

Safety of vessels against tsunamis (2)

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Tsunamis can cause rapid changes in water level and unpredictable dangerous currents in harbours and ports. Vessels would be washed onto the shore, crashed against quay wall or bridges or sunk in violent waters.



A fishing boat was deposited on top of a concrete shore protection barrier at Okushiri Island, Japan during the 1993 Japan Sea tsunami. (Courtesy of Intergovernmental Oceanographic Commission)

As tsunamis have a small amplitude offshore and generally pass unnoticed at deep sea, the impact of tsunamis to vessels at deep sea would be minimal. Hence, the general guidelines for countermeasures to be taken for vessels in case of tsunamis are (a) those at port, harbour or in shallow water should evacuate to an area with deep water (sea depth of 50 m or more for tsunamis at coast smaller than 3 m, but deeper for more significant tsunamis, according to the Ministry of Agriculture, Forestry and Fisheries of Japan) if there is enough time to do so before tsunami arrival, or (b) secure the vessels and evacuate the crew away from the waterfront if the time is not enough for the ships to evacuate to the deep sea or if evacuation is difficult. Furthermore, vessels which are already in or have evacuated to deep sea areas should take control to avoid being upset by or caught in the flow of the current.

In Japan, the Research Committee for the Safety of Vessels has conducted a study on countermeasures of vessels in case of tsunami (Takahashi 2004). A table showing the summary of the standard countermeasures of vessels against tsunamis in the study report which is published in the magazine “Japan Association of Marine Safety” in 2004 is translated into English and shown below for reference. It is noted that irrespective of the lead time for tsunami arrival, all vessels with dangerous or hazardous goods on board should evacuate to deep sea.

However, the degree of tsunami effect to vessels is different, depending on the shape, infrastructure, design, etc. of the harbour or port, and the actions to be taken are also different according to the size and shape of the vessels. The availability of deep sea areas for evacuation is another factor for consideration. Details of tsunami countermeasures plan would therefore be unique for each harbour or port.

Reference: Masaru Takahashi, 2004. Japan Association of Marine Safety magazine.

List of Countermeasures of Vessels against Tsunami

Predicted tsunami height		Time before arrival of tsunami	Recommended countermeasures of vessels						
			Vessels at port			Vessels moored by anchor or by mooring buoy	Navigating ships		
			Large and middle size vessels (including fishing boats)		Small boats (Pleasure boats, small fishing boats etc.)		Large and middle size vessels (including fishing boats)	Small boats (pleasure boats and small fishing boats, etc.)	
Vessels with dangerous objects		Vessels in general (including loading and working)k barge)							
Tsunami Warning	Big Tsunami 3m, 4m, 6m, 8m, and equal to or more than 10m	No time	Evacuate outside port	Evacuate to land	Evacuate to land	Use engine	Evacuate outside port	Evacuate outside port or evacuate to land after reaching shore	
		Between		Evacuate outside port or evacuate to land	Land and lash ship or evacuate to land (Evacuate outside port depending on circumstances)			Use engine or evacuate outside port	Evacuate outside port or land and lash ship after reaching shore (Evacuate to land depending on circumstances)
		Has time		Evacuate outside port	Evacuate outside port			Evacuate outside port or land and lash ship after reaching shore	
	Tsunami 1m, 2m	No time		Evacuate to land or strengthen mooring	Evacuate to land	Use engine		Evacuate outside port or evacuate to land after reaching shore	
		Between		Evacuate outside port, evacuate to land, or strengthen mooring	Land and lash ship or evacuate to land (Evacuate outside port depending on circumstances)	Use engine or evacuate outside port		Evacuate outside port or land and lash ship after reaching shore (Evacuate to land depending on circumstances)	
		Has time		Evacuate outside port or strengthen mooring	Land and lash ship (Evacuate outside port depending on circumstances)	Evacuate outside port		Evacuate outside port or land and lash ship after reaching shore	
Tsunami Alarm	Tsunami Alarm 0.5m		Strengthen mooring or evacuate outside port	Land and lash ship or evacuate outside port	Pay attention to information (Evacuate outside port and use engine depending on circumstances)		Land and lash ship, evacuate outside port or strengthen mooring		
Remark			Handling manual should be prepared by enterprise in advance		If there is a safe water outside port where even small boats can cope well with tsunami , and also there is enough time to evacuate, boats can evacuate outside port	Water area where water current is likely to be faster at the time of tsunami among the water areas used as anchorage should be checked in advance			

Notes.

Has time : When it has sufficient time to evacuate (the vessel can evacuate outside the port or land and lash the ship in the safe place) from the moment tsunami warning was announced.

No time : When there is no time to evacuate (the vessel can evacuate outside the port or land and lash the ship in the safe place) from the moment tsunami warning was announced.

Between : Between the "Has time" and "No time" above.

Small boats : It refers the boats which can be landed in the port (not including being landed to the dockyard) among pleasure boats and fishing boats.

Evacuate to land : Since the evacuation with the vessel seems to have high risk, the crew should evacuate to the higher place on land. Measures to prevent outflow of the vessel and safety measures for the dangerous objects should be taken as much as possible.

Evacuate outside port : Evacuate to the offshore where the water is deep enough and has sufficient space outside the port (if there is no time to evacuate outside the port, the vessel should be on standby in the emergency evacuation water area inside the port).

Pay attention to information : Although the vessel does not evacuate, they should pay attention to the information until the tsunami warning is lifted and the safety measures for the vessel should be taken.

Land and lash ship : Small boats such as pleasure boats or fishing boats should be landed, and should be lashed in order to prevent outflow of the boats by tsunami etc.

Use engine : Start the engine while the vessel is moored by anchor, and cope with tsunami by using the engine if necessary.