

ABSTRAK

Pipa merupakan komponen yang banyak digunakan untuk pendistribusian fluida dan banyak dipilih karena banyak jenis, bentuk serta ukurannya. Fluida yang dialirkan menentukan jenis dan bentuk dari instalasi pemipaan serta pendistribusiannya sering menggunakan sambungan pipa (*fittings*), pipa lengkung (*elbow*), maupun *flange*. Penggunaan sambungan akan menimbulkan permasalahan kompleks pada instalasi pipa yaitu rugi-rugi aliran dalam pipa yang berupa rugi-rugi mayor maupun minor. Penelitian dilakukan dengan melakukan pengujian alat rugi-rugi aliran pipa pada pipa lurus jenis PVC, Galvanis, *stainless* dan komponen pipa seperti *elbow*, *reducer*, dan *valve* untuk menghitung terjadinya penurunan tekanan, rugi mayor, dan minor. Pengujian dilakukan dengan mengukur tekanan yang masuk dan keluar menggunakan *pressure gauge* dengan variasi bukaan katup $\frac{1}{3}$, $\frac{2}{3}$ dan $\frac{3}{3}$. Setelah dilakukan pengujian kemudian dihitung untuk mengetahui berapa penurunan tekanan, rugi mayor dan rugi minor. Dihasilkan penurunan tekanan terbesar pipa Galvanized steel 3236 Pa, pipa Stainlees Steel 3138 Pa dan pipa PVC sebesar 2157 Pa. Pada *Elbow* 45⁰ sebesar 981 Pa dan 4903 Pa untuk *Elbow* 90⁰, peningkatan tekanan *reducer* perbesaran penampang yaitu 5884 Pa, penurunan tekanan *reducer* penyempitan mendadak yaitu 2942 Pa, *ball valve* sebesar 2942 Pa, dan *gate valve* sebesar 3432 Pa. Kemudian rugi mayor terbesar pipa Galvanized steel sebesar 0,33 m, pipa Stainlees Steel 0,32 m dan pipa PVC sebesar 0,22 m dan rugi minor terbesar *Elbow* 45⁰ sebesar 0,10 m dan 0,50 m untuk *Elbow* 90⁰, *reducer* (pembesaran mendadak) 0,693 m, *reducer* (penyempitan mendadak) 0,207 m, *Ball Valve* 0,30 m, dan *Gate Valve* 0,35 m.

Kata Kunci: Penurunan tekanan, *major losses*, *minor losses*, pipa

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ANALYSIS OF MAJOR AND MINOR LOSSES OF FLOW LOSSES TEST EQUIPMENTS INSTALLATIONS

ABSTRACT

Pipes are components that are widely used for fluid distribution and are widely chosen because of their many types, shapes and sizes. The flowing fluid determines the type and shape of the piping installation and its distribution, often using fittings, elbows, or flanges. The use of joints will cause complex problems in pipe installation, namely flow losses in the pipe in the form of major and minor losses. The research was carried out by testing pipe flow loss tools on straight pipes of PVC, Galvanized, stainless type and pipe components such as elbows, reducers, and valves to calculate the occurrence of pressure drops, major and minor losses. The test is carried out by measuring the incoming and outgoing pressure using a pressure gauge with variations in valve openings of $\frac{1}{3}$, $\frac{2}{3}$ and $\frac{3}{3}$. After testing, it is then calculated to find out how much the pressure drop, major loss and minor loss are. The biggest pressure drop was 3236 Pa Galvanized steel pipes, 3138 Pa Stainless Steel pipes and 2157 Pa PVC pipes. At Elbow 45° it is 981 Pa and 4903 Pa for Elbow 90° , the increase in cross-sectional enlargement reducer pressure is 5884 Pa, the sudden narrowing reducer pressure drop is 2942 Pa, the ball valve is 2942 Pa, and the gate valve is 3432 Pa. Then the biggest major loss for Galvanized steel pipe is 0,33 m, Stainless Steel pipe is 0,32 m and PVC pipe is 0,22 m and the biggest minor loss for Elbow 45° is 0,10 m and 0,50 m for Elbow 90° , reducer (sudden enlargement) 0,693 m, reducer (sudden narrowing) 0,207 m, Ball Valve 0,30 m, and Gate Valve 0,35 m.

Keywords: Pressure drop, major losses, minor losses, pipes

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