

1. Scope

- 1.1. This standard is applicable to all business units and managed operations, including new acquisitions, admin/corporate offices and research facilities located off site; during exploration, through all development phases and construction, operation to closure and - where applicable - for post closure management;
- 1.2. This standard applies to personnel and equipment involved in handling of molten materials. The standard does not apply to hoisting operations in underground mines.

2. People

- 2.1. Supervisors of molten material handling activities must be experienced, knowledgeable and shall closely monitor the activities;
- 2.2. Employees operating mobile equipment used for handling molten materials shall be trained and authorized as competent by the business;
- 2.3. Operators must undertake a pre-operational safety check for each shift that must be based on a risk assessment for all molten material handling equipment;
- 2.4. Employees shall be given appropriate information, instruction and training on the dangers of working with molten materials including the danger from liquid contamination entering the furnace; the need to follow safe working practices; and the correct use of PPE;
- 2.5. Employees working in an area where molten materials are being handled must be periodically trained in emergency preparedness, response and evacuation.

3. Process

- 3.1. All vessels and equipment used for handling molten materials shall be designed as per OEM recommendation and must be certified by a competent engineer;
- 3.2. Standard operating and maintenance procedures based on a risk assessment shall be developed for molten materials handling activities and the application of the procedures shall be monitored;
- 3.3. All molten material handling equipment including cranes and associated rigging hardware must have valid load tests certificate signed by a competent authority including recertification if configuration is changed;
- 3.4. All molten material handling equipment must have necessary safety devices, fail safe devices and interlocks;
- 3.5. A warning device (a Bell, Horn, Siren or a flashing light) is required to be activated whenever mobile equipment is handling molten materials;
- 3.6. Molten materials handling EOT cranes greater than 15 T capacity shall be equipped with safety brake in addition to conventional brake;
- 3.7. Cranes with a safe working load beyond 15T shall be fitted with rated load indicator;
- 3.8. Long traverse and cross traverse motion shall be equipped with soft start devices like variable frequency drives and inverter-controlled brake/electro hydraulic booster to avoid sudden jerk during acceleration and deceleration;
- 3.9. Molten material transport tracks shall be regularly inspected for undulations and prompt rectification action shall be ensured;
- 3.10. Cranes, forklifts and other equipment handling molten materials must have heat protective shields;
- 3.11. Preheating and inspection of ladles for any moisture shall be done before handling molten materials;

- 3.12. Molten materials ladles shall be suited for the intended operation and shall be inspected regularly for shell condition and descaling;
- 3.13. There must be a system to ensure bottles, cans etc. are not charged to furnaces and ladles;
- 3.14. Water accumulation in sumps, drains, spillages etc. must be protected from contact with molten materials;
- 3.15. The maximum level of molten material in furnaces, ladles and other devices shall be clearly defined and any deviations shall have an effective control mechanism;
- 3.16. Furnaces must be operated within design limits and this must be monitored at regular intervals;
- 3.17. Critical water supplies shall have a backup supply in the event of failure of the primary water supply;
- 3.18. Equipment must be designed to "fail safe" in the event of any power or energy source failure;
- 3.19. Tools and equipment used in molten materials handling should be ergonomically designed;
- 3.20. Tools and equipment used in molten materials handling shall be secured;
- 3.21. Transmission cables, utility pipe lines and other infrastructure shall be protected from heat damage;
- 3.22. Correct PPE usage shall be mandatory for molten material activities and may include helmet, face shield, leather gloves, balaclava, toe guard, high ankle safety shoes and fire-retardant clothing;
- 3.23. Fire retardant clothing shall be provided for any person entering an area where there is a potential for exposure to molten materials;
- 3.24. Molten materials transfer path/aisle must have pedestrian and access controls and be clearly marked. All necessary signage, posters, warning indicators and barricades must be in place;
- 3.25. Molten material transport roads/rail must have a risk analysis to identify and control hazards of metal spillage;
- 3.26. Traffic rules for molten material transport vehicles must be developed and rigorously enforced;
- 3.27. Molten material transport vehicles must be segregated from other vehicles and pedestrians unless effective risk controls have been established and implemented;
- 3.28. An emergency evacuation plan for personnel shall be in place and must consider emergency lighting in blackout scenarios.

4. Review

- 4.1. Mobile Equipment safety devices must be inspected periodically and tested on a suitable schedule for effectiveness and the findings recorded;
- 4.2. Businesses are required to comply with local laws and regulations related to molten materials safety.



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