論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Damage Limit States for Infill Walls Subjected to In-Plane Cyclic Loading
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出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第11831号, 授与年月日:2022年3月26日, 学位の種別:課程博士, 審査員:吉敷 祥一,元結 正次郎,河野 進,西村 康志郎,佐藤 大樹
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第11831号, Conferred date:2022/3/26, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

（博士課程）
Doctoral Program

論 文 要 旨

THESIS SUMMARY

系・コース： Department of, Graduate major in	建築学 都市・環境学	系 コース	申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of	（ 工 学 ）
学生氏名： Student's Name	付 翔		指導教員（主）： Academic Supervisor(main)	吉敷 祥一	
			指導教員（副）： Academic Supervisor(sub)		

要旨（英文 800 語程度）
Thesis Summary（approx.800 English Words ）

Wall is a vertical component that is widely used in many types of constructions. According to their functionality, it can be classified as structural or non-structural walls. A typical structural wall is the shear wall, which is often constructed of reinforced concrete or steel plates nowadays. The purpose of structural walls is to resist gravity loads, overturning moments, as well as shear forces. On the other hand, the non-structural wall is usually used to separate a room. For non-structural walls, although their load-bearing capacity is not required, buildings may no longer be functional for entrance or may even need to be demolished as a result of the damage of non-structural components in recent earthquakes, even though the structural components remain intact. Such damage may prove to be a major burden on the economy. Accordingly, the importance of non-structural components in seismic performance is widely recognized by both researchers and practitioners. Light-Gauge-Steel partition (LGS partition) and masonry infilled wall are non-structural interior wall systems that are widely used in the construction market. The present study intends to characterize the in-plane seismic performance of infill walls, with light-gauge steel (LGS) partition drywalls and unreinforced masonry infill walls as research subject. To achieve the objective, a series of experimental tests were conducted by in-plane cyclic loading.

Firstly, Light-Gauge-Steel drywall is an interior non-structural partition system widely used for frame building across the globe. In Japan, this system is featured by the sliding track-stud connection of base frame. To investigate the in-plane seismic performance of a typical LGS partition constructed in accordance with Japanese practice. An experimental was conducted on Light-Gauge-Steel partition drywall (LGS partition). Fifteen LGS partition subassemblies were subjected to in-plane cyclic loading. Base on the test results, the characteristic points of the envelope curve are defined, in order to generate the performance level of the LGS partition. By evaluating the characteristic points, equations for their strength, stiffness, and story drift ratio are proposed. As a result, the prediction results from the equations of drift ratio lay on the safe side. The equations are then adopted to define the damage limit states. Moreover, the observed damage during the test is reported and correlated with the respective damage limit states.

Secondly, the use of masonry infills has been found to be one of the most appropriate solution to meet architectural needs because of the durability, fire resistance and sound insulation provided by the masonry, along with the ease-of-construction and cost-effectiveness. they are generally recognized as vulnerable to seismic activity and have often been observed in field experience after damaging earthquakes. In spite of the widespread recognition of the critical role of specific damage control measures for masonry infills, code procedures for determining whether the elements should be repaired and the design of new buildings contain only a limited number of recommendations for non-structural elements which are widely regarded as inadequate, incomplete or unclear. To investigate the seismic behavior of the structural system, six full-scale Chuandou timber frame subassemblies were subjected to in-plane cyclic loading, four of which were infilled with masonry walls. Base on the test results, the contribution of masonry infill is obtained by an approximate approach. The characteristic points of the envelope curve of masonry infill is defined, in order to generate the performance level of the masonry infill. By evaluating the characteristic points, equations for their strength, stiffness, and story drift ratio are proposed. The equations are then adopted to define the damage limit states. Moreover, the observed damage during the test is reported and correlated with the respective damage limit states.

Although two different construction systems are employed for gypsum board walls and masonry infill walls, they are both filled in the frame structure and both are compressed by the surrounding structural frame when subjected to horizontal loads. In the study of their seismic performance, it should be evaluated from their compression areas. In an LGS wall, the base frame does not contribute much to the lateral force since the studs may slide and its lateral force comes mainly from the compression damage of the gypsum board, which is a relatively uniform construction material, so the focus should only be on its effective compression area. On the other hand, the masonry infill wall is constructed from two materials, mortar and brick, each of which has highly variable material properties, with the complicated frame-panel interaction, making the evaluation of its load-carrying capacity challenging. In this study, its lateral force mainly comes from the weaker mortar of the two building material, while the strength of the brick has a certain contribution to its stiffness, so the failure areas corresponding to the two materials needs to be taken into account when considering the masonry infill wall. Finally, a case study is conducted to compare LGS partition wall and masonry infill wall. It is found that LGS partition is hardly damaged within the design limit, while masonry infill represents high initial stiffness.

備考 ： 論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。
Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).

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