

# International Hazard Datasheets on Occupation



## Operator, boiler

### What is a Hazard Datasheet on Occupation?

This datasheet is one of the International Datasheets on Occupations. It is intended for those professionally concerned with health and safety at work: occupational physicians and nurses, safety engineers, hygienists, education and information specialists, inspectors, employers' representatives, workers' representatives, safety officers and other competent persons.

This datasheet lists, in a standard format, different hazards to which operator, boilers may be exposed in the course of their normal work. This datasheet is a source of information rather than advice. With the knowledge of what causes injuries and diseases, it is easier to design and implement suitable measures towards prevention.

This datasheet consists of four pages:

- Page 1: Information on the most relevant hazards related to the occupation.
- Page 2: A more detailed and systematized presentation on the **different hazards** related to the job with indicators for preventive measures (marked as numbered shields and explained on the third page).
- Page 3: Suggestions for **preventive measures** for selected hazards.
- Page 4: **Specialized information**, relevant primarily to occupational safety and health professionals and including information such as a brief job description, a list of tasks, notes and references.

This information has been compiled by the Israel Institute for Occupational Safety and Hygiene jointly with the BIA (Germany).

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### Who is a boiler operator?

A worker who operates boilers to generate steam that supplies heat or power for buildings or industrial processes.

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### What is dangerous about this job?

- Boilers work at a high heat adjacent to pressurized vessels which put their operators at a risk of burns and explosions.
- Burning of fuel used in boilers may lead to fires, carbon monoxide poisoning, etc.
- Boiler operators come into contact with various substances used in boilers (fuel, water additives, etc.) which may lead to eye and skin disorders.
- Boiler operators work in a noisy, hot and humid environment that may cause tiredness and general ill-feeling.

## Hazards related to this job

<b>Accident hazards</b> 	<ul style="list-style-type: none"> <li>Falls from ladders, stairs and elevated platforms</li> </ul>	
	<ul style="list-style-type: none"> <li>Slips and falls on the level, particularly on floors made slippery by water, fuel, oils, etc.</li> </ul>	1
	<ul style="list-style-type: none"> <li>Struck by falling objects</li> </ul>	
	<ul style="list-style-type: none"> <li>Mechanical accidents when operating pulverizer and stoker in coal-fired boilers</li> </ul>	
	<ul style="list-style-type: none"> <li>Burns from hot surfaces, hot water and escaping steam</li> </ul>	
	<ul style="list-style-type: none"> <li>Electrocution or electric shocks</li> </ul>	
	<ul style="list-style-type: none"> <li>Poisoning by carbon monoxide or by other combustion products in the air, particularly in the case of faulty ventilation or inadequate air supply to burners (acute carbon monoxide poisoning may cause headache, dizziness, nausea, unconsciousness, coma and death)</li> </ul>	2 3
	<ul style="list-style-type: none"> <li>Asphyxia due to breathing of oxygen-depleted air</li> </ul>	3
	<ul style="list-style-type: none"> <li>Splashes of hydrazine and its derivatives on the skin may cause penetrating burns and severe dermatitis</li> </ul>	4
	<ul style="list-style-type: none"> <li>Splashes into the eyes of chemicals used in the regeneration of ion exchange columns, in derusting and descaling; particularly, splashes of hydrazine and its derivatives may cause permanent corneal lesions</li> </ul>	5
	<ul style="list-style-type: none"> <li>Punctures, cuts and amputations</li> </ul>	
	<ul style="list-style-type: none"> <li>Fires and explosions (particularly from fuel leaks) and from rags soaked with fuel; fires of soot; explosions of gas-air mixtures within the boiler</li> </ul>	
	<ul style="list-style-type: none"> <li>Bursting of boilers (because of overheating and overpressure, failure of structural components due to metal fatigue, etc.) with possible fires, and injury by the explosion wave, by flying fragments, flames, steam, excessive noise, etc.</li> </ul>	6
<b>Physical hazards</b> 	<ul style="list-style-type: none"> <li>Excessive continuous noise levels - as high as 94 dBA</li> </ul>	7
	<ul style="list-style-type: none"> <li>Heat stress caused by prolonged work at high temperatures and relative humidities</li> </ul>	
	<ul style="list-style-type: none"> <li>Potential exposure to radon [see Note 3]</li> </ul>	
<b>Chemical hazards</b> 	<ul style="list-style-type: none"> <li>Irritation of eyes, respiratory tract and skin as a result of exposure to hydrazine and its derivatives, used as additives to boiler water; severe exposure may cause temporary blindness</li> </ul>	8
	<ul style="list-style-type: none"> <li>Irritation of the upper respiratory tract and coughing, as a result of inhalation of sulfur dioxide, particularly if burning high-sulfur fuels</li> </ul>	
	<ul style="list-style-type: none"> <li>Pneumoconioses from exposure to vanadium-containing dust, and to asbestos from the insulation, particularly during maintenance and repair work, and from exposure to respirable fly ash</li> </ul>	9
	<ul style="list-style-type: none"> <li>Dermatoses from exposure to fuels and to corrosion inhibitors (various organic or metallorganic compounds) and other water additives</li> </ul>	4
	<ul style="list-style-type: none"> <li>Asbestos may cause cancer; smoking strongly increases the risk</li> </ul>	
<b>Biological hazards</b> 	<ul style="list-style-type: none"> <li>Development of fungi and growth of bacteria in the boiler room, due to the elevated temperature and humidity</li> </ul>	
	<ul style="list-style-type: none"> <li>Presence of rodents and insects may result in bites and infectious diseases</li> </ul>	
<b>Ergonomic, psychosocial and organizational factors</b> 	<ul style="list-style-type: none"> <li>General tiredness as a result of physical work in a noisy, warm and humid environment;</li> </ul>	
	<ul style="list-style-type: none"> <li>Cumulative trauma disorders as a result of continuous repetitive movements or over strenuous efforts</li> </ul>	
	<ul style="list-style-type: none"> <li>Back pains and other musculoskeletal problems (including lesions of intervertebral discs) resulting from overexertion and wrong postures, during lifting and moving of sacks and heavy loads</li> </ul>	10
	<ul style="list-style-type: none"> <li>Psychological stress due to dissatisfaction at work, as a result of boredom, monotony, low salary, problematic personal relations with peers and/or superiors, etc.</li> </ul>	

**Preventive measures**

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- 1** Wear safety shoes with non-skid soles
  - 2** Periodically check and adjust burners operation to prevent carbon monoxide generation
  - 3** Install effective exhaust ventilation to prevent air contamination; add local exhaust ventilation if necessary
  - 4** Wear long-sleeve shirts and protect hands with chemical-resistant gloves; if impractical, use a barrier cream
  - 5** Wear appropriate eye protection; consult a safety supervisor or a supplier
  - 6** Arrange periodic inspection of boilers, to detect failure of components, metal cracking, etc.
  - 7** Wear hearing protection appropriate for the noise levels and type of noise - consult the supplier or an expert
  - 8** Replace hydrazine with less-hazardous substitutes
  - 9** Wear respiratory protection during maintenance or other work in which dust may be released into the atmosphere
  - 10** Learn and use safe lifting and moving techniques for heavy or awkward loads; use mechanical aids to assist in lifting
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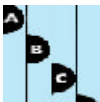
**Specialized information**


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**Synonyms** Boiler attendant; boiler-house operator; boiler-room worker; boiler tender; boiler water treater; firer, boiler; steam-boiler operator

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**Definitions and/or description** Operates automatically fired boilers to generate steam that supplies heat or power for buildings or industrial processes: Lights gas- or oil-fed burners using torch. Starts pulverizer and stoker to grind and feed coal into furnace of boiler. Observes pressure, temperature, and draft meters on panel to verify specified operation of automatic combustion control systems, feed water regulators, stoker, pulverizer, and burners. Turns valves and adjusts controls to set specified fuel feed, draft openings, water level, and steam pressure of boiler. Observes boiler and auxiliary units to detect malfunctions and makes repairs, such as changing burners and tightening pipes and fittings. May test and treat boiler feed water, using specified chemicals. May maintain log of meter and gauge readings and record data, such as water test results and quantity of fuel consumed. May be designated according to fuel burned, type of boilers, or class of license required [DOT]



**Related and specific occupations** Boiler maker; boiler-house inspector; boiler-house mechanic; boiler-operator helper; boiler-shop supervisor; boiler-tube blower; control-room operator; steam-generator operator; steam-power-plant operator; steam-supply operator

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**Tasks** Activating (pumps), adjusting; assembling and disassembling; changing; charging; checking; cleaning (valves, fuel tanks); detecting (malfunctions); feeding (fuel, water,...); filling; firing; fixing; flushing (slurry); generating; grinding; installing; lighting; loading and unloading (fuel); maintaining (insulation, log,...); making (repairs); measuring; monitoring; observing; operating; recording; regenerating (ion exchanger resins); regulating (flow, temperature); removing (ash, wastes); repairing; sealing (leaks); screwing; setting; start-ing; stoking; testing (water); tightening; treating (feed water); turning; verifying; wrenching

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**Primary equipment used** Calibrated water-meters; machinist working tools (hammers, pliers, spanners, wrenches); safety-valve testing kit; steam-pressure gauge/tester; water testing kit; etc.

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**Workplaces where the occupation is common** Manufacturing plants and services which require steam for operation, e.g.: Chemical industry; desalination plants; electrical power plants; food industries; hospitals; plastics industry; shipping; steam laundries; etc.

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- Notes**
1. According to published reports, boiler attendants may be at increased risk of breast or nasopharyngeal cancer; exposure of boiler operators to hydrazine and its derivatives may cause damage to the lungs, liver and kidneys.
  2. Special hazards are encountered when wastes are used as the fuel; in such a case the boiler operator may be exposed to a wide variety of hazardous chemicals present in the waste or formed during its burning - e.g., furans, dioxide derivatives, metal fumes, mineral fibers, etc. Also, the operator may be exposed to bites or stings from parasites, insects and even small animals (e.g., snakes, scorpions) present in the wastes, and to bacterial infections.
  3. As boiler rooms are frequently located in basements, a radon exposure hazard may exist in some regions.



**References** Gas-Fired Low-Pressure Steam and Hot Water Boilers. ANSI Standard Z21.13-87, 1987.



Parsons, R.A. (Ed.): 1988 ASHRAE Handbook: Equipment, Ch. 23: "Boilers", Atlanta.

Boiler and Pressure Vessel Manufacture Assurance, Worksafe Australia , 50 pp., 1992.

Plant and Equipment: Boilers and Pressure Vessels, 32 pp., ILO, Geneva, 1990.

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