

Analisis risiko pipa distribusi gas bumi di apartemen menggunakan metode event tree analysis = Risk analysis on gas distribution pipeline in apartment by event tree analysis method

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Abstrak

Dalam kegiatan operasional jaringan pipa gas banyak ditemukan potensi bahaya yang dapat mengakibatkan kegagalan pipa, tidak terkecuali pada jaringan pipa distribusi gas bumi di apartemen. Namun, studi tentang analisis risiko pipa distribusi gas bumi di apartemen belum banyak dilaporkan. Berdasarkan fakta tersebut, tujuan dari penelitian ini adalah untuk menganalisis risiko pada pipa distribusi gas bumi di apartemen menggunakan metode event tree analysis. Penelitian ini dilakukan dengan mengidentifikasi risiko dalam skenario kasus kebocoran skala kecil, pelepasan gas berskala besar dan pecah pipa gas, kemudian identifikasi pivotal event, membuat event tree diagram, menentukan event failure dan menghitung probabilitas risiko. Risiko dievaluasi dalam hal kebakaran, korban jiwa dan pelepasan gas.

Hasil dari penelitian ini menunjukkan bahwa risiko tertinggi dalam setiap skenario dapat mengakibatkan kebakaran besar, korban jiwa dan keracunan ringan. Risiko tertinggi dalam skenario kebocoran skala kecil memiliki nilai probabilitas $5,1 \times 10^{-3}$. Dalam skenario pelepasan gas skala besar, risiko terbesar memiliki nilai probabilitas $1,0 \times 10^{-3}$ sedangkan dalam skenario pecah pipa gas memiliki nilai probabilitas $7,7 \times 10^{-4}$. Nilai probabilitas masing-masing risiko menurun karena pemasangan gas detector dan heat/smoke detector di apartemensebagai barrier.

Operational activities on gas pipelines associates with potential hazard and risks that can potentially lead to pipeline failure, including in gas distribution pipeline in an apartment building. However, study on risk analysis of gas distribution pipeline in apartment has not been widely reported. Based on that fact, the purpose of this study is to analyze the risk on gas distribution pipeline in apartment using event tree analysis method. Firstly, identify skenario in case of small-scale leakage, large-scale gas release and gas pipeline rupture, then identify pivotal event, construct event tree diagram, obtain event failure and calculate risk probability. The risk is evaluated in terms of fire, casualties and gas released.

Results of this study show that the highest risk in each skenario which can result fire, severe casualties and light poisoning. The highest risk in small scale skenario has probability value 5.1×10^{-3} . In large-scale gas release skenario, the highest risk has probability value 1.0×10^{-3} . The highest risk in gas pipeline rupture skenario has probability value 7.7×10^{-4} . Probability value of each risk is reduced since the installation of gas detector and heat/smoke detector in an apartment as a barrier.