INTISARI

Gempa bumi merupakan salah satu bencana terbesar di Indonesia karena kerusakan yang ditimbulkan, terutama kerusakan pada bangunan *Non-Engineered Buildings* (NEB). Dibutuhkan suatu sistem yang dapat meminimalkan kerusakan tersebut. Rumah Instan Sehat Baja Ringan (RISBARI) merupakan sistem bangunan sebagai perwujudan dalam merealisasikan rekonstruksi bangunan tahan gempa. Sistem bangunan RISBARI secara *engineering* terjamin, namun perlu dikaji lebih lanjut baik studi laboratorium maupun studi analisis dengan tujuan untuk mengetahui level kinerja bangunan terhadap ancaman gempa.

Studi laboratorium dilakukan pada sistem joint dan sistem dinding rangka baja canai dingin *strap-braced* tanpa dan dengan penutup/*sheathing* dari bangunan RISBARI dengan metode pembebanan *lateral quasi-static monotonic*, dan studi analisis dilakukan pada model 3D bangunan RISBARI dengan *Linear Diynamic Procedure* (LDP) dan *Nonlinear Static Procedure* (NSP) terhadap ancaman gempa periode ulang BSE-2N: 2%/50 dan BSE-1N: 10%/50 berdasarkan ASCE/SEI 41-17.

Hasil *uji quasi-static monotonic* dari sistem joint tidak menunjukkan adanya penurunan kekuatan, melainkan terjadi perpindahan lateral yang berlebihan dan tidak dibarengi dengan peningkatan terhadap beban lateral, yang disebabkan oleh *tilting* pada *screw* dan *punching shear* yang terjadi pada daerah pelat sambung *hold-down*. *Fracture* pada material GRC *board* merupakan kegagalan yang terjadi pada dinding rangka baja canai dingin *strap braced* dengan *sheathing*, dan penurunan kekuatan disebabkan *hole bearing* pada daerah sambungan *hold-down* dan *bottom track*. *Tilting* pada *screw* merupakan kegagalan yang terjadi pada dinding rangka baja *canai dingin strap braced* tanpa *sheathing*, dan penurunan kekuatan disebabkan *tear-out* pada elemen *flens* dari bottom *track*. Pemeriksaan kriteria penerimaan komponen bangunan melalui *Linear Dynamic Procedure* (LDP) dan *Nonlinear Static Procedure* (NSP) terhadap gempa periode ulang BSE-1N: 10%/50 memenuhi syarat sebagai level kinerja *Immediate Occupancy* (IO) dan terhadap gempa periode BSE-2N: 2%/50 memenuhi syarat sebagai level kinerja *Damage Control* (DC). *Drift ratio* struktur bangunan berdasarkan nilai *target displacement* pada gempa periode ulang BSE-1N: 10%/50 memenuhi level kinerja *Immediate Occupancy* (IO), dan untuk gempa periode ulang BSE-2N: 2%/50 struktur bangunan memenuhi level kinerja *Damage Control* (DC). Berdasarkan pengecekan kinerja bangunan melalui metode spektrum kapasitas ATC-40 terhadap intesitas gempa BSE-2N :2%/50 dan BSE-1N: 10%/50 bahwa bangunan masih dalam kondisi elastis, dapat dinyatakan bahwa bangunan memiliki kinerja yang baik terhadap intesitas gempa yang diaplikasikan pada bangunan.

Kata kunci: *quasi-static monotonic*; *Linear Dynamic Procedure* (LDP); *Nonlinear Static Procedure* (NSP); level kinerja

ABSTRACT

Earthquake is one of the biggest disasters in Indonesia because of the damage caused, especially damage to Non-Engineered Buildings. A system is needed that can minimize the damage. Rumah Instan Sehat Baja Ringan (RISBARI) is a building system as a realization in realizing earthquake-resistant buildings. The RISBARI building system is assured by engineering, but more research is needed, including laboratory and analytical studies, to determine the level of building performance against seismic risks.

Joint systems and cold-formed steel frame strap-braced wall systems without and with sheathing were studied in the lab using a quasi-static monotonic method, and analytical studies were conducted on the 3D model of the RISBARI building through using Linear Dynamic Procedure (LDP) and Nonlinear Static Procedure (NSP) against the risk of earthquake return period BSE-2N: 2% /50 and BSE-1N: 10% /50 according to ASCE/SEI 41-17.

The quasi-static monotonic at joint system did not demonstrate a reduction in strength in laboratory experiments, however, there is excessive lateral displacement without such a corresponding rise in lateral load, due tilting of the screw and punching shear in the hold-down connection area. The fracture in the GRC board material is a failure that occurs in the cold-formed steel frame wall strap braced with sheathing, and the decrease in strength is caused by hole bearings in the hold-down connection area and bottom track. The tilting of the screw is a failure that occurs in the cold-formed steel frame strap-braced wall without sheating, and the decrease in strength is caused by the tear-out of the flange element of the bottom track. Inspecting of the acceptance criteria for building components through Linear Dynamic Procedure (LDP) and Nonlinear Static Procedure (NSP) against earthquake return period BSE-1N: 10% /50 qualifies as Immediate Occupancy (IO) performance level, and for the earthquake return period BSE-2N: 2% /5 qualifies as a Damage Control (DC) performance level. The drift ratio of the building structure based on target displacement in the earthquake returns period BSE-1N: 10% /50 qualifies the Immediate Occupancy (IO) performance level, and for the earthquake return period BSE-2N: 2%/50 the building structure qualifies the Damage Control (DC) performance level. Based on the results of evaluating the building performance using the capacity spectrum method (ATC-40) for the intensity of earthquakes BSE-2N:2% /50 and BSE-1N: 10% /50 that the building is still in an elastic condition, it can be concluded that the building has a high-performance level against the intensity of the earthquake that is applied to the building.

Keywords: quasi-static monotonic; Linear Dynamic Procedure (LDP); Nonlinear Static Procedure (NSP); performance level