's (Necsa) requirements including the jaw crusher ISO quality standard(s).

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4.0 STANDARDS

- Jaw crusher shall be built in accordance with the latest ISO 9001 standard.
- Adhere to Occupational Health and Safety Act 85, of 1993
- **BS EN 13383-1: 2013 - Air-cooled blast-furnace slag armour stone.**
- The jaw crusher and related items must be designed to sound engineering and scientific practices and appropriate technical standards to ensure intended function and performance.
- Safety, human factors, maintenance, operating and other interfaces shall be considered while designing the jaw crusher.

5.0 REFERENCES

- EN 932-3, Tests for general properties of aggregates – Part 3: Procedure and terminology for simplified petrographic description
- EN 1097-1:2011, Tests for mechanical and physical properties of aggregates – Part 1: Determination of the resistance to wear (micro-Deval)
- EN 1367-2:2009, Tests for thermal and weathering properties of aggregates – Part 2: Magnesium sulfate test
- EN 1744-1:2009+A1:2012, Tests for chemical properties of aggregates – Part 1: Chemical analysis
- EN 1744-3, Tests for chemical properties of aggregates – Part 3: Preparation of eluates by leaching of aggregates
- EN 1926:2006, Natural stone test methods – Determination of uniaxial compressive strength
- EN 13383-2:2013, Armour stone – Part 2: Test methods EN 16236, Evaluation of conformity of aggregates – Initial Type Testing and Factory Production Control

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6.0 GENERAL REQUIREMENTS

6.1 SAFETY PRINCIPLES

6.1.1 Safety hazard pertaining to equipment

All safety symbols shall be posted on the equipment and contained in the manuals. All safety symbols, labels, and instructions must be visible at all times.

- Safety instructions and safety labels attached to the equipment shall be complete and legible.
- Safety instructions and safety labels shall be kept visible.
- Any illegible or missing safety instructions and safety labels shall be replaceable before operating the equipment.

6.1.2 Symbols for prohibited actions

Prohibited actions used on equipment shall be indicated by a red circle with a red diagonal line across the circle. The following action shall be indicated as prohibited on the crusher where applicable.

- No climbing
- No smoking
- Do not touch
- No open flames
- Limited or restricted access
- Do not use hands for testing hydraulic leaks, and.
- All other non-stated but applicable prohibited actions
- All required PPE shall be displayed

6.1.3 Blockage and malfunction

In the event of material blockage, any malfunction or operational difficulty, it should be made possible to stop equipment and lockout immediately (i.e. emergency stop). Rectify problem immediately, and carry on with the crushing activities.

7.0 OPERATION OF THE CRUSHER

7.1.1 Minimum safety requirements

All required personal protective equipment requirements, instructions and signs shall be posted and be clearly visible on the crusher as follows:

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- Operating the crusher generates dust. Breathing or inhaling silica dust particles will cause death or serious injury.
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- All necessary precautions shall be taken to reduce the risk of breathing dust or particles.
- Working on or in close proximity to the crusher whilst it is operational could cause serious injury or death.
- All safety guards shall be installed and in correct working order before operating the crusher. Failure to do so could cause serious injury or death.
- The crusher shall not be started for any operational activity until the operators have read and fully understood the operating manual, including the safety section of the manual.
- This crusher shall be electrically isolated prior to cleaning.

7.2 METHODS AND MODES OF OPERATION

- The crusher start-up shall have an automatic mode which should normally be used. The manual crusher start up mode may be used if desired but components of the machine shall be started and stopped in the correct sequence.
- The machine controls shall only allow the correct sequence by highlighting the next step when available.
- The crusher shall comprise of an interlock such that no operator can start it with material while loaded on it.
- All material shall be cleared first before starting the crusher.

7.3 REMOVAL OF SAFETY DEVICES , GUARDS, AND DECALS

- Prior to operation, all safety devices, control devices, decals and guards, temporarily removed for set-up, maintenance or repair purposes shall be refitted and checked immediately upon completion of the maintenance or repair work.
- To avoid serious personal injury or death, the crusher shall never be operated without the the equipment safety devices, decal or guards removed or unsecured.

8.0 TROUBLE SHOOTING

8.1 FAULT CODES

- Fault shall be reported on the display screen, when the system detects a fault.
- Each fault shall be identified by a fault number.
- A fault description shall be shown on the display screen.

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9.0 SPECIFICATIONS

9.1 CRUSHER

- The jaw crusher shall be supplied with an inclined conveyor belt system, a feed chute and other accessories fully mounted on one skid, and supplied as one unit.
- Capacity: 3-6 tonnes per hour (tph)
- The crusher power to be determine accordance to the slag hardness.
- The crusher motor voltage shall be 3 phase, 380 Volts.
- Compact crusher shall crush slag to 60mm or smaller particle size
- Hardness of the slag is 156.8 Vickers hardness
- The maximum feed size of the crusher shall have a throat opening of 200*350mm, with ribbed liners.
- The main feed conveyor shall be fitted with feeding launders
- The crusher shall be fitted with dust control and extraction hood.
- The crusher shall be supplied with a crusher support structure
- The crusher bottom discharge seal (Iris valve) shall seal 160 L - 210 L drum containers to receive the crushed slag.
- The crusher shall have a maximum feed size of 150mm*150mm.
- The clearance between the concrete work and the base plate shall be pressure pack with non-shrink grout.
- The flooring around the jaw crusher should be checkered plate 6,5mm material thickness, suitable for a safe working area around the crusher, and there will be enough room to create a suitable safe work area for maintenance on the crusher.
- Mentis design hand railing will be secured with bolts around the perimeter of the upper flooring to create a safe working environment.
- Access ladder shall be bolted to the frame work and built to code.
- Supplier to specify all crusher components including quantity, and materials of construction.

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9.2 CONVEYER:

- 400mm wide
- Conveyor belt to feed within a containment area of 5m X 5m X 5m.
- Conveyor belt to have a feed chute fitted with skirts at the bottom at the tail end
- Conveyor belt to have discharge chute fitted with skirts at the head end, discharging into the crusher.
- Safety stop and trip wires, with siren included as part of equipment supply.
- Conveyor belt motor shall be supplied with a variable speed drive.
- Manual feed with slag
- Maximum height of the feed chute shall be 1.2m

9.3 MAIN INLET AND DISCHARGE HOPPER AS WELL AS DRUM TROLLEY

- Main inlet hopper shall be fabricated in such a way as to minimize dust from the tipping drum, when it is being emptied.
- The inlet hopper shall allow for direct dust extraction at the main inlet hopper.
- The discharge hopper shall be made flexible to allow the inlet for receiving drums.
- A wheeled trolley shall be specifically fabricated and supplied for travel in a straight line, to prevent the trolley from falling over when turning. The trolley's main purposed will be to move material in and out the crusher room.
- The trolley shall be designed to handle up to 1650kg in mass.
- The drum trolley shall receive crushed material at a height of 1,5m

10.0 CERTIFICATE

- Certificate of conformity shall be supplied by the supplier
- Mechanical completion certificate shall be supplied by the supplier on completion of site installation, electrical connection and crusher energizing, pre-commissioning and commissioning of the crusher.

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11.0 PLANT LAYOUT

The crusher shall be installed inside Area 26 building, in the smelter furnaces hall area.

