

MOLTEN METAL EXPOSURE

DECEMBER 2022



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LOSS PREVENTION BULLETIN

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- ❖ Hazard scenario in the metal industries can be high as compared to other engineering workshop. The making and shaping of iron, steel, aluminum and other metals involves heat, pressure, movement of molten metals and other activities that can expose workers to numerous physical and chemical hazards as well as industrial hazard also.
- ❖ A metal or alloy in liquid state which flow under atmospheric pressure and take shape of container in which it is placed known as molten metal.
- ❖ In other words, molten metal works in any industry in which metals are melted at certain temperature, poured and molded at required shape.
- ❖ Molten metal is a serious hazard in melting / pouring applications of metal casting. Workers who execute tasks with or near the molten metal process are highly prone to risks, such as coming in contact with metal splashes or be exposed to electromagnetic radiation.



Hazards associated with molten metals:

- ❖ Heat and relatively stress exposure to the person working over the area due to heat and Ultra violet / infrared radiation generated from the molten metal works.
- ❖ Unforeseen leaks of molten metals from the furnace can cause structural damages and can cause fire hazard to the nearby areas.
- ❖ Radiation from the molten metal or spillage can melt the cables and relative equipment's.
- ❖ Exposure of toxic hazard due to relative dust, fumes, gases or vapors etc.
- ❖ Mechanical handling of heavy process equipment's.
- ❖ Most molten metals have the potential to cause explosions, if it come in contact of water that is left out in the molten metal vessel or while transferring to the container. This is particularly considered with steel and aluminum.

Loss prevention measures from Molten metal exposure:

- ❖ Molten metal breakouts are common loss in primary metal occupancies. Visual inspection of furnace at regular intervals can help to identify primary hazard.
- ❖ Pit, Spill kits, Routine maintenance and protection of surroundings equipment's can help to minimize the loss.
- ❖ All the vessels and equipment used in molten metal materials should be as per OEM guidelines and with proper precautions.
- ❖ The maximum level of molten material in furnaces, ladles and the devices shall be clearly defined and any deviations shall have an effective control mechanism.
- ❖ Steam explosions are caused by introducing moisture into molten metal or by pouring molten metal onto materials containing moisture. Loss prevention steps from explosions:
 - 1) Raw materials for furnace like scrap of iron, steel, aluminum, copper etc. should be free from moisture and contaminations.
 - 2) Refractories need to be preheated before use for safe operations.

3) Liquid containers or pressurized tanks should not be installed near the refractories or furnace.

4) Molten metal handling equipment or tools should be free from dust before usage.

- ❖ Chemical explosion can also occur while adding chemical directly or as a contaminant while charging in furnace. Proper storage method needs to be present for the chemicals or should not store nearer areas of the molten metal exposure.
- ❖ Heat stress illness to workers working in close proximity of furnace is also common hazard due to infrared radiation of molten metals or furnaces. Water screens or air curtains in front of furnaces as well as primary level heat protective clothing can be used as safety provisions.
- ❖ Correct PPE usage should be mandatory for molten material handling activities and may include helmet, face shield, leather gloves, safety shoes and fire-retardant clothing.
- ❖ Molten materials handling cranes greater than 15 tons capacity or with appropriate capacity should be equipped with safety break additional to conventional break and rated load indicator.
- ❖ Molten material transfer tracks should be regularly inspected and maintained as per OEM guidelines.
- ❖ Molten metal spillage over the concrete will damage the concrete. Make practice to use sand barrier of at least 03 inches thick below molten metal handling area which help to reduce spillage and damaging the floor.



- ❖ Proper installation of the lining of furnace is as important as selection of the right material. If the material is inadequately compacted during process which creates a weak spot easily attacked by molten metal.
- ❖ Safety measures also needed for the moving molten metals:
 - 1) Lid should be put on the transfer vessels is the best practical way for reducing the spills.
 - 2) Traffic management plan should be implemented around the molten management moving area and any personal should be strictly prohibited at area.
 - 3) Aisles marking space should be at least 800 mm wide where molten metal is being transported.
 - 4) Electric power forklifts are better than conventional diesel powered which possess hazards of flammable exposure.

Case Studies - Molten metal hazards:

Incident 1:

Type of industry – Aluminum plant

Incident date – November 2012

Location – Birmingham, UK

Cause of loss – Molten Aluminum & Lithium leaked from furnace

Incident brief –

- Large amount of molten aluminum leaks from the furnace due to worker error or design defect as per the study report of Chinese government.
- The intensity of damage was so explosive that almost 50 workers died and around 64 workers injured.



Incident 2:

Type of industry – Copper / Al conductor manufacturing

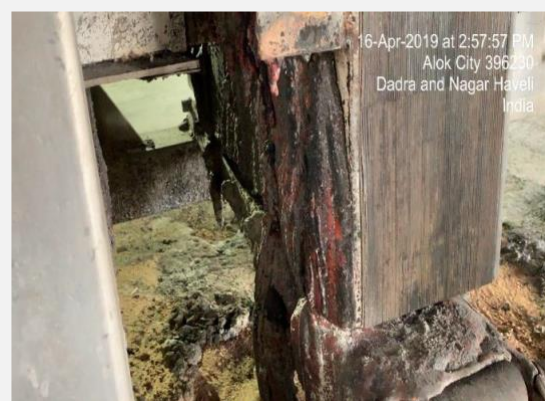
Incident date – April 2019

Location – Silvassa, UT of D&NH

Cause of loss – Molten metal leakage from Furnace

Incident brief –

- On 14th April 2019, around 07 pm in evening molten metal leaked from the bottom of the furnace.
- Molten metal spilled over the floor and fire started at the bottom area of the furnace. Molten metal spilled around 03 feet radius of the furnace.
- Fire controlled by internal team within 30 to 35 minutes.
- Molten metal which spilled on the floor got contaminated due to firefighting activity and solidified.





Incident 3:

Type of industry – Steel Manufacturing industry

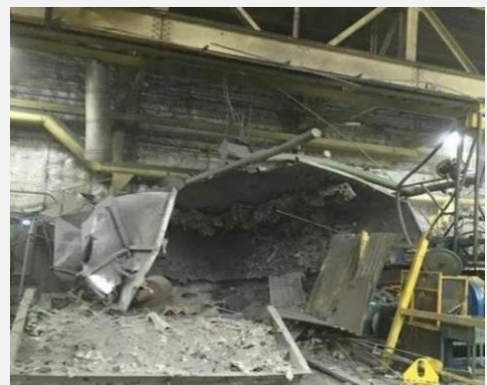
Incident date – November 2020

Location – Hamilton, Ontario (Canada)

Cause of loss – Leakage of Liquid steel from caster

Incident brief –

- On 14th November 2020 at afternoon, spill occurred of liquid steel from the caster machine due to malfunction.
- The area was taken controlled around 2.25 pm and no injuries found as employees were not allowed at that area.
- Company's own fire tender was also responded and public fire brigade of Hamilton was also on site for emergency support.
- However incident caused plum rise in the air and emission contained dust from the steel, steam generated by the reaction between the water used by firefighters and the liquid steel and smoke from the combustibles in the area that caught fire.





Insurance Underwriting View:

- ❖ Molten metal spillage covers available as add on cover for SFSP Policy. Loss and damage to insured property by leaked/spilled molten metal is covered by this “add on”. However, leaked / spilled molten itself is not covered.
- ❖ In IAR Policy, spillage of molten metal is covered in built.
- ❖ Molten metal generally applicable to Steel plants, Glass industries etc. having furnaces or foundries.
- ❖ Public liability exposure can also be considered in case of leakage of molten metals or metal explosion.
- ❖ Business interruption due to damages to furnace and surrounding area due to leakage of molten metal is common scenario. Reinstatement period of furnace to be considered as critical parameter for taking coverage of Business interruption period.

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Beacon Insurance Brokers Pvt Ltd. Introduces itself as one of the leading names amongst insurance broking companies in India.

Incorporation: January 31, 2005

Main objective: Act as composite insurance broker (Life, Non-life & Reinsurance)

- Our presence: Vadodara, Ahmedabad, Ankleshwar, Surat, Rajkot, Delhi, Mumbai, Jaipur, Indore, Gift City (Gandhinagar), Bangalore, Chennai and expanding in eastern & Northern regions.
- Beacon insurance has a team of qualified MBA'S, Engineer's & Professionals certified from the Insurance Institute of India. The organization is set up to develop core competency in insurance sector. We started our operations in the year 2005. Since then, beacon is effectively managing insurance portfolio of numbers of individuals, small, medium and large corporate.
- Professionals with 20 - 30 years' experience in private and public sector blended with young vibrant team have come up together to emerge beacon as a one of the fastest growing insurance broking company.
- We also have team of around 35 - 40 engineers from the various fields like Mechanical, Electrical, Electronics & Communication, Civil, Computer engineering & Information and Technology, that added advantage to utilize the technical knowledge.
- We have our networks all over India and have in house expertise in all aspects of property, human, liability and other insurance domains. We have strong infrastructure which takes care of all needs of clients for general and life insurance. Beacon is committed to bring changes in the mindset of Indian corporate about effectiveness of implementing insurance as Risk management tool.