

# International Hazard Datasheets on Occupation



## Ship-Engineer (Machinist)

### 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 ship-engineers (machinist) 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.

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### Who is a ship-engineer?





A professional, licensed (on large vessels) mechanic who is responsible for the operation, troubleshooting, repair and maintenance of shipboard engines and other machinery such as generators, pumps, boilers, etc.

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### What is dangerous about this job?

- A ship-machinist is exposed to all the hazards of machine attendants or of maintenance workers, e.g., entanglement in moving machinery, blows, cuts, penetration of foreign particles into eyes, exposure to exhaust gases, dermatoses caused by lubricating and cleaning formulations, etc. Those hazards, however, are exacerbated by the motion of the ship, by working and living over long periods of time in confined and constricted spaces, by personal problems caused by prolonged absences from home, and by the rigid and often depressing discipline aboard ship. When at sea, the ship's machinist is also exposed to some major accident hazards common to all seafarers, in particular shipwreck and falls into water.

## Hazards related to this job

<b>Accident hazards</b> 	<ul style="list-style-type: none"> <li>Falls from ladders or staircases in the engine room</li> </ul>	1
	<ul style="list-style-type: none"> <li>Fall from gangways or ladders, when climbing into ship, esp. when climbing to the ship from a boat</li> </ul>	1
	<ul style="list-style-type: none"> <li>Slips, trips and falls (esp. while carrying loads), and related to the insufficient illumination of corridors and passages</li> </ul>	2
	<ul style="list-style-type: none"> <li>Struck by unsecured heavy objects, falling from high places and shelves on feet and other parts of body, or squeezed by such unsecured objects that move horizontally due to ship's rolling and pitching</li> </ul>	2
	<ul style="list-style-type: none"> <li>Cuts and injuries caused by sharp instruments and tools</li> </ul>	3
	<ul style="list-style-type: none"> <li>Hazard of suffocation from asphyxiating gases (e.g., CO) or from oxygen deficiency, during maintenance and cleaning operations</li> </ul>	4
	<ul style="list-style-type: none"> <li>Burns caused by flames, by contact with hot parts of equipment, pipes, steam lines, etc., or by release of hot water or steam</li> </ul>	
	<ul style="list-style-type: none"> <li>Burns caused by corrosive substances stored on high shelves, that may be spilled when taken down from the shelf</li> </ul>	
	<ul style="list-style-type: none"> <li>Electric shock, caused by defective installations and equipment (esp. portable) or faulty insulation</li> </ul>	5
	<ul style="list-style-type: none"> <li>Musculo-skeletal injuries (esp. of the back), resulting from lifting and moving of heavy loads</li> </ul>	6
	<ul style="list-style-type: none"> <li>Blows (in particular on the head) from low door frame-heads, from protruding overhead pipes, etc.</li> </ul>	2
	<ul style="list-style-type: none"> <li>Blows (in particular on arms and legs) when moving in poorly-illuminated passages</li> </ul>	7
	<ul style="list-style-type: none"> <li>Blows from falling heavy objects</li> </ul>	2
	<ul style="list-style-type: none"> <li>Bites by rodents</li> </ul>	
	<ul style="list-style-type: none"> <li>Poisoning by fuel vapors, or other vaporizing chemicals, when worker doesn't wear the required personal protection equipment</li> </ul>	7
	<ul style="list-style-type: none"> <li>Fires and explosions caused by fuels and other combustibles</li> </ul>	
	<ul style="list-style-type: none"> <li>Hand injuries caused by sharp tools, slipping of tools, use of faulty hand tools, etc.</li> </ul>	3
	<ul style="list-style-type: none"> <li>Drowning, as a result of shipwreck or falls into the water</li> </ul>	
	<ul style="list-style-type: none"> <li>Injuries caused by entanglement in moving or rotating machinery, belts, shafts, pulleys, and/or cables, ropes, etc.</li> </ul>	8
	<ul style="list-style-type: none"> <li>Involvement in work accidents, as a result of verbal or written misunderstanding and lack of communication between workers not speaking the same language</li> </ul>	
<b>Physical hazards</b> 	<ul style="list-style-type: none"> <li>Exposure to noise and whole-body vibrations</li> </ul>	
	<ul style="list-style-type: none"> <li>Exposure to strong draft winds and stormy weather</li> </ul>	10
	<ul style="list-style-type: none"> <li>Exposure to cold stress and/or heat-stress, as a result of rapid movement between cold and hot areas</li> </ul>	10
	<ul style="list-style-type: none"> <li>Exposure to excessive heat from burners, steam pipes, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>Exposure to UV radiation during welding operations</li> </ul>	
<b>Chemical hazards</b> 	<ul style="list-style-type: none"> <li>Exposure to various chemicals, such as: acids, adhesives, caulking compounds, fluxes (solder), glues, hydrochloric acid, sulfuric acid, zinc chloride, tars, greases, oils &amp; various distillation products, inorganic lead, solvents, thinners, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>Exposure to toxic substances released sometimes when mixing different chemicals</li> </ul>	
	<ul style="list-style-type: none"> <li>Exposure to carbon monoxide and other exhaust gases</li> </ul>	
<b>Biological hazards</b> 	<ul style="list-style-type: none"> <li>Exposure to pest- or rodent-transmitted diseases, in particular on older ships</li> </ul>	
	<ul style="list-style-type: none"> <li>Exposure to communicable diseases</li> </ul>	4

## Hazards related to this job (continued)

<b>Ergonomic, psychosocial and organizational factors</b> 	<ul style="list-style-type: none"> <li>Repetitive strain injury (RSI) and other musculoskeletal problems as a result of continuous repetitive movements, overexertion during lifting and moving of heavy loads, work in awkward (bent, etc.) postures</li> </ul>	<b>6</b>
	<ul style="list-style-type: none"> <li>Psychological stress due to dissatisfaction at work as a result of strict discipline, boredom and monotony, low salary, problematic personal relations with subordinates and/or superiors, poor amenities, separation from family, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>Stress and cumulative fatigue as a result of shift and night work, cultural differences from crew members from other nations, etc.</li> </ul>	
	<ul style="list-style-type: none"> <li>General ill feeling as a result of work in confined spaces and development of sick-building syndrome</li> </ul>	
	<ul style="list-style-type: none"> <li>In port: hazards related to violence, drinks, drugs, prostitution, etc.</li> </ul>	

## Preventive measures

- 1** Inspect ladder before climbing. Never climb on a shaky ladder or a ladder with slippery or broken rungs, be very careful when climbing a rope-ladder
- 2** Always wear adequate personal protective equipment, in particular safety helmets, safety shoes or boots with metal caps and non-slip soles (sport shoes, mountaineering shoes, etc. are NOT safety shoes), goggles, etc.
- 3** Use gloves to avoid contact of skin to sharp edges, lubricants or cleaning formulations; do not use latex-containing gloves if an allergy to latex has been diagnosed; do NOT use gloves when working near moving or rotating parts of machinery
- 4** Ventilate the work station site, according to need; if necessary wear a gas mask
- 5** Check electrical equipment for safety before use. Take faulty or suspect electrical equipment to a qualified electrician for testing and repair
- 6** Learn and use safe lifting and moving techniques for heavy or awkward loads; use mechanical aids to assist in lifting
- 7** Use personal protection equipment, fit for the work being carried-out
- 8** Do NOT enter dark or poorly-illuminated spaces; use portable light sources
- 9** Do NOT enter the engine room with loose clothing or hair; collect hair in a net or beneath a hat to avoid entanglement
- 10** Wear adequate clothing and head-gear for protection in adverse weather

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**Specialized information**


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**Synonyms** Marine-engineer; mechanic, marine engine; ship's machinist; ship's engine operator; ship's engine room attendant

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**Definitions and/or description** Supervises and coordinates activities of crew engaged in operating and maintaining propulsion engines and other engines, boilers, deck machinery, and electrical, refrigeration and sanitary equipment aboard ship: Inspects engines and other equipment and orders crew to repair or replace defective parts. Starts engines to propel ship and regulates engines and power transmission to control speed of ship. Stands engine-room watch during specified periods, observing that required water levels are maintained in boilers, condensers, and evaporators, load on generators is within acceptable limits, and oil and grease cups are kept full. Repairs machinery, using hand tools and power tools. Maintains engineering log and bell book (orders for changes in speed and direction of ship). May be required to hold appropriate U.S. Coast Guard license, depending upon tonnage of ship, type of engines, and means of transmitting power to propeller shaft. When more than one ENGINEER (water trans.) is required, may be designated Engineer, Chief (water trans.); Engineer, First Assistant (water trans.); Engineer, Second Assistant (water trans.); Engineer, Third Assistant (water trans.). May be designated according to ship assigned as Barge Engineer (water trans.); Cannery-Tender Engineer (water trans.); Engineer, Fishing Vessel (water trans.); Tugboat Engineer (water trans.). May be designated Cadet Engineer (water trans.) when in training. [DOT]



**Related and specific occupations** Barge engineer; boiler attendant; cadet engineer; cannery-tender engineer; engine attendant; engineering assistant; fishing vessel engineer; tugboat engineer

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**Tasks** Abrading; adjusting; aligning; assembling and disassembling; bolting; bonding; boring; brazing; brushing; burning; calibrating; cementing; chipping; clamping; cleaning; controlling (speed); coordinating; cutting; diagnosing; dipping; dismantling; drilling; driving; examining; fabricating; fastening; filing; filling; finishing; fitting; flame-cutting; forging; grinding; gluing; hammering; heating; inspecting (engines); installing; lifting; lubricating; machining; maintaining (machines; log and bell books); measuring (with instruments); melting; mending; milling; observing; operating; ordering; overhauling; painting; piercing; planning; positioning; pressing; pulling; pumping; pushing; raising; rebuilding; recharging; reconditioning; regulating; relining; removing; repairing; replacing; rewiring; sanding; scraping; servicing; setting; soldering; spraying; stapling; starting (engines); supervising; watching; testing; threading; tightening; tuning; welding

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**Primary equipment used** Machine tools (saw, grinder, etc.); hand tools; fire extinguishers; personal protective equipment; water treatment equipment; plumbing, welding, soldering and other equipment

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**Workplaces where the occupation is common** Ships (commercial or military), shipyards, barges

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- Notes**
1. Quite frequently the seaman carries-out his work without sufficient supervision, without superior's approval, and many times without any knowledge about the properties of the materials (esp., chemicals) he is working with, and without knowledge of the required operations needed to minimize the damage in the event of an accident.
  2. A considerable number of accidents happen when the seaman is engaged in securing cargo to the deck, when the surface upon which he is working is full with obstacles that make movement quite difficult; or when the seaman is checking the temperature of elevated containers - a task that requires "acrobatically talents" from the seaman. This is even more severe due to the fact that quite frequently the worker is alone without any other crewman that can help in need! Very severe accidents may happen throughout the tying or untying of the ship, when the limited number of the crew prevents the necessary care and supervision required for such a dangerous work.
  3. Ladders must be secured by appropriate tying, especially when they are used as work-platforms; in such a case an additional worker must be at the place to watch the worker.



**References** Encyclopaedia of Occupational Health and Safety, 3rd Ed. ILO, Geneva, 1983.



Encyclopaedia of Occupational Health and Safety, 4th Ed., ILO, Geneva, 1999

Safety Guide for the Merchant Marine (In Hebrew). IMMSC, Haifa, Israel 1992 (219 pp.)

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