**Analysis Of The Suitability Of Fire Handling With Active Fire Protection In Yaperjasa Senior High School In 2020**

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**Abstrak**

Fire starts with burning until it cannot be controlled. Fire can has many effects in fatalities, material damage, and business. Based on data from National Disaster Management Agency the fire that occurred in Indonesia in 2012 until 2018 with a total of 486 incidents. According to Kepmen PU No. 10/2002, every building must completed the fire safety protection including an active fire protection system.

This study used descriptive design with mix method using an observational approach. This research instrument using a checklist and interview sheets. The purpose of the research is to determine the suitability level of active fire protection in Yaperjasa senior high school in 2020 than the result will be compared based on several standards preference such as Permen PU No.26/2008, SNI 03-3989-2000, SNI 3985-2000, SNI 1745-2000, Permen PU No.20/2009 dan NFPA.

From the result of research showed the suitability level of the active fire protection system in Yaperjasa senior high school only has existing components only fire extinguisher with a score 73.3%. This level means it has quite good suitability, but there are still many components that are not available such as fire hydrants, sprinklers, standpipe systems, manual call point, fire alarm adan fire detectors.

**Keywords**: Fire, suitability, active fire protection

**1. INTRODUCTIONS**

Fires happen anytime, anywhere there can be a fire [1]. Fire starts with burning until it cannot be controlled [2]. Educational buildings are one type of government asset that should be protected, and they play an important role as temporary communal meeting places for children, teachers and communities. In

terms of management, schools need to emphasize fire safety for their buildings. A study on fire safety management has been carried out on schools that have recently experienced fires in Penang it was found that the school buildings require further enhancement in terms of both active and passive fire protection systems. For instance, adequate fire extinguishers should be provided to the school and the management should inspect and maintain fire protection devices regularly [3].

According to the Minister of Public Works Regulation No. 20 of 2009 concerning technical guidelines for fire protection management in buildings, which means that all occupants of the building are required to use the building according to its function as in the building permit, which includes handling fire hazards from maintenance, maintenance, and periodic checks of fire protection systems as well as preparation of a trained team for control fire [4].

In accordance with the Minister of Public Works Decree No. 10 of 2002 Technical Provisions for Fire Protection Systems in Buildings and the Environment, where all buildings must implement and comply with safety requirements for fire risks including programs for fire protection, rescue facilities, active protection systems, and passive protection systems [5].

The fire protection system in the building and its surroundings consists of tools, equipment and facilities, either those already installed or in the building and intended for both active and passive protection systems. An active protection system is a system that must be operated with an object that functions to extinguish fires. In contrast to passive protection systems, active protection systems do not become a group or part of an object design. However, this system will not operate if regulated or managed by humans [6]. An active protection system is a protection system that consists entirely of a complete manual and automatic fire detection system including fire extinguishers, hydrants, fire alarms, sprinklers, and fire detectors [7]. In addition, this system is used to start fire management [5].

According to the International Association of Fire and Rescue Services in 2019, in 2015 there were 31 countries that reported fires and there were 1 billion total populations affected [8] and based on data from the National Disaster Management Agency, fires that occurred in Indonesia from 2012 to 2018 totaled 486 incidents with a total of 269 victims [9].

According to the Fire Recapitulation Data, in October 2017 in 3 (three) regions, namely: West Jakarta, South Jakarta and East Jakarta, there were 21 fire incidents that damaged 103 facilities such as buildings, shop houses, schools, houses, hotels and restaurants [10].

Regional Disaster Management According to the DKI Jakarta Provincial Government Agency in 2014, there were 71 sub-districts that had moderate fire hazard levels, one of which was Jagakarsa. Based on the frequency of fire incidents from January to September 2014, there were 3 to 5 fire incidents in Jagakarsa village [11].

Based on the problems that have been stated above, the researcher wants to know the level of suitability of active fire handling facilities which include fire alarms, detectors, spinklers, light fire extinguishers, standpipe systems, manual call points and hydrants. The fires that have occurred in the Yaperjasa High School canteen and the absence of fire-fighting regulations in accordance with the Law in a building that is relatively recently renovated and there is no change in the problem of the active protection system from before it was renovated to be the main problem, planning of active fire protection devices according to SOP for a multi-storey building with a population of more than 100 people it is very important to extinguish the fire at the beginning of the fire, therefore the protection device must be in accordance with its designation in each room built during the building construction.

**2. METHODS**

This study used descriptive design with mix method using an observational approach and makes direct observations using risk assessment techniques and interviews with related sections to determine the active protection system and handling of fire hazards in Yaperjasa High School building.

Then the results from observations, interviews, and checking of related documents are compared with the conformity of the standards of Permen PU No.26 / PRT / M / 2008, SNI 03-3985-2000, SNI 03-1745-2000, SNI 03-3989-2000 and NFPA. the non-conformity will be given a recommendation. Then present the data in tabular and narrative form. Another instrument used is the interview, based on the results of in-depth interviews with a small number of qualitative techniques, data triangulation is needed to protect data validation. One of the instruments used in this study was a checklist, where each item of the question contained 2 categories of assessment, namely according to and not according to the final result in the form of a percent. How to analyze a checklist with calculations:

High: if the object analyzed meets the requirements> 80% - 100%

Moderate: if the object is attached but there are mismatches on some installations 60% - 80%

Low: if the object being analyzed does not match at all <60% [12].

**3. RESULTS**

The analysis carried out on each component of this study obtained different conformity results.

**Tabel 1 Suitability of The Fire Extinguisher**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Permen No.26 tahun 2008 | S | NS | Actual Conditions |
| 1 | A light fire extinguisher is available | √ |  | There is an APAR available in Yaperjasa High School building |
| 2 | There is a description of the class of fire and extinguishers proven effective | √ |  | There is an APAR classification |
| 3 | The fire extinguisher is placed in a conspicuous place and easy to reach | √ |  | The fire extinguisher is placed within easy reach |
| 4 | The fire extinguisher must not be obstructed | √ |  | The fire extinguisher was not blocked |
| 5 | The fire extinguisher must be firmly attached to a suitable hanger | √ |  | The fire extinguisher is hung with straps |
| 6 | The distance between the fire extinguisher on the floor is ≤10cm |  | √ | The fire extinguisher distance from the floor is more than 10cm |
| 7 | Instructions for use must be placed on the front of the fire extinguisher and clearly visible | √ |  | Usage instructions are on the front |
| 8 | Instructions for use, hazard identification labels, maintenance and hydrostatic test labels and other labels must be attached to the fire extinguisher on the front | √ |  | There are operating instructions, hazard and maintenance labels |
| 9 | The wall-mounted extinguisher that protrudes inward must be positioned so that the instruction label faces forward |  | √ | The fire extinguisher that is installed is not placed on an overhanging wall |
| 10 | The fire extinguisher is checked manually or monitored electronically | √ |  | The fire extinguisher is checked manually |
| 11 | Maintenance of fire extinguishers for a period of ≤ 1 year | √ |  | Fire extinguisher is maintained once a year |
| 12 | Each Fire extinguishers has a validity card and shows the month and year of maintenance | √ |  | Fire extinguisher has a clear validity period |
| 13 | The maintenance label says the person running the maintenance | √ |  | There is an fire extinguisher maintenance officer label |
| 14 | Fire extinguishers are inspected at every 30 day time interval |  | √ | Fire extinguisher is not inspected within 30 days |
| 15 | Records of all inspected fire extinguishers should be kept |  | √ | There is no fire extinguisher archive |

Based on the results of observations, the light fire extinguisher available at Yaperjasa High School is only capable of 1 (one) unit in each agency. The fire extinguisher in the Yaperjasa school building is not placed where it should be in the cupboard, and is only placed on the wall with a security in the School's Health Clinic room.

**Tabel 2 Suitability of the Manual Call Point**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-3985-2000 | S | NS | Actual Conditions |
| 1 | The manual dial point is red and clearly visible |  | √ | Not found |
| 2 | Distance from one point to TPM max 30m |  | √ | Not found |
| 3 | The manual call point is located at the outlet and mounted at a height of 1.4m from the floor |  | √ | Not found |
| 4 | The placement of the manual dial point is not prone to damage, not clearly visible, must be easy to operate |  | √ | Not found |
| 5 | For multi-storey buildings, manual call points must be installed on each floor and capable of reaching a max of 900m2 |  | √ | Not found |

Based on the results of the observations obtained, the Yaperjasa school building did not have a manual call point because there was no planning at the beginning of the construction.

**Table 3 Hydrant Suitability**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-1745-2000  SNI 03-3985-2000 | S | NS | Actual Conditions |
| 1 | The hydrant box is only intended to store blackout equipment |  | √ | Not found |
| 2 | Each hydrant box is painted a striking color |  | √ | Not found |
| 3 | The connecting hose with the hydrant box is unobstructed |  | √ | Not found |
| 4 | The hose is placed and ready to use |  | √ | Not found |
| 5 | There is a yard hydrant |  | √ | Not found |
| 6 | There is a nozzle |  | √ | Not found |
| 7 | There are instructions for use |  | √ | Not found |
| 8 | The yard hydrants are located along the fire engine access road |  | √ | Not found |
| 9 | The connecting tube has a thread according to the existing provisions |  | √ | Not found |
| 10 | Attached to the connecting hose with a cap with a cap to maintain the thread of the hose |  | √ | Not found |
| 11 | The distance between the hydrant and the fire engine is ≤50m |  | √ | Not found |
| 12 | Each shelf or hose storage area has a label that reads "fire hose for occupant use" |  | √ | Not found |
| 13 | Each of the hose holders is attached with a suitable rack or permitted storage area |  | √ | Not found |

Based on the observations obtained, the Yaperjasa school building did not have a hydrant because there was no planning at the beginning of the construction.

**Table 4 Suitability of Stand Pipe Systems**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-1745-2000 | S | NS | Actual Conditions |
| 1 | Minimum of two extinguishing connectors |  | √ | Not found |
| 2 | fire extinguishers must be fitted with a cover to protect the system from incoming debris |  | √ | Not found |
| 3 | There is maintenance to the standpipe system |  | √ | Not found |
| 4 | The fire department connection must be on the roadside of the building, clearly visible and known from the fire department entry point |  | √ | Not found |
| 5 | Each fire-fighting connector should be marked with a capital letter, not less than 25mm high, written on a board that reads "STAND PIPE"” |  | √ | Not found |
| 6 | The sign should also display the pressure required at the inlet for dispensing |  | √ | Not found |
| 7 | Each SPT must be installed along with the drain. The cap is attached at the lowest point of the pipe and is measured so that it can drain the water where it is permitted |  | √ | Not found |

Based on the results of interviews and field observations, the results show that Yaperjasa senior high school does not have a standpipe system.

**Table 5 Sprinkler Suitability**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-3989-2000 | S | NS | Actual Conditions |
| 1 | There is an automatic sprinkler |  | √ | Not found |
| 2 | The sprinklers are not decorated or coated |  | √ | Not found |
| 3 | Water for installation does not contain chemicals that will cause corrosion |  | √ | Not found |
| 4 | Water contains no fiber or material that will affect the sprinkler's work |  | √ | Not found |
| 5 | All automatic sprinkler installations must be accompanied by one type of water supply device that can work automatically, with adequate pressure and water capacity, and can be used at any time |  | √ | Not found |
| 6 | Mandatory system under the authority of the building owner |  | √ | Not found |
| 7 | A connection shall be provided that will allow firefighters to pump water into the sprinklers |  | √ | Not found |
| 8 | The minimum distance between sprinkler heads is ≤ 2m |  | √ | Not found |
| 9 | Existing sprinklers must be corrosion-resistant sprinkler heads |  | √ | Not found |
| 10 | The spare place for the sprinkler head and its key is placed in a room≤380C |  | √ | Not found |
| 11 | The spare sprinkler head stock is ≤36 pieces |  | √ | Not found |
| 12 | The spare sprinkler must be fulfilled, of the type or temperature with all sprinklers that have been installed |  | √ | Not found |
| 13 | There is also a special key for the sprinkler |  | √ | Not found |

Based on the results of field observations, the results show that Yaperjasa senior high school does not have a sprinkler because there is no planning at the beginning of the construction.

**Table 6 Suitability of Fire Alarms**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-3985-2000 | S | NS | Actual Conditions |
| 1 | The alarm sound is different from other signs so that it is easily recognized |  | √ | Not found |
| 2 | In every location the control panel and help panel is installed an alarm alarm |  | √ | Not found |
| 3 | Every room in the building must be reached by the fire alarm system with a clear sound of the alarm |  | √ | Not found |
| 4 | The control panel can show where the fire is |  | √ | Not found |
| 5 | The control panel can help the detector work |  | √ | Not found |

Based on the results of interviews and field observations, it was found that Yaperjasa High School did not have a fire alarm because there was no planning at the beginning of the construction.

**Table 7 Suitability of Fire Detectors**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | SNI 03-3985-2000 | S | NS | Actual Conditions |
| 1 | List of all fire detectors in the control unit |  | √ | Tidak terdapat detektor kebakaran |
| 2 | Fire detectors, floor plans and complete technical information are available |  | √ | Tidak terdapat detektor kebakaran |
| 3 | The detector is protected against possible damage due to mechanical interference |  | √ | Tidak terdapat detektor kebakaran |
| 4 | The detector is not mounted on an overhanging ceiling surface |  | √ | Tidak terdapat detektor kebakaran |
| 5 | There are detectors installed in all rooms |  | √ | Tidak terdapat detektor kebakaran |
| 6 | All available detectors are accessible for maintenance for periodic tests |  | √ | Tidak terdapat detektor kebakaran |
| 7 | Inspection, testing and maintenance are carried out |  | √ | Tidak terdapat detektor kebakaran |
| 8 | Data from the results of all inspections is stored for the next 5 years, for checking by the competent authority |  | √ | Tidak terdapat detektor kebakaran |

Based on observations in the field, the results show that Yaperjasa senior high school does not have a fire detector because there was no planning at the beginning of the construction.

**4. DISCUSSIONS**

**Light Fire Extinguisher**

Based on the results of observations, there are only 1 (one) small fire extinguishers available at Yaperjasa High School in each agency. The fire extinguisher in the Yaperjasa school building is not placed where it should be, namely in the cupboard, and is only placed on the wall securely in the School's Health Clinic room.

The fire extinguisher in Yaperjasa senior high school has only 1 type and is placed in the School's Health Clinic room on the 1st floor and installed on the wall with security. The type of fire extinguisher used is a type of CO2 fire extinguisher. Maintenance and maintenance is only carried out by cleaners. In addition, the procedures for use and training have never been carried out in schools.

Based on the results of the fire extinguisher suitability table at Yaperjasa High School of 15 requirements as many as 11 requirements that meet so that 73.3% of the value is obtained from where the score is the sum of the fire extinguisher data elements compared to the total number, it is concluded that there is no match between the actual conditions with Permen No.26 of 2008 and can be categorized as moderate (60-80%). The fire extinguisher in Yaperjasa High School also has a hazard identification label, how to use it and a maintenance label. However, the fire extinguisher inspection file was not stored properly.

This is not the same as the research conducted by Mahmasshony (2016) regarding the description of the fulfillment of the fire protection system in PT Unilever's Personal Wash Factory. In the study, it was stated that the overall assessment of the factory had an fire extinguisher with 100% compliance, which was good [13].

**Manual Call Point**

Of the 5 requirements, all the requirements are not fulfilled so that you get a result of 0% the value is obtained from where the score is the sum of the manual call point data elements compared to the total number, the assessment is according to the Audit Assessment table on Fire Research Center for the Ministry of Public Works, so it is concluded that no There is compatibility between the actual conditions and SNI 03-3985-2000 and it can be categorized as low (<60%).

This is not the same as the research conducted by Mahmasshony (2016) regarding the description of the fulfillment of the fire protection system in PT Unilever's Personal Wash Factory. In this study, it is stated that from the overall assessment the factory has a manual call point with 100% conformity, which is good [13].

**Hydrant**

Of the 13 requirements, all the requirements are not fulfilled so that you get a result of 0% the value is obtained from where the score is the sum of the hydrant data elements compared to the total number, the assessment is according to the Audit Assessment table on Fire Research Center for the Ministry of Public Works, so it is concluded that there is no conformity. between the actual conditions with SNI 03-1745-2000 and SNI 03-3985-2000 and may fall into the low category (<60%).

This is the same as research conducted by Odipatra (2017) regarding the analysis of the level of fulfillment of active fire protection facilities in the campus building of the Faculty of Public Health, University of Andalas. In the study, it was stated that there was no hydrant system in the FKM UNAND building, with a hydrant system suitability level of 0%, which was not suitable [14].

**Stand Pipe Systems**

Of the 7 requirements, all the requirements are not met so that you get a result of 0% the value is obtained from where the score is the sum of the vertical pipe system data elements compared to the total number, the assessment is according to the Audit Assessment table on Fire Research Center for the Ministry of Public Works, so it is concluded that no There is conformity between the actual conditions and SNI 03-1745-2000 and it can be in the low category (<60%).

This is not the same as the research conducted by Kusumaningsih (2012) regarding the analysis of fire prevention and emergency response systems in the central library of the University of Indonesia, which states that the UI central library building has a vertical pipe system and fire hoses connected to hydrants. The suitability level of the standpipe and fire hose system is 83%, which is good (B) means that it meets the requirements [15].

**Sprinkler**

There are 13 requirements that all requirements are not met so that you get a result of 0% the value is obtained from where the score is the sum of the hydrant data elements compared to the total number, the assessment is according to the Audit Assessment table on Fire Research Center for the Ministry of Public Works, so it is concluded that there is no conformity. between actual conditions and SNI 03-3989-2000. This is because there is no planning at the beginning of development. Yaperjasa senior high school does not have automatic sprinklers installed in all installations, both classrooms, teachers' rooms and canteens and other learning rooms.

This is similar to the research conducted by Odipatra (2017) regarding the analysis of the level of fulfillment of active fire protection facilities and life-saving facilities in the campus building of the Faculty of Public Health, Andalas University. In this study, it was stated that there was no sprinkler in the FKM UNAND building which functioned to spray water evenly in all directions of the fire incident, with a sprinkler suitability level of 0%, which is not suitable [14].

**Fire Alarms**

Of the 5 requirements, all the requirements are not met so that you get a result of 0% the value is obtained from where the score is the sum of the fire alarm data elements compared to the total number, the assessment is according to the Audit Assessment table on Fire Research Center for the Ministry of Public Works, so it is concluded that there is no conformity between actual conditions and SNI 03-3985-2000 and can be in the low category (<60%).

Unlike research conducted by Anisa (2016) in her research on the description of fire emergency response management and life-saving facilities at the Faculty of Pharmacy, University of Indonesia Building, 2016 states that there are fire alarms as emergency communication in case of fire. The suitability level of fire alarms in the building of the Faculty of Pharmacy, University of Indonesia is 75%, which means it is installed, but there are some elements that do not meet the requirements [16].

**Fire Detectors**

Of the 8 requirements, all the requirements are not fulfilled so that you get a result of 0% the value is obtained from where the score is the sum of the fire detector data elements compared to the total number, the assessment is according to the Audit Assessment table on the Fire Research and Development Center of the Department of Public Works, it is concluded that there is no conformity between actual conditions and SNI 03-3985-2000 and can be in the low category (<60%).

This is in line with Odipatra's research (2017) regarding the analysis of the level of fulfillment of active fire protection facilities and life-saving facilities in the campus building of the Faculty of Public Health, Andalas University. In the study, it was stated that the FKM UNAND building did not have a fire detector, the fire detector fulfillment rate was 0%, which was not in accordance with the requirements [14].

**5. CONCLUSION**

Based on the results of research on the analysis of the application of fire management suitability with active fire protection in the Yaperjasa Jakarta School building which was carried out using a checklist based on regulatory standards, interviews, field observations and document review, the following conclusions were obtained:

1. The hazard identification carried out found that the potential hazards that could cause a fire in the Yaperjasa school building included electricity; solid objects such as tables, chairs and paper; flammable and explosive chemicals; and gas stove.
2. Yaperjasa senior high school only has an active protection system in the form of 1 light fire extinguisher or APAR and the results from the suitability table are 73.3% and according to the fire audit assessment level of the Puslitbang Department of Public Works, the system is in the suitability level category, which is sufficient.
3. The fire extinguishers provided have instructions for use, hazard identification and maintenance labels attached. APAR also has a label for the officer who carries out maintenance.
4. The extinguisher provided is placed in the School's Health Clinic room with the strap on the wall.

**REFERENCES**

[1] Z. Djunaidi, “Analysis of the Active and Passive Fire Protection Systems in the Government Building, Depok City, Indonesia,” *KnE Life Sci.*, vol. 4, no. 5, p. 384, 2018.

[2] S. Sagala, “Analisis Upaya Pencegahan Bencana Kebakaran di Permukiman Padat Perkotaan Kota Bandung, Studi Kasus Kelurahan Sukahaji,” *Resil. Dev. Initiat.*, vol. 3, no. 3, pp. 5–18, 2013.

[3] N. Nadzim, “Appraisal of Fire Safety Management Systems at Educational Buildings,” *SHS Web Conf.*, vol. 11, p. 01005, 2014.

[4] P. PU, “Permen PU Tentang Pedoman Teknis Manajemen Proteksi Kebakaran Di Perkotaan,” vol. 2, no. 5, p. 255, 2009.

[5] 2000 KepMen PU, “Keputusan Menteri Negara Pekerjaan Umum No 10/KPTS/2000 tentang Ketentuan Teknis Pengamanan Terhadap Bahaya Kebakaran pada Bangunan Gedung dan Lingkungan,” *Eff. Br. mindfulness Interv. acute pain Exp. An Exam. Individ. Differ.*, vol. 1, 2000.

[6] Tarwaka, *Dasar-Dasar Keselamatan Kerja serta Pencegahan Kecelakaan di Tempat Kerja*. Surakarta, 2012.

[7] M. R. Suryoputro, “Active and passive fire protection system in academic building KH. Mas Mansur, Islamic University of Indonesia,” *MATEC Web Conf.*, vol. 154, pp. 0–5, 2018.

[8] B. N. P. B. BNPB, “Data Informasi Bencana Indonesia (DIBI),” 2018. [Online]. Available: http://bnpb.cloud/dibi/tabel1a.

[9] ASFP, “What is Passive Fire Protection, The Association for Specialist Fire Protection,” 2019. [Online]. Available: https://asfp.org.uk/what-is-pfp/.

[10] Portal Data DKI Jakarta, “Data Rekapitulasi Kebakaran Oktober 2017,” 2017. .

[11] BPBD DKI Jakarta, “Peta\_Tingkat\_Kerawanan\_Kebakaran\_sd\_September\_2014.pdf.” 2014.

[12] D. Saptaria, “Pedoman Teknis Pemeriksaan Keselamatan Kebakaran Bangunan Gedung,” *Bandung Puslitbang Pemukim. Badan Penelit. dan Pengemb. PU*, 2005.

[13] S. Mahmasshony, “Gambaran Tingkat Pemenuhan Sistem Proteksi Kebakaran Di Pambrik Personal Wash PT Unilever Indonesia TBK Rungkut,” *Skripsi*, 2016.

[14] R. Odipatra, “Analisis Tingkat Pemenuhan Sarana Proteksi Kebakaran Aktif Dan Sarana Penyelamatan Jiwa Di Gedung Kampus Fakultas Kesehatan Masyarakat Universitas Andalas Tahun 2017,” *Skripsi, Univ. Andalas*, 2017.

[15] R. Kusumaningsih, “Analisis Sistem Pencegahan Penanggulangan Dan Tanggap Darurat Kebakaran Di Perpustakaan Pusat Universitas Indonesia Tahun 2012,” *Skripsi, Univ. Indones.*, 2012.

[16] A. D, “Gambaran Manajemen Tanggap Darurat Kebakaran dan Sarana Penyelamatan Jiwa Di Gedung Fakultas Farmasi Universitas Indonesia Tahun 2016,” 2016.