Jurnal Kesehatan STIKes Sumber Waras
Volume 7 Nomor 2 Tahun 2025
EISSN 3032-4262

Condition of The Fire Protection System in Building A University X, 2024

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ABSTRACT

Fire cases in buildings are one of the fire cases that can cause many fatalities. The most frequent cases of building fires are residential buildings where the biggest cause of fires is short circuits. This research aims to analyze fire protection facilities in building A, University of X in 2024. This research uses a descriptive analysis method to describe the fire protection facilities available in building A, University. The observation method is used to assess the condition of fire protection facilities, and interviews with related officers are used to confirm the observation results found. The results of the research show that the active fire protection system in building A is included in the fairly good category with 56% fulfillment of inspection aspects and the passive fire protection system in building A is included in the quite good category with 47% compliance with inspection aspects. It can be concluded that the fulfillment of active and passive fire protection systems is included in the quite good category. This explains that the entire building has fire protection facilities but it's in poor condition or does not comply with applicable standards. It is necessary to execute maintenance and functional tests on existing facilities regularly and conduct fire risk assessments to determine additional facilities that are not yet available in building A, University of X.

Keywords: Fire, Building, Protection System.

ABSTRAK

Kebakaran pada gedung merupakan salah satu kasus kebakaran yang dapat menyebabkan banyak korban jiwa. Kebakaran gedung yang paling sering terjadi adalah pada bangunan tempat tinggal, di mana penyebab kebakaran terbesar adalah korsleting. Penelitian ini bertujuan untuk menganalisis fasilitas proteksi kebakaran di Gedung A, Universitas X pada tahun 2024. Penelitian ini menggunakan metode analisis deskriptif untuk mendeskripsikan fasilitas proteksi kebakaran yang tersedia di Gedung A, Universitas. Metode observasi digunakan untuk menilai kondisi fasilitas proteksi kebakaran, dan wawancara dengan petugas terkait digunakan untuk mengonfirmasi hasil observasi yang ditemukan. Hasil penelitian menunjukkan bahwa sistem proteksi kebakaran aktif di gedung A termasuk dalam kategori cukup baik, dengan pemenuhan aspek inspeksi sebesar 56% dan sistem proteksi kebakaran pasif di gedung A termasuk dalam kategori cukup baik dengan pemenuhan aspek inspeksi sebesar 47%. Dapat disimpulkan bahwa pemenuhan sistem proteksi kebakaran aktif dan pasif termasuk dalam kategori cukup baik. Hal ini menjelaskan bahwa seluruh gedung memiliki fasilitas proteksi kebakaran tetapi dalam kondisi buruk atau tidak memenuhi standar yang berlaku. Perlu dilakukan pemeliharaan dan uji fungsional pada fasilitas yang ada secara berkala dan melakukan penilaian risiko kebakaran untuk menentukan fasilitas tambahan yang belum tersedia di A, Universitas X.

Kata Kunci : Kebakaran, Gedung, Sistem Proteksi.

INTRODUCTION

Background

Fire is an event that can cause loss of both property and life. Preventive measures include providing fire protection equipment to mitigate the impact. One of the most common fires each year is fires in buildings. The most common cause is short circuits in electrical installations within the building. More than 20 campus building fires were reported in the media throughout 2023, and more than 5 cases from January to June 2024. These figures represent reported cases. In reality, many campus building fires go unreported. In addition to causing loss of life, building fires can also cause asset loss and environmental damage (National Disaster Management Agency, 2023).

Building A at University X, the research area, was built in 1995. The building's age makes it susceptible to fire. This necessitates a robust fire protection system to ensure protection against fire risks.

RESEARCH METHOD

The research method used was descriptive analysis, which analyzed the results of the inspection of fire protection equipment availability in Building A. The inspection was conducted using observational techniques, where compliance with regulations, SNI, and NFPA was observed. Primary data collection was conducted using observation techniques and interviews with building staff to triangulate the observational data obtained.

RESULTS

Table 1. Results of The Active Fire Protection Facility Inspection

Check Item	%
Standpipe system	67
Automatic sprinkler system	0
Fire pump	75
Hydrant	48
Light Fire Extinguishers (APAR)	90
Fire detection, alarm, and communication system	57
Average Compliance	**56**

The overall inspection results of active protection facilities in building A were quite good, namely 56%. The inspection results categories for the standpipe system were quite good (67%), the automatic sprinkler system was not found (0%), the fire pump was good (75%), the hydrant was good (48%), the fire extinguisher was good (90%), and the detection system, fire alarm, and communication system were good (57%).

Table 2. Results of Passive Fire Protection Facility Inspection

Check Item	%
Installation of Fire-Resistant Construction	50
Emergency Stairs	45
Emergency signage	50
Evacuation Plans	0
Assembly Points	88
Average Compliance	**47**

The overall passive fire protection facility inspection results in building A were quite good at 47%. The installation of fire-resistant construction was quite good (50%), the emergency stairs were quite good (45%), the emergency signage was quite good (50%), the evacuation plan was not found (0%), and the assembly point was good (88%).

Discussion 1

Active Fire Protection Facilities

Active fire protection is a system that actively functions in the fire extinguishing process (Lestari, 2021). It can be water-based or other materials that work by breaking the chain reaction within the tetrahedron. Fire protection facilities, including water-based systems such as standpipes, hydrants, and sprinklers, require pressure from pressure pumps, alarms, fire detectors, and fire extinguishers. Furthermore, a good communication system is also essential for disseminating information or requesting assistance.

The analysis of the fulfillment of active fire protection facilities in building A was generally categorized as good at 56%. Most active fire protection facilities were present, but some were missing. However, some available facilities had not undergone maintenance or functional testing. The facilities that were available and had undergone maintenance had not been regularly maintained.

Based on information obtained from building staff through interviews, other equipment, other than fire extinguishers, has not been regularly inspected.

Fire hydrant facilities have been inspected but have not yet undergone functional testing.

The standpipe system is the section of pipe that rises above the surface of the piping system, used to channel pressurized water. It serves as a connection between the fire pump and the hoses, both available and supplied by firefighters (National Standardization Agency, 2002).

The inspection results of the standpipe system in building A were in good condition. Based on the observations, 12 standpipe facilities were found. These standpipe facilities were connected to 2 pump facilities at the front and rear of the building, with 8 standpipe facilities connected to the front side fire extinguishers and 4 standpipe facilities connected to the rear side fire extinguisher pumps. A total of 8 standpipe facilities on the front side were in good condition, while 4 standpipe facilities on the rear side were rusted. After conducting interviews with building officials, it was found that the facility installation on the front side of the building was a new installation and the one on the rear side was an old installation that had not been rejuvenated. The new installation of the standpipe is in accordance with PU Regulation No. 26 of 2008, namely that buildings with more than 3 stories above ground must have a class 1 standpipe system facility. Standpipe facilities must be properly maintained to ensure fire protection (National Fire Protection Association, 2021).

An automatic sprinkler system is a wet pipe installation installed in multi-story buildings, industrial buildings, and other buildings according to their classification, which aims to directly extinguish fires that occur in the building. This system is permanently installed inside the building and works automatically by spraying water at the source of the fire (Ministry of Public Works and Housing Regulation, 2008). Based on the results of observations conducted, the building does not yet have a sprinkler facility. The results of interviews with building officials obtained information that the entire building will be renovated to plan the piping installation.

A fire pump is a pressurized water distribution facility specifically used for firefighting, considering water supply, suction, discharge, power supply, drive, control, acceptance testing, and operation (National Standardization Agency, 2021). Fire pump units are installed outside at least 15 meters from the building. Fire pump units must be protected from possible explosions, fires, floods, earthquakes, rodents, insects, storms, theft, and other extreme conditions (National Fire Protection Association, 2021).

A hydrant system is a device equipped with a hose and nozzle used to channel pressurized water and is placed on the walls of each floor in a building and in the building yard (National Fire Protection Association, 2021). The hydrant in building An is in the corridor and is easily visible and unobstructed, while the yard hydrant is located adjacent to the standpipe and is easily visible and unobstructed. The results of the hydrant system inspection are in the good category. Based on the observation results, it was found that each standpipe in the yard of building A had a hydrant box. However, only 8 hydrant boxes had hoses and nozzles inside them. Meanwhile, the other 4 hydrant boxes were empty. The results of interviews with building officials obtained information that the nozzles in several hydrant boxes were missing and their whereabouts were unknown. Similarly, the remaining hoses were damaged by irresponsible and unknown individuals.

APAR is a facility that can be used by one person quickly to extinguish small fires. The components of APAR are liquid, foam, dry powder and gas. The position of APAR placement is a maximum of 15 meters between the cylinder with a height of 125 cm from the floor surface to the APAR mounting. APAR must be placed in a prominent position, easily accessible, ready to use and not obstructed so that it can be immediately used when needed. The placement of APAR with a box must be ensured to be unlocked unless the location is unsafe. APAR must be checked regularly and refilled periodically even if not in use (Permennaker, 1980).

The inspection results for the fire extinguishers in building A were categorized as good. Building A already has Dry Chemical Powder (DCP) fire extinguishers installed at several locations on each floor. The fire extinguishers are routinely inspected and refilled. Observations found that the cylinders, hoses, pins, and nozzles were in good condition. However, one of the fire extinguishers was positioned above 125 cm, requiring adjustment.

The detector is a device used to detect heat and smoke and trigger the siren on the unit. The communication system is an emergency broadcasting facility used to disseminate emergency information and evaluation instructions. Communication systems are recommended for buildings with a height of 4 stories or 14 meters or more (National Standards Agency, 2000).

The results of the inspection of the fire detector and alarm system and the communication system in building A are included in the good category. Based on the observation results, building A has smoke detectors installed in every corridor of the building. Most of the smoke detector units have indicator lights that are not lit. The results of interviews with building officers obtained information that the existing smoke detectors have not been maintained. Building A also does not have a special communication system for emergency situations. As a replacement, officers will use a loudspeaker announcement. In addition, officers will use HT for the evacuation process which will of course be supervised by security officers at posts

near the building. There are three security posts: one at the front of the building, the left side of the building, and the other at the back of the building.

Passive Fire Protection Facilities

Passive fire protection is a system that functions to reduce the spread of fire, thereby mitigating its impact (Lestari, 2021). Passive fire protection facilities include the installation of fire-resistant construction, emergency stairs, emergency signage, evacuation plans, and assembly points, which serve as rescue facilities during the evacuation process.

The analysis of passive fire protection facilities in Building A was generally considered satisfactory, at 47%. Most passive fire protection facilities were in place, although they did not meet applicable standards. Furthermore, several facilities were missing.

Fire-resistant construction involves the construction of fire barriers to prevent the spread of fire. Fire-resistant construction items that must be maintained include fire walls, fire-retardant partitions, and roof coverings (Ministerial Regulation of Public Works and Housing, 2008).

The inspection results for the fire-resistant construction installation in Building A were categorized as quite good. The core construction of Building A uses fire-resistant materials with a minimum of 2 hours. Building A also uses walls as room dividers. However, the interior still uses materials containing combustible wood. The observation found several windows with wooden frames that were damaged and easily burned. Furthermore, the condition of the ceiling was also found to be moldy and damaged. After conducting interviews with building officials, it was learned that this had been reported and was in the schedule for condition inspection and repair planning.

Emergency stairs are used during rescue operations in emergencies. To maintain stability during stair access, handrails are required on both sides. Stair access maintenance is carried out by ensuring the stairway area is unobstructed so it can be used for rescue or evacuation (Ministry of Health Regulation, 2016).

The inspection results for the emergency stairs in building A are in the good category. Building A has two access stairs in each building. However, some of the existing access stairs do not have handrails. The emergency stairs that do have handrails are damaged and need to be repaired. The results of the observation were found that the lights used in the emergency stairs are not automatic emergency lights. The access stairs area does not have a floor location number label. However, the floor location number can be identified by the room number label in the corridor. The end of the access stairs end at the access door to the room. However, the access door at the back of the room is locked and is not used for entering and exiting the building. After interviewing officers, it was found that all keys to the rear doors of the building are kept in the administration room. All building occupants have been informed that in an emergency they can use the main access door of the building.

Emergency signage is one of the supporting facilities in evacuation access as a guide to the evacuation route used in emergency conditions. The "EXIT" signage is used as an exit guide from a room or area within a building. Meanwhile, emergency evacuation route signage is used as an evacuation direction guide that can be used in emergency situations. Evacuation route signage points the way to the nearest assembly point from the nearest exit access. The "EXIT" sign is required to be placed at a vertical distance of no more than 20 cm above the access door. Signage printing rules are listed in SNI 03-6574-2001 (National Standards Agency, 2001). Placement of emergency signage can be clearly visible and unobstructed. Signs that use powerful lighting are checked periodically so that they can light up when needed. Meanwhile, signage that does not have powerful lighting can use glow-in-the-dark materials.

The inspection results of the emergency signage in building A were in the good category. The "EXIT" sign was installed at the main door of the building. The installed signage used powerful lighting at each access stairway exit, but the lights were not on. The observation results also showed that each access stairway did not have emergency signage for the evacuation route down. After conducting interviews with building officials, it was found that the facility had not been routinely maintained. Almost all the signage was in a powerless condition, and some were damaged.

An evacuation plan is a plan that describes the layout of a floor with color codes, symbols, and images that are easy to understand and easily visible. The plan must also contain information about the location of the plan position, exits, the position of fire extinguishers, hydrants, and assembly points. Evacuation plans must be provided on each floor of the building as a visible source of information to support the evacuation process (Minister of Public Works Decree, 2000). Based on the results of observations conducted, it was found that building A did not have an evacuation plan on each floor of the building. After conducting interviews with building officers, it was found that building A had a building blueprint but had not yet been made an evacuation plan.

A gathering point is an area used to gather during an emergency during the evacuation process for building occupants. Planning the location of the gathering point is included in one of the building emergency response planning efforts. Determining the gathering point must consider the suitability of the final location to be targeted in the evacuation route, security, ease of access, and a safe

distance from hazards including building debris. The capacity of the gathering point can accommodate building occupants. The safe distance from the gathering point is a minimum of 20 meters from the building. The location of the gathering point must be easily accessible to emergency vehicles such as ambulances and fire engines. Information boards must be placed at least 200 cm from the ground surface (Ministry of Public Works and Housing Regulation, 2008).

The results of the inspection of the assembly points in building A are included in the good category. Based on the results of the observations carried out, building A has 3 assembly points, namely on the front side of the building, the left side of the building, and the back side of the building. The locations of the assembly points on the front and left sides of the building have information boards. Meanwhile, the location of the assembly point on the back side of the building does not have an information board. After conducting interviews with building officials, it was found that the location has not been installed with an information board because it is still in the planning stage of construction that meets standards and is accessible to fire trucks. However, all residents of building A have been socialized regarding the location of the assembly points.

CONCLUSION

Based on the research results and discussion, it can be concluded that the fire protection system in building A is considered adequate. One aspect that remains unmet is routine facility maintenance to ensure it is in good condition and ready for use when needed. Furthermore, functional testing of several facilities has not been conducted. Facilities such as assembly point signs are incomplete.

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