



Designing Means of Access and Related Access Aids

incidences that repeatedly appeared in the company accident database. Over a five-year span the company had 21 serious fall accidents involving stairs. Six of these falls required hospital treatment or hospital stays for the crew members involved. More recent reviews of offshore accidents revealed that these accidents were not unique to this company, but rather reflected a general picture of fall injuries for the offshore industry.

Further research into the reasons or causes as to why these falls up and/or down stairs occur with such frequency influenced new stair design guidance. In a follow-up study of stair falls five years later, the company had only one fall associated with the new stair design (compared to 21 falls over a five-year period as discussed above) (Templer, 1992; Templer 1985). See ASTM F 1166 (2007), and ABS (2007) for the new stair design guidance.

Vertical Ladders

Falls from vertical ladders are less frequent than for stairs but can be extremely injurious or deadly. Fall data clearly shows that the risk of a fall being fatal increases after age 45. Also, the average height of a fatal fall decreases as the age of the fall victim increases, dropping from an average height of 55 feet (18.3 meters) for the 20-24 year old males to 21 feet (6.9 meter) for men between 55-59 years of age (Agnew , 1993). Translating these results into practical maritime design suggests that positive fall protection would be beneficial in the case of vertical ladder design in excess of 20 feet (6 meters) in height.

Vertical ladder landing location is another important concern. There is an increased risk of a crew member falling further when a landing is within about six feet (1830mm) from the edge of a deck. A crew member could fall over the handrail to the next deck level below, or fall overboard if falling from a ladder near the deck edge.

Design guidance for a variety of vertical ladder configurations is contained in the ASTM F1166 design standard (ASTM, 2007), the ABS Guide for Means of Access to Tanks and Holds for Inspection (ABS 2007), and the ABS Guidance Notes on the Application of Ergonomics to Marine Systems (ABS, 2013).

Handrails

Handrail heights for stairs have traditionally been 35 inches (890mm). Recently, it has been pro-posed that stair handrails should be closer to 36 to 37 inches (915mm to 940mm). The reasoning behind this shift in thinking is that crew members today are generally taller, and as a result their vertical center of mass is higher. The higher handrail heights help to compensate for this growth and render the increased vertical center of mass to the same level as safety rail height (ABS, 2007; ASTM, 2007).

Handrail heights for safety at deck edges can vary depending on what ship design standard is selected. Design dimensions have traditionally accommodated the lower limit required, 39 inches (1000mm); however, it has recently been recommended that 39 inches (1000mm) is insufficient. The general opinion of safety engineers is that the lower limit is no longer adequate to deter falls over a rail for the 95th%

