Updated to November 30, 2024
This document has official status.

chapter S-2.1, r. 15

Regulation respecting safety and health in foundry works

Act respecting occupational health and safety
(chapter S-2.1).

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DIVISION I

DEFINITIONS

1. Unless the context otherwise requires,

(a) "crucible" means a pot made of refractory earth or made of metal lined with refractory materials, used to melt metals;

(b) "mould and core oven" means a heating chamber made of brick, stone or metal and used to bake cores and sand moulds;

(c) "foundry" means an industrial establishment where ores, metals and alloys are melted, purified or converted;

(d) "cupola furnace" means a furnace composed of a vertical steel cylinder lined with refractory materials and topped with a stack to evacuate the gases from the combustion. The melting of pig iron mixed with coke and fluxes is activated by a current of compressed air. A few cupola furnaces are equipped with a water cooled system;

(e) "electric arc furnace" means a fixed, rotary, or tiltable furnace to produce steel, iron or alloys. This furnace consists of a cylindrical or elliptical steel shell lined with refractory materials and provided in the top with openings for insertion of 2 or more electrodes. These electrodes are automatically raised or lowered to maintain proper arcing distance from the charge for melting heat energy from the arcs;

(f) "crucible furnace" means a furnace built of refractory materials, provided in the top with melting holes for insertion of crucibles;

(g) "induction furnace" means a furnace of a fixed or tiltable type, composed of a vertical steel cylinder normally lined with refractory materials. The induction furnace uses the transformer principle to melt the metal. A high voltage circuit is coupled to a low voltage circuit, these 2 circuits not being connected directly. The coupling is done by a magnetic field produced when the primary coil is energized;

(h) "heating or thermal treatment furnace" means a reverberatory furnace of the recuperative, regenerative or other type used

i. to reheat uniformally and gradually ingots, billets, sheet bars or forging rounds to predetermined temperatures, to make, by mechanical work, the forged or rolled steel products; or

ii. to reheat the forged or rolled steel products to predetermined temperatures suitable for hardening, annealing, and tempering or other heat-treating processes;

(i) "open-hearth furnace" means a horizontal stationary or tiltable furnace built of a steel frame lined with refractory materials, in which a current of burning gases from solid, liquid or gaseous fuel is passed over the top of the charge, and which is equipped with regenerators for the gases;

(j) "furnace" means a structure or chamber, principally built of steel frame lined with refractory materials, for the purpose of melting ores or metals or subjecting them to the continuous action of intense heat;

(k) "foundry operations" means all manual works carried out in a foundry for the purpose of melting or converting or refining metals and alloys in order to make ingots or castings. These operations include duties relative to pattern-making, moulding, pouring and trimming of castings;

(l) "ladle" means a pot which, receiving the molten metal from the furnace, is used to carry it to the moulds into which it is to be poured.

R.R.Q., 1981, c. S-2.1, r. 20, s. 1.

DIVISION II

GENERAL PROVISIONS

§ 1. — *Scope*

2. This safety and health Regulation applies to the equipment, maintenance and foundry operations.

R.R.Q., 1981, c. S-2.1, r. 20, s. 2.

3. This Regulation applies to any new foundry. It also applies to any new installation and equipment in an existing foundry.

R.R.Q., 1981, c. S-2.1, r. 20, s. 3.

4. In the case of existing foundries on 10 October 1973, appropriate measures shall be taken to insure equivalent safety and health conditions to those prescribed in this Regulation.

R.R.Q., 1981, c. S-2.1, r. 20, s. 4.

5. In the application of this Regulation, the nature, dimensions, and disposition of materials and apparatus may differ from this Regulation inasmuch as the resistance of the material and apparatus and their safe use are at least equivalent to those prescribed.

R.R.Q., 1981, c. S-2.1, r. 20, s. 5.

6. If there is conflict with regard to an equivalence between the head of an establishment and the inspector, the chief inspector delivers a written decision which is final.

R.R.Q., 1981, c. S-2.1, r. 20, s. 6.

§ 2. — *Duties of the employer*

7. The head of the establishment shall ensure that this Regulation is observed.

R.R.Q., 1981, c. S-2.1, r. 20, s. 7.

8. **Generalities:** The head of the establishment shall ensure that the working areas and equipment are made, equipped, operated and maintained in a way to eliminate accident hazards, and that the working methods are safe.

R.R.Q., 1981, c. S-2.1, r. 20, s. 8.

9. **Foundry characteristics:** All foundries shall conform to this Regulation, and, in addition, shall have the following characteristics:

(a) for a new construction or an alteration of the building, the main offices shall be isolated from the foundry operations areas, by a brick, stone or concrete wall having a fire resistance of at least one hour. This wall shall have fire doors;

(b) the foremen's offices, located within 6 m of the areas where molten metal is handled, shall be built of materials having a fire resistance of at least one hour;

(c) any apparatus, tool, instrument and equipment shall be kept in good working condition, and procedures for inspection and maintenance shall be set up and followed;

(d) ladles with their forks, crucibles with their handles, ladle skimmers and the slag basins used for the casting of molten metal shall be checked each day before being used, regardless of their condition;

(e) an illumination that conforms to Division XIV of the Regulation respecting occupational health and safety (chapter S-2.1, r. 13) shall be provided for each section of the foundry;

(f) during the working hours, the ventilation and temperature inside foundries shall conform to Divisions XI, XII and XIII of the Regulation respecting occupational health and safety;

(g) workshops where lacquers, paint, varnish, oil or other flammable or explosive substances are utilized, shall be isolated and protected from the foundry operations areas;

(h) containers containing flammable or explosive substances shall be stored in rooms isolated from the foundry operations areas;

(i) cylinders of gases under pressure shall not be stored in the foundry operations areas; only the day's requirements will be allowed.

R.R.Q., 1981, c. S-2.1, r. 20, s. 9; O.C. 885-2001, s. 384; O.C. 805-2020, s. 1.

10. Explosions of molten metal: To avoid explosions of molten metal, the following is forbidden:

(a) the introduction of substances or any damp objects into molten metal;

(b) the pouring of molten metal in a damp receptacle; and

(c) the introduction of pieces having hermetically closed cavities in molten metal.

R.R.Q., 1981, c. S-2.1, r. 20, s. 10.

DIVISION III

ENTRANCES AND WORK AREAS

§ 1. — *Entrances*

11. Air drafts: The doors and windows shall be so constructed and located as to reduce excessive air drafts.

R.R.Q., 1981, c. S-2.1, r. 20, s. 11.

12. Hinged doors: The hinged doors giving access to the foundry shall be equipped with windows.

R.R.Q., 1981, c. S-2.1, r. 20, s. 12.

§ 2. — *Floors, pits and floor openings*

13. Quality of grounds and floors: Grounds and floors where foundry operations are performed shall be firm and without irregularities. They shall be made of earth or of non-combustible materials, with the exception of the wooden block floors especially treated for this purpose. These floors shall be constantly clear of obstacles and cleaned as often as necessary.

R.R.Q., 1981, c. S-2.1, r. 20, s. 13.

14. The floors immediately adjoining tracks shall be firm and flush with the top of the rails.

R.R.Q., 1981, c. S-2.1, r. 20, s. 14.

15. **Tracks:** An unobstructed passageway, at least 750 mm in width on each side of each rail, shall be maintained parallel to and extend the entire length of the tracks upon which any gantry crane is operated.

R.R.Q., 1981, c. S-2.1, r. 20, s. 15.

16. **Non-slip steel plates:** For the floors or sections of floor made of steel plates, these plates shall have a non-slip surface.

R.R.Q., 1981, c. S-2.1, r. 20, s. 16.

17. **Guardrail:** Any openings in the floor of a foundry shall be covered or protected by a guardrail. Pits and other floor openings in which molten metal is poured or handled shall be completely dry to avoid explosions.

R.R.Q., 1981, c. S-2.1, r. 20, s. 17.

18. **Cleaning of floors:** Floors shall be cleaned in such a manner that they are not left in an oily or slippery condition.

R.R.Q., 1981, c. S-2.1, r. 20, s. 18.

§ 3. — *Platforms and gangways*

19. **General provisions:** Any platform or gangway inside a foundry shall be kept in good condition and sufficiently firm to withstand the traffic for which it is intended.

R.R.Q., 1981, c. S-2.1, r. 20, s. 19.

20. Platforms and gangways used for carrying molten metal shall be of metal construction and kept dry.

R.R.Q., 1981, c. S-2.1, r. 20, s. 20.

21. **Minimum widths:** Platforms and gangways used for carrying molten metal shall have the following minimum widths:

(a) 900 mm for crucibles carried by not more than 2 workmen;

(b) 1.2 m for crucibles carried by more than 2 workmen;

(c) 1.8 m if the manual transport of the crucible is done simultaneously in both directions; and

(d) 600 mm wider than the extreme width of the truck in which the ladles are transported.

R.R.Q., 1981, c. S-2.1, r. 20, s. 21.

22. **Guardrails:** Platforms, gangways and stairs shall be provided with guardrails on all open sides.

R.R.Q., 1981, c. S-2.1, r. 20, s. 22.

§ 4. — *Aisles*

23. Aisles where molten metal is being carried shall be kept in good condition, dry, free of obstructions, well indicated and without irregularities.

R.R.Q., 1981, c. S-2.1, r. 20, s. 23.

24. **Aisles for transport of crucibles:** The aisles used for the manual transportation of crucibles shall possess the following minimum widths:

(a) 450 mm if the transporting of crucibles does not require more than 2 workmen and if moulds, placed alongside the aisle, are not more than 500 mm above the aisle level;

(b) 600 mm if the transporting of crucibles does not require more than 2 workmen and if the moulds, placed alongside the aisle, are more than 500 mm above the aisle level;

(c) 900 mm if the transporting of crucibles requires more than 2 workmen.

R.R.Q., 1981, c. S-2.1, r. 20, s. 24.

25. Width of aisles: The aisles where molten metal is carried and poured into moulding floors by means of lifting apparatus such as a hoist, monorail, overhead or gantry crane or a lift-truck shall be wide enough to handle and empty the ladles safely.

R.R.Q., 1981, c. S-2.1, r. 20, s. 25.

DIVISION IV

PREPARATION OF FURNACES

§ 1. — *Entry into furnaces*

26. Entry conditions: No person shall enter any furnace when its temperature exceeds 50 ºC, except if:

(a) the workmen wear an aluminized suit, wool clothes or other equivalent protective clothing;

(b) ventilation is provided to reduce radiant heat inside the furnace and if standards for heat stress conform to the Threshold Limit Value of Physical Agents prescribed by the American Conference of Governmental Industrial Hygienists (ACGIH-1972);

(c) under the continuous supervision of a workman.

R.R.Q., 1981, c. S-2.1, r. 20, s. 26.

§ 2. — *Fuel supply control*

27. Gas lines: Gas lines supplying furnaces shall have the following characteristics:

(a) be tight and protected against breaks;

(b) be provided with explosion release valves;

(c) be provided with safety cut-off valves capable of instantly shutting off oil fuel in case of a deficient supply of gas or of any deterioration of the pipes.

R.R.Q., 1981, c. S-2.1, r. 20, s. 27.

28. Oil-supply piping for oil-fired furnaces shall be provided with automatic devices able to cut off oil feed when the pressure drops too low to maintain a flame.

R.R.Q., 1981, c. S-2.1, r. 20, s. 28.

29. Remote control stations: New furnace installations shall be equipped with remote control stations for operating at a distance.

R.R.Q., 1981, c. S-2.1, r. 20, s. 29.

§ 3. — *Lighting of furnaces*

30. **Check before lighting:** The furnace shall be carefully examined and all its operating apparatus shall be in good condition before lighting the furnace. The checking of the following items is necessary before each light-up:

(a) the refractory lining, the air inlet and smoke outlet duct-work;

(b) devices, pipes and fittings for the fuel supply;

(c) the control station and all other control devices.

R.R.Q., 1981, c. S-2.1, r. 20, s. 30.

31. **Precautions during light-up:** For the lighting of small torch-fired furnaces, the following precautions shall be taken:

(a) the torch shall have a shield and be at least 1.5 m length to protect the user from burns;

(b) the air supply shall be sufficient to create a slight draught prior to placing the torch to the burner;

(c) no person shall stand or pass in front of the doors during the lighting operations.

R.R.Q., 1981, c. S-2.1, r. 20, s. 31.

32. **Accidental extinction:** In the event of accidental extinction of an oil, gas or coal burner of the furnace, the fuel supply valves shall be closed and the combustion chambers ventilated prior to another light-up of the burners.

R.R.Q., 1981, c. S-2.1, r. 20, s. 32.

DIVISION V

CUPOLA FURNACES

§ 1. — *Floors beneath the cupola furnaces*

33. Floors beneath and immediately surrounding cupola furnaces shall be kept dry or slightly damp during operation time.

R.R.Q., 1981, c. S-2.1, r. 20, s. 33.

§ 2. — *Charging equipment*

34. **Manual charging:** When the charging is done manually, a guardrail at the entrance to the charge door shall be provided.

R.R.Q., 1981, c. S-2.1, r. 20, s. 34.

35. **Access with guardrails:** When charging by hand, by wheelbarrow or by truck, the access to the charging doors of cupola furnaces shall be provided with guardrails on each side. In locations where there is danger of dropping material off the charging ramp, a 1 m high wall shall be built on both sides.

R.R.Q., 1981, c. S-2.1, r. 20, s. 35.

36. **Closed door:** When charging is done manually, the charging door shall be kept closed except during the period of charging.

R.R.Q., 1981, c. S-2.1, r. 20, s. 36.

37. **Mechanical charging:** For the mechanical charging of a cupola furnace by elevators, conveyors, winches and other mechanical means, the area under and in the vicinity of these devices shall be surrounded by protective guards.

R.R.Q., 1981, c. S-2.1, r. 20, s. 37.

§ 3. — *Air ducts*

38. All installations of cupola furnaces shall be provided either with a blast valve or damper which closes automatically when the blower stops or with valves in tuyeres which will open if blowers stop.

R.R.Q., 1981, c. S-2.1, r. 20, s. 38.

39. Any cupola furnace shall have at least one safety opening that consists of a tube located 40 mm to 50 mm lower than the level of the tuyeres. This tube shall have a meltable plate which will melt if the molten metal reaches a limit level.

R.R.Q., 1981, c. S-2.1, r. 20, s. 39.

§ 4. — *Tap holes and slag spouts*

40. **Tap holes:** When botting-up tapping holes, the bott shall not be driven directly into the stream of molten metal. The bott shall be brought up immediately over the stream close to the hole and applied at a sharp angle so as to minimize spattering of the metal.

R.R.Q., 1981, c. S-2.1, r. 20, s. 40.

41. **Slag spouts:** Slag spouts shall be provided with suitable shields for protection against spattering of slag.

R.R.Q., 1981, c. S-2.1, r. 20, s. 41.

§ 5. — *Dropping of bottom doors*

42. When the cupola furnace is in operation, the bottom doors shall be solidly supported by one or more props on a steel base mounted on a foundation of concrete or of any other material of equivalent resistance.

R.R.Q., 1981, c. S-2.1, r. 20, s. 42.

43. These bottom door props shall be pulled out by means of mechanical appliances, from a minimum distance of 4.5 m.

R.R.Q., 1981, c. S-2.1, r. 20, s. 43.

44. During the opening of these doors, no person shall be allowed to be within 4.5 m from the cupola furnace circumference unless protected by a shield.

R.R.Q., 1981, c. S-2.1, r. 20, s. 44.

45. Workmen shall be warned by a signal before the dropping of the bottom doors.

R.R.Q., 1981, c. S-2.1, r. 20, s. 45.

§ 6. — *Repair and refilling of cupola furnaces*

46. **Protection against falling objects:** Workmen entering cupola furnaces for chipping out linings, relining or for other repairs shall be protected against falling objects.

R.R.Q., 1981, c. S-2.1, r. 20, s. 46.

47. The charging doors shall be locked.

R.R.Q., 1981, c. S-2.1, r. 20, s. 47.

48. **Locked of control switch:** When using a bucket elevator or other type of electrically driven apparatus for the charging of cupola furnaces, the control switch shall be locked during the cleaning or repairing of the lining.

R.R.Q., 1981, c. S-2.1, r. 20, s. 48.

49. If there are no charge doors, the opening shall be protected to prevent falls of objects.

R.R.Q., 1981, c. S-2.1, r. 20, s. 49.

50. **Inspection:** An inspection shall be carried out at least once a week to verify and control the condition of the interior of the cupola furnace.

R.R.Q., 1981, c. S-2.1, r. 20, s. 50.

DIVISION VI

CRUCIBLE FURNACES

§ 1. — *Platforms of upright crucible furnaces*

51. **Platform characteristics:** Upright crucible furnaces with crown plates elevated more than 300 mm above the surrounding floor shall be equipped with platforms, except when the crucibles are transported by mechanical means exclusively. These platforms shall be:

(a) constructed of metal and have a non-slip surface;

(b) of sufficient width for the safe operation of the furnace;

(c) extending along the front and sides of the furnace flush with the crown plate;

(d) provided with guardrails; and

(e) clear of any obstructions and dry.

R.R.Q., 1981, c. S-2.1, r. 20, s. 51.

§ 2. — *Crucibles*

52. **Tongs:** Crucibles shall only be lifted with tongs encircling the top part and of the appropriate dimensions for the crucibles.

R.R.Q., 1981, c. S-2.1, r. 20, s. 52.

53. **Mass of the crucible:** When the combined mass of the crucible, its contents of molten metal and handle exceeds 25 kg, the crucible shall be lifted from the furnace by not less than 2 workmen or by mechanical means. When the combined weight exceeds 80 kg, a lifting apparatus shall be used.

R.R.Q., 1981, c. S-2.1, r. 20, s. 53.

54. **Length of the handle:** A crucible fixed to handle and transported by one workman shall be equipped with a protector for the workman's hands. The minimum length of the handle shall be 1.5 m.

R.R.Q., 1981, c. S-2.1, r. 20, s. 54.

§ 3. — *Oil fired crucible furnaces*

55. **Gate-valve:** Where the blower and oil-pump feeding one or a bank of oil-fired crucible furnaces are not connected to the same source of power, a gate-valve shall be installed in the main oil-supply line.

In the event of air failure, the oil supply shall be stopped immediately by means of the gate-valve.

R.R.Q., 1981, c. S-2.1, r. 20, s. 55.

DIVISION VII

ELECTRIC INDUCTION FURNACES

§ 1. — *Platforms of electric induction furnaces*

56. Electrical induction furnaces charged manually shall be equipped with platforms having the following characteristics:

(a) constructed with metal and having a non-slip surface;

(b) sufficiently wide for safe charging operation;

(c) located not more than 600 mm below top level of furnace and extending the front and sides of the furnace;

(d) provided with guardrails; and

(e) dry and free of obstructions.

R.R.Q., 1981, c. S-2.1, r. 20, s. 56.

§ 2. — *Charging and cleaning of induction furnaces*

57. **Forbidding hand charging:** Vertical induction furnaces shall never be charged directly by hand while they are in operation.

R.R.Q., 1981, c. S-2.1, r. 20, s. 57.

58. **Charging furnaces in operation:** A chute or other mechanical means shall be utilized for charging electric induction furnaces when the latter are in operation. These charging apparatus shall be designed in a way that the workman is at a minimum distance of 3 m from the furnace, except where a protective shield is provided.

R.R.Q., 1981, c. S-2.1, r. 20, s. 58.

59. **Design of charging apparatus:** Charging apparatus such as metal push-plate conveyors, vibrator-conveyors, chutes or buckets opening from the bottom and suspended to a hoisting apparatus shall be designed in such a way that the complete charge falls into the furnace opening.

R.R.Q., 1981, c. S-2.1, r. 20, s. 59.

60. **Protective screens:** Protective screens shall protect the opening of the induction furnace opposite to the side where the charging is performed, if there is any possibility of spattering of molten metal.

R.R.Q., 1981, c. S-2.1, r. 20, s. 60.

61. **Utilisation of a metal rod:** When pieces of metal fall on top of the furnace, on the outside of the opening, a metal rod not less than 1.8 m long shall be utilized to protect workman pushing pieces into the furnace.

R.R.Q., 1981, c. S-2.1, r. 20, s. 61.

62. **Protection against spattering:** For the removal of the slag stuck on the refractory wall of an induction furnace, the workman shall cover at least half of the opening of the furnace with metal plates, so as to protect himself from spattering of the metal, and the level of molten metal in the furnace shall be below 150 mm.

R.R.Q., 1981, c. S-2.1, r. 20, s. 62.

63. **Skimming-ladle:** The skimming-ladle used to remove slag on the surface of the molten metal in induction furnaces shall have a handle at least 1.5 m in length.

R.R.Q., 1981, c. S-2.1, r. 20, s. 63.

§ 3. — *Electrical controls*

64. The electrical controls of induction furnaces shall be sufficiently protected from the intense heat, smoke or dust.

R.R.Q., 1981, c. S-2.1, r. 20, s. 64.

65. **Inspections:** All electrical controls shall be periodically inspected to ensure proper operation of induction furnaces.

R.R.Q., 1981, c. S-2.1, r. 20, s. 65.

DIVISION VIII

OPEN-HEARTH FURNACES

§ 1. — *Protection against heat*

66. Open-hearth furnaces shall be insulated to protect the workmen from any heat above 50 ºC.

R.R.Q., 1981, c. S-2.1, r. 20, s. 66.

§ 2. — *Tapping guards*

67. **Protective screens:** Where tapping holes on open-hearth furnaces are cut with oxygen, protective screens shall cover the holes to prevent molten metal from being blown and injuring workman, unless the oxygen nozzle is at least 1.8 m long.

R.R.Q., 1981, c. S-2.1, r. 20, s. 67.

68. **Warning to the workmen:** Before open-hearth furnaces are tapped, warning shall be given by gongs, whistles or other signals to warn the workmen to leave the zone where tapping of molten metal is processed.

R.R.Q., 1981, c. S-2.1, r. 20, s. 68.

§ 3. — *Breakouts of hearth*

69. Whenever sections of open-hearth furnace bottoms become detached and rise to an extent which might endanger workmen, the charge shall be tapped at once, so as to avoid breakouts in the bottom.

R.R.Q., 1981, c. S-2.1, r. 20, s. 69.

70. In the event of breakouts on open-hearth furnaces, the tapping hole shall immediately be opened, so as to draw as much as possible of the charge into the ladle or the cinder pit.

R.R.Q., 1981, c. S-2.1, r. 20, s. 70.

§ 4. — *Mechanical charging machines*

71. **Mechanical charging equipment:** Open-hearth charging machines shall be provided with:

(a) protective crank cases for gears and drive pinions;

(b) wheel guards in front of wheels moving on tracks; and

(c) shields protecting the operators against metal splashes and sparks.

R.R.Q., 1981, c. S-2.1, r. 20, s. 71.

72. An horizontal clearance of at least 150 mm shall be left between any fixed object and the open-hearth furnace charging machines in motion.

R.R.Q., 1981, c. S-2.1, r. 20, s. 72.

§ 5. — *Charging boxes and buggies*

73. **Drainage of water:** Bottoms of open-hearth charging boxes shall have openings to enable the water to be drained.

R.R.Q., 1981, c. S-2.1, r. 20, s. 73.

74. Charging boxes and materials containing snow, ice, water or objects having hermetically sealed cavities shall not be charged into open-hearth furnaces.

R.R.Q., 1981, c. S-2.1, r. 20, s. 74.

75. Platforms of charging-box buggies for open-hearth furnaces shall be provided along the edges with stops to prevent charging boxes from slipping off the buggies during transit.

R.R.Q., 1981, c. S-2.1, r. 20, s. 75.

§ 6. — *Disposal of slag*

76. Slag from open-hearth furnaces shall be dumped in places where there is no water that might cause spattering.

R.R.Q., 1981, c. S-2.1, r. 20, s. 76.

77. Slag from open-hearth furnaces shall be allowed to solidify before being broken up and heaped up.

R.R.Q., 1981, c. S-2.1, r. 20, s. 77.

DIVISION IX

ELECTRIC ARC FURNACES

§ 1. — *Pouring pits*

78. Where pouring pits are used at electrical arc furnaces for holding the ladles during pouring of the molten metal, such pits shall:

(a) be clean and dry;

(b) allow at least 300 mm clearance on all sides of the ladle;

(c) have guardrails or be covered with non-slip steel plates when they are not in use; and

(d) have a minimum depth equal to half the height of the ladle.

R.R.Q., 1981, c. S-2.1, r. 20, s. 78.

79. It is forbidden to stay in such pits during the pouring of metal into the ladle.

R.R.Q., 1981, c. S-2.1, r. 20, s. 79.

§ 2. — *Charging doors*

80. Charging doors of electric arc furnaces shall be completely closed so as to avoid danger from spark projections.

R.R.Q., 1981, c. S-2.1, r. 20, s. 80.

§ 3. — *Electrical equipment*

81. The control panels for electric arc furnaces shall satisfy the following conditions:

(a) be so located and lighted that the operators will have an unobstructed view at all times;

(b) be protected from water, dust, oil, vibrations and from intense heat which might cause injuries or damage; and

(c) be equipped with a manual control device for raising or lowering the electrodes independently from the automatic regulators.

R.R.Q., 1981, c. S-2.1, r. 20, s. 81.

§ 4. — *Eye protection*

82. **Safety goggles:** Melters working at electrical arc furnaces shall wear safety goggles especially designed for their trade. These goggles shall meet CSA standard Z94.3-1969 Eye Protectors.

R.R.Q., 1981, c. S-2.1, r. 20, s. 82.

83. **Protective screens:** Protective screens shall be provided in the locations where there is radiation coming from an electric arc, so as no workman's eyes are exposed to such radiations coming from a neighbouring source.

R.R.Q., 1981, c. S-2.1, r. 20, s. 83.

DIVISION X

MOULD AND CORE OVENS

§ 1. — *Doors*

84. Sliding vertical doors on mould and core ovens shall be constructed and installed in such a manner as to ensure safety.

R.R.Q., 1981, c. S-2.1, r. 20, s. 84.

85. **Door characteristics:** These doors shall, in addition, possess the following characteristics:

(a) have cables or chains having a safety factor of at least 5;

(b) have counterweights covered with guards and solidly attached and heavy enough to avoid any excessive effort in operating the doors;

(c) be equipped with devices allowing locking them in the open position during loading and unloading;

(d) be provided with pulleys of appropriate diameter to prevent excessive wearing of cables;

(e) be so constructed and hung that they cannot become disengaged from their carriers or hangers.

R.R.Q., 1981, c. S-2.1, r. 20, s. 85.

86. **Door inspection:** The doors of mould and core ovens shall be inspected once a month. The workman shall make sure before entering the ovens that the doors will not close by themselves.

R.R.Q., 1981, c. S-2.1, r. 20, s. 86.

87. For electrically operated doors, the operator shall lock the electrical control switch before entering the mould and core ovens.

R.R.Q., 1981, c. S-2.1, r. 20, s. 87.

§ 2. — *Access to the oven roofs*

88. Means of access shall be supplied to the workers responsible for the operation and maintenance of fans and other apparatus installed on the roof of the ovens.

R.R.Q., 1981, c. S-2.1, r. 20, s. 88.

89. **Vertical ladders:** When using vertical ladders fixed on a wall of the oven, they shall be rigidly constructed of metal and located at least 150 mm from the wall.

R.R.Q., 1981, c. S-2.1, r. 20, s. 89.

§ 3. — *Oven cars*

90. **Cars on tracks:** Where flat cars running on surface tracks are used for loading core and mould ovens:

(a) the tracks shall be either horizontal or slightly sloped towards the rear of the oven;

(b) the roll tracks shall have a stop;

(c) the cars shall be removed from the ovens by mechanical means.

R.R.Q., 1981, c. S-2.1, r. 20, s. 90.

§ 4. — *Gas-fired or oil-fired ovens*

91. Before lighting-up burners of mould and core ovens, an inspection shall be made of burners, controls and of the ovens themselves.

R.R.Q., 1981, c. S-2.1, r. 20, s. 91.

92. Dust protection: Burners and control equipment shall be protected from the dust coming from the foundry.

R.R.Q., 1981, c. S-2.1, r. 20, s. 92.

93. Control valve: Blast-tip type burners shall be provided with a control valve that will shut off the flow of unburned gas or oil if the pilot light is extinguished.

R.R.Q., 1981, c. S-2.1, r. 20, s. 93.

94. Blaffle: Blast-tip type burners shall be equipped with baffles to spread the flames and to keep the sand out of the tip. The tip shall be in a horizontal position.

R.R.Q., 1981, c. S-2.1, r. 20, s. 94.

95. Explosion vents: Oil-fired and gas-fired ovens shall be equipped with explosion vents in accordance with the prescriptions of the Guide for Explosion Venting, NFPA, No. 68-1954.

R.R.Q., 1981, c. S-2.1, r. 20, s. 95.

DIVISION XI

HEATING OR THERMAL TREATMENT FURNACES

§ 1. — *Doors*

96. The vertical sliding doors on heating or thermal treatment furnaces shall have the characteristics described in Subdivision 1 of Division X.

R.R.Q., 1981, c. S-2.1, r. 20, s. 96.

§ 2. — *Protection against heat*

97. Radiant heat: The effects of the radiation of heat from the faces of heating or thermal treatment furnaces shall be decreased by means of:

(a) insulation of the furnace;

(b) aluminium sheets hung temporarily to reflect radiant heat; or

(c) fans to produce air circulation.

R.R.Q., 1981, c. S-2.1, r. 20, s. 97.

98. **Castings:** Castings coming out of the heating or thermal treatment furnaces shall be protected to avoid burns.

R.R.Q., 1981, c. S-2.1, r. 20, s. 98.

§ 3. — *Heating systems of heating or thermal treatment furnaces*

99. **Inspection and location of supply lines:** Solid pulverized-fuel, oil and gas supply lines for heating or thermal treatment furnaces shall be isolated from hot air vents or from heat sources of the furnaces and shall be inspected at least once a week to detect possible harmful gas leaks in working areas.

R.R.Q., 1981, c. S-2.1, r. 20, s. 99.

100. **Temperature control and reading:** Electric-heating elements in heating or thermal treatment furnaces shall be provided with reliable temperature-controlling devices and with easy readable thermometers and high temperature fuses.

R.R.Q., 1981, c. S-2.1, r. 20, s. 100.

101. **Control switch opening:** The workman responsible for the inspection and maintenance of heating elements shall open and lock the control switch before entering into the furnace.

R.R.Q., 1981, c. S-2.1, r. 20, s. 101.

DIVISION XII

MATERIAL HANDLING IN FOUNDRIES

§ 1. — *Crucibles and ladles*

102. **Inspection:** Crucibles and ladles shall be inspected before being put into service after their relining and each time they are allowed to cool down.

R.R.Q., 1981, c. S-2.1, r. 20, s. 102.

103. Crucibles and ladles shall be completely dry and without any cracks before being used.

R.R.Q., 1981, c. S-2.1, r. 20, s. 103.

104. **Locking devices:** The hand shank type ladles shall be provided with a manually operated safety lock to prevent accidental tilting.

R.R.Q., 1981, c. S-2.1, r. 20, s. 104.

105. **Inspection and construction:** Handles or pivots and trunnions used on ladles shall be examined every day so as to detect possible failures or excessive wear. These handles and trunnions shall be constructed with a safety factor of at least 10.

R.R.Q., 1981, c. S-2.1, r. 20, s. 105.

106. **Head diameter:** The diameter of the head on the outside end of the trunnion shaft of ladles shall be not less than one and a half times the diameter of the trunnion shaft.

R.R.Q., 1981, c. S-2.1, r. 20, s. 106.

107. Ladles and crucibles shall not be filled to a level higher than the level specified by the manufacturer and in any case, never more than 90% of the height of the pot.

R.R.Q., 1981, c. S-2.1, r. 20, s. 107.

108. The stoppers or refractory outlet nozzles of ladles shall be carefully fitted to the opening in the bottom of the ladle.

R.R.Q., 1981, c. S-2.1, r. 20, s. 108.

109. **Warning devices:** When ladles containing molten metal are transported by power trucks, monorails, gantry cranes or overhead cranes, these apparatus shall be provided with warning devices (bells, whistles or sirens) which shall be sounded while traveling. For each type of lifting apparatus used for the transport of molten metal, a different warning device shall be utilized.

R.R.Q., 1981, c. S-2.1, r. 20, s. 109.

110. Ladles handled by overhead crane, monorail or truck shall be provided with a safety lock preventing accidental tilting.

R.R.Q., 1981, c. S-2.1, r. 20, s. 110.

111. When transporting ladles from one mould to another, they shall always be brought back to a vertical position or to an angle of at least 15º from their position when moulding.

R.R.Q., 1981, c. S-2.1, r. 20, s. 111.

112. **Gear mechanism:** Ladles of 900 kg or more capacity shall be provided with a gear tilting mechanism to prevent overturning. This mechanism shall be so designed that at least 2 teeth of each gear are in contact at all time.

R.R.Q., 1981, c. S-2.1, r. 20, s. 112.

113. **Gear protection:** The tilting mechanism gears on the ladles shall be protected against molten metal splashes.

R.R.Q., 1981, c. S-2.1, r. 20, s. 113.

114. Any workman shall stay as far away as possible from the ladles during their filling, their transportation and their unloading.

R.R.Q., 1981, c. S-2.1, r. 20, s. 114.

§ 2. — *Load-bars, slings, suspension chains, hooks*

115. **Safety factor:** The load-bars, slings, suspension chains, hooks and other accessories for the lifting and transportation of ladles shall have a safety factor of not less than 10. These lifting accessories shall be examined every day.

R.R.Q., 1981, c. S-2.1, r. 20, s. 115.

116. The workman assigned to the hooking of ladles, flasks, buckets and other equipment to a lifting apparatus shall make sure that the attachments do not present a danger of slipping and sliding before giving the lifting signed.

R.R.Q., 1981, c. S-2.1, r. 20, s. 116.

117. No person shall stay underneath loads suspended to a lifting apparatus.

R.R.Q., 1981, c. S-2.1, r. 20, s. 117.

§ 3. — *Crane buckets*

118. Boxes or buckets, including their lifting accessories used for the moving of material by an overhead crane or other aerial lifting apparatus, shall have a safety factor of not less than 5.

R.R.Q., 1981, c. S-2.1, r. 20, s. 118.

119. When the buckets have a mobile handle, the latter shall be equipped with a safety device to avoid tilting.

R.R.Q., 1981, c. S-2.1, r. 20, s. 119.

DIVISION XIII

PRODUCTION FOUNDRY EQUIPMENT

§ 1. — *Mechanical sand sifters*

120. Unless the treated sand contains sufficient moisture to prevent dust emissions, mechanical sand sifters shall:

(a) be enclosed; and

(b) be equipped with a dust exhaust system.

R.R.Q., 1981, c. S-2.1, r. 20, s. 120.

121. **Mechanical sand sifter protection:** Rotary mechanical sand sifters shall be protected by fences or by guardrails located not less than 380 mm from such sifters.

R.R.Q., 1981, c. S-2.1, r. 20, s. 121.

122. Mechanical and portable sand sifters equipped with vibrators operated by compressed air shall be attached by a cable a little shorter than the flexible hose supplying the air, in order to avoid the rupture of the coupling of the flexible hose by movement of the machine.

R.R.Q., 1981, c. S-2.1, r. 20, s. 122.

§ 2. — *Moulding machines*

123. Moulding machines shall be provided with switches, handlevers or other devices requiring the use of both hands to operate.

R.R.Q., 1981, c. S-2.1, r. 20, s. 123.

124. Nobody shall touch the flask when it is in motion.

R.R.Q., 1981, c. S-2.1, r. 20, s. 124.

125. Venting shall be made in moulds to avoid explosions when casting.

R.R.Q., 1981, c. S-2.1, r. 20, s. 125.

DIVISION XIV

EQUIPMENT FOR THE CLEANING AND FINISHING OF CASTINGS

§ 1. — *Mechanical shake-outs*

126. Shake-out machines used to strip castings from sand shall be provided with:

(a) a suction system to collect dust created by the operations; and

(b) conveyors or equivalent means to catch the sand under the grating and return it to the sand reclaimer or storage.

R.R.Q., 1981, c. S-2.1, r. 20, s. 126.

127. Workmen shall not try to pull the pieces out of the vibrating grills when the latter are in operation.

R.R.Q., 1981, c. S-2.1, r. 20, s. 127.

§ 2. — *Trimming by hand*

128. Large castings may be trimmed and chipped by hand in the moulding and casting rooms, on the condition that a suitable protection be furnished to the cleaners. This suitable protection requires:

(a) the use of suitable curtains, partitions or screens to prevent any injury caused by flying chips or particles;

(b) an exhaust system to prevent dust concentrations exceeding the maximum value allowed by the standard entitled Threshold Limit Values for Substances in Workroom Air of the American Conference of Governmental Industrial Hygienists (ACGIH-1972);

(c) the wearing of goggles and protective clothing and the use of breathing apparatus where the other protective methods do not ensure the required protection. The use of self-contained or air-supplied protective breathing apparatus equipped with an automatic device which interrupts or restricts the air supply in the part of the apparatus covering the face is prohibited.

R.R.Q., 1981, c. S-2.1, r. 20, s. 128; O.C. 1960-86, s. 6.

129. Work tables or benches used for the finishing of castings shall be sufficiently spaced to allow the workmen to circulate and work without any danger of being injured by the falling of castings and tools.

R.R.Q., 1981, c. S-2.1, r. 20, s. 129.

130. Work tables or benches, as well as the mounts and other supporting accessories, shall be designed and used in such a way as to hold the casting solidly.

R.R.Q., 1981, c. S-2.1, r. 20, s. 130.

§ 3. — *Tumbling barrels*

131. Horizontal revolving or reciprocating tumbling barrels shall be enclosed by guardrails at a sufficient distance to prevent any person from coming in contact with the tumblers when they are in motion.

R.R.Q., 1981, c. S-2.1, r. 20, s. 131.

132. **Barrel locking:** While barrels are being loaded or unloaded they shall be locked in the stop position.

R.R.Q., 1981, c. S-2.1, r. 20, s. 132.

§ 4. — *Abrasive blasting units*

133. Cleaning of foundry castings by sandblasting:

(a) shall only be undertaken in booths or rooms completely enclosed except for air intakes and satisfactory protected outlets:

i. with automatic equipment; or

ii. with the operator located outside and manipulating the tools through openings sealed with flexible washers or sleeves;

(b) shall be performed with the use of abrasives such as steel shot or grit used as a blasting medium.

R.R.Q., 1981, c. S-2.1, r. 20, s. 133.

134. When the operators work inside abrasive-blasting rooms, they shall be provided with air-supplied sandblast suits, gloves, leggings, and necessary special clothing to ensure their protection against dust and flying particles of abrasives or metal.

R.R.Q., 1981, c. S-2.1, r. 20, s. 134.

135. No part of the protective equipment shall be left inside the blasting chambers. The protective equipment shall be placed in a locker sheltered from dust.

R.R.Q., 1981, c. S-2.1, r. 20, s. 135.

136. The air supplying the respirators shall:

(a) be fresh and filtered;

(b) be heated to at least 18 ºC if this air is from outside; and

(c) provide a minimum flow of 3 dm^3 per second for each respirator.

R.R.Q., 1981, c. S-2.1, r. 20, s. 136.

137. When the air is supplied by a compressor, it shall be equipped with:

(a) an air cooler to eliminate carbon monoxide produced by an overheating;

(b) a separator, filter or other apparatus to collect the impurities, especially oil mist, rust, water; and

(c) a pressure regulator.

R.R.Q., 1981, c. S-2.1, r. 20, s. 137.

DIVISION XV

PARTICULAR PERSONAL PROTECTIVE EQUIPMENT

§ 1. — *Safety shoes*

138. Any workmen engaged in manual labour in a foundry shall wear safety shoes that conform to section 344 of the Regulation respecting occupational health and safety (chapter S-2.1, r. 13).

R.R.Q., 1981, c. S-2.1, r. 20, s. 138; O.C. 885-2001, s. 385.

§ 2. — *Eye and face protection*

139. Protection of a workman's eyes and face shall be as specified in section 343 of the Regulation respecting occupational health and safety (chapter S-2.1, r. 13).

R.R.Q., 1981, c. S-2.1, r. 20, s. 139; O.C. 885-2001, s. 386.

§ 3. — *Protective clothing*

140. Melters, workmen tending the furnaces and all workmen assigned to the handling of molten metal shall wear wool or asbestos clothes, aluminized suits or other protective clothing that conforms to section 345 of the Regulation respecting occupational health and safety (chapter S-2.1, r. 13).

R.R.Q., 1981, c. S-2.1, r. 20, s. 140; O.C. 885-2001, s. 387.

§ 4. — *Safety hats*

141. Safety hats certified in accordance with CSA Z94.1-1966 Industrial Protective Head Wear shall be worn at all times in the foundry operation areas.

R.R.Q., 1981, c. S-2.1, r. 20, s. 141.

UPDATES
R.R.Q., 1981, c. S-2.1, r. 20
O.C. 1960-86, 1987 G.O. 2, 202
O.C. 885-2001, 2001 G.O. 2, 3888
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