

## *Massachusetts Plumber Falls When Extension Ladder Collapses*

*Investigation: #95-MA-042-01*

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### **SUMMARY**

*On November 6, 1995, a 37 year old male plumber was fatally injured when he fell approximately 20 feet from an extension ladder which had collapsed. The ladder collapsed while the victim was descending from a roof where he had been inspecting the ventilation system with a co-worker. He suffered severe head trauma in the fall. An ambulance was called immediately by a worker inside the building. The victim was unresponsive at the scene and was transported to a local hospital by fire service ambulance where he was pronounced dead. The MA FACE Program Director concluded that to prevent similar future occurrences, employers should:*

**C** *ensure that all employees are trained in the hazards of extension ladders.*

*Also, manufacturers of ladders should:*

**C** *ensure that there is no interference with the proper operation of rung locks on extension ladders.*

### **INTRODUCTION**

*On November 9, 1995, the MA FACE Program was notified by a town clerk through its Occupational Fatality Hotline that on November 6, 1995, a 37 year old male plumber was fatally injured when he fell approximately 20 feet from an extension ladder which had collapsed. An investigation was immediately initiated. The MA FACE Program Director traveled to the jobsite and met with the employer on November 14, 1995. The police report, death certificate, corporate information, witness interviews and photographs were obtained during the course of the investigation.*

*The employer was a heating and ventilation contractor and was in business approximately 3 years at the time of the incident. Six persons were employed as needed company-wide. Two employees were working at the incident site when the victim fell. The victim was a licensed master plumber; his co-worker was a plumber's helper. The victim was employed by the*

*company for three months and had worked on the site for two days. The company had no designated person in charge of safety on the site.*

## **INVESTIGATION**

**On November 6, 1995, a master plumber (the victim) and a plumber's helper were working at a one story industrial building repairing and installing ductwork for the heating and ventilation system. They had installed some piping through the ceiling from the inside of the building. They then went outside to climb onto the roof to check the work and see what else needed to be done. Not having brought a ladder from the shop, they borrowed a 28 foot Type 1A fiberglass extension ladder, with a working height of 24'3", from their client. This ladder was new, purchased in January of 1995 from a retail hardware outlet. The men climbed the ladder to the roof and examined the pipes to see what flashing and other parts were needed from the truck. The victim then stepped back onto the ladder to climb down to the truck. The ladder collapsed, with one section sliding into the other. The top of the ladder struck the side of the building approximately three feet down from the roof. The victim fell to the paving below severely injuring his head.**

**A worker inside the building saw the victim fall past the window and immediately ran outside, while another telephoned for emergency medical assistance. Emergency assistance arrived but found the victim unresponsive. The fire service ambulance then transported the victim to a local hospital where he was pronounced dead. The 21-year old co-worker refused to climb down any ladder and was retrieved from the roof with an aerial lift borrowed from a nearby company. The ladder was taken to the police station where it was stored.**

**The investigation revealed that when running the ladder**

section up and down, occasionally the rung locks would get hung up on braces on the second to top rung of the lower section. The rung locks are designed to grip over the two rungs, one from each ladder section. (See Figure 1) When the lock would get hung up on the brace, the lock would not cover completely the upper section rung. Putting weight on the ladder (upper section) in this condition could force the section to slide down. In this case, the men had already climbed the ladder, possibly while the rung lock was partially engaged, with no adverse consequences. It is possible that while the victim was getting onto the ladder from the roof, the ladder was shifted just enough to allow the rung lock to disengage completely from the upper section.

Kick-out, or the sliding of the bottom of the ladder in a horizontal direction, was considered as a possible contributing factor in the incident. The rubber shoes of the ladder had scrape marks, which could also have been caused while the ladder was in free fall. However, there were no scrape marks on the side of the building to indicate that the ladder had slid down, which might indicate a kick-out condition. A witness did say that the ladder top was approximately 1 1/2 feet above the roof. Given that the roof was 21 feet from the ground and that the ladder was at full extension at 24'3", calculations indicate that the base was 8 feet from the building. The recommended distance for stability (4:1 ratio) would be approximately 5 feet. Thus the angle of the ladder to the ground was slightly too acute. However, nobody on the scene had done precise measurements while the ladder was in position and witnesses agree that the top section had slid into the lower section. The ladder was also found in a retracted position after the incident. Therefore, kick-out was ruled out as the

**main cause of the incident.**

**As a result of the OSHA investigation of this incident, the manufacturer of the ladder reported this possible problem with obstruction of the rung locks to the Consumer Product Safety Commission. The CPSC has issued a product recall on the manufacturer's series of ladders as a result.**

#### **CAUSE OF DEATH**

**The medical examiner listed the cause of death as blunt head and chest trauma.**

#### **RECOMMENDATIONS/DISCUSSION**

**Recommendation #1: Employers should ensure that all employees are trained in the hazards of extension ladders.**

**Discussion:** In this case, the rung locks of the ladder apparently failed to engage safely over the rungs of both the upper and lower sections of the ladder. This condition appeared to be caused by the rung lock getting stuck on the corner braces between the side rails and the second to last rung of the bottom section. Extension ladders are susceptible to collapse when the rung lock is not completely engaged. Employees should be alerted to be sure that the rung lock is completely engaged over the rungs of both the upper and lower sections before ascending or descending the ladder.

OSHA regulation 1926.1060 provides that all employees using ladders should be trained by a competent person. This training should include:

- C the nature of the fall hazards in the work area*
- C correct procedures for erecting, maintaining and disassembling the fall protection systems to be used*
- C proper construction, use, placement and care in handling of all ladders*
- C maximum intended load-carrying capabilities of the ladders being used*

*Employees should also be trained to check a ladder for defects before each use and remove defective ladders from service.*

***Recommendation #2: Manufacturers of ladders should ensure that there is no interference with the proper operation of rung locks on extension ladders.***

*Discussion: The braces between the rails and the rungs of the ladder were installed to assure stability and prevent twisting. Other design measures could be taken to avoid these conditions as well. The manufacturer of the ladder involved in this incident is developing a rung lock replacement and has recalled the ladders through the Consumer Product Safety Commission.*

## **REFERENCES**

**Code of Federal Regulations, Labor 29 Parts 1926.1050-1060, Subpart X - Stairways and Ladders**

**American National Standards Institute, American National Standard for Ladders-Portable Reinforced Plastic-Safety Requirements, ANSI A14.5-1992**

**U. S. Department of Energy, Occupational Safety and Health (OSH) Technical Reference**