

Analytical Study on Term of Warranty Liability in Window and Door Work Defect in Apartment Building based on Occurred Defect Data

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Abstract: *In Korea, the number of defect disputes in apartments has been increased and is becoming a social and economic issue. In these defect disputes, term of warranty liability is an important legal standard but current standards are unrealistic and lack of solid basis. This research analyzed the tendencies of defects and warranty period of defect focusing on window and door work of the apartments. As a result of analyzing the trend and cumulative rate of defect occurred, the defect occurrence tendency was similar between detailed construction process such as window frame, and door work and metallic material work for the window. But, window glass construction was rather different. In this study, we can know that the term reaching 95% cumulative rate of defect occurred is a year longer than the warranty period of defect in each work.*

Keywords: *defect dispute, term of warranty liability, window and door work, apartment building*

1. Introduction

1.1 Background

In Korea, apartment housing became the most popular housing type as rapid urbanization took place since the 1980s. Especially, in 2010, apartments account for 59% of total housing. [1]. Koreans consider that apartments have superior convenience since they are equipped with various social infrastructures that cannot be found in detached houses. Therefore, many Koreans are living in, and also desire to live in an apartment [2]. Since 2000s, the recognition of Koreans on housing was changed in a great scale and a house was not only considered as a place to live but also as an important asset. Thus, the residents living in an apartment focus on maintaining the apartment more safely and comfortably, while also focusing on increasing the asset value as a real estate [3]. Especially, since the mid-2000s, the number of defect disputes has been rapidly increased, it caused economic negative effect and have become one of serious social problems [4].

In a defect dispute, warranty period of defect is a very important issue. Warranty period of defect can be defined as the period for exercising a right to claim defect repair or as an obligation period for defect repair. Thus, if warranty period of defect is passed, the business entity has the obligation to execute defect repair no longer and the apartment owner loses the right to claim defect repair [5]. However, in early 1980s, the middle of industrialization, when the regulations were first enacted, there was not enough scientific basis on setting warranty period of defect.[6].

Even though there are many types of defect in an apartment by various construction fields, Korean Housing Law defines 18 types of professional constructions fields to classify the defects. Among them, window work is the basic functional element for passage, lighting, and ventilation, which requires diverse functions such as a fire door in preparation for fire hazard, and a screen to prevent harmful insects from coming into the house. There are many types of windows and its shape, size and quality are different

depending on the purpose. There are at least 10 windows per a house and tens of thousands in the whole apartment complex.

Defects in windows occur by various causes such as problems in design and construction or lack of proper maintenance by the residents. The most common defects include unsmooth opening and closing of the window, insufficient insulation property and recently, the lack of fire door performance is becoming the biggest social issue.

In this sense, window construction is important in terms of defect disputes. But as I explained above, the warranty period of defect within the Housing Law was settled without any objective standards and studies and modified randomly for decades. Therefore, basic researches and efforts are required to modify the warranty period of defect properly. Especially, warranty period of defect should be interpreted and utilized in accordance with its original intention and should be modified effectively to minimize the waste and harmful consequences caused by defect disputes.

1.2 Purpose

The purpose of this research is as follows. First, examine the history and current regulations on warranty period of defect regarding apartment window construction. Second, analyze the trends of total defects occurred in window and door work as well as detailed construction-types and define characteristics. Third, seek a rational alternatives on term of warranty liability for window and door work defect.

2. Literature Study

2.1 Definition of Window and Door Work

The window construction according to the Housing Law can be classified into window frame and door construction, window metallic material construction, and window glass construction. A window has various functions such as passage, lighting, ventilation, prevention of sights and air, etc. Therefore, the functional and aesthetic aspects are focused for window constructions an economic aspect should be considered as well since insulation performance is directly linked to energy cost during Summer and Winter. Also, since it is related to the entrance and door locks, a window plays a critical role in crime prevention and fire hazards.

2.2 Term of Warranty Liability of defect

Under current Housing Law, warranty period of defect means the period of exercising the right that an apartment owner can claim defect repair to the business entity. The reasonable warranty period is important in defect disputes because it determines whether a defect dispute can be brought to court or not [4].

2.3 Revised History of Housing Law

The summary of warranty period of defect changing over years is as follows [5]. In 1981, Decree on the Management of Apartment Houses was enacted and 5-years to 10-years warranty period of defect was enacted for structures. In 1982, warranty period of defect was established by construction fields. After that, in 1998, the matters on the warranty period of defect were transferred to the Rules on the Management of Apartment Houses. In 2003, both Decree on the Management of Apartment Houses and the Rules on the Management of Apartment Houses were revoked and related regulations were transferred to the enforcement ordinance and regulations of Housing Law. In 2007, the enforcement ordinance of Housing Law was revised, adding a new construction process, and the warranty period of defect was extended for 1~2 years.

To 1979, warranty period of defect on window work did not exist, only 1-year warranty period of defect for window frame included in carpentry. In 1982, two construction process of independent window construction were regulated, one was window frame, door frame and door construction and the other was window metallic material construction. In 2007, the enforcement ordinance of Housing Law changed the characteristics of defect repair period to the warranty period of defect. Previous two categories had 2-years term of warranty liability and the window glass construction with 1-year warranty period was added.

2.4 Problem of Housing Law

For 40-years history of regulation change, there was no reasonable basis for setting and revision of regulations on window construction defect repair period or term of warranty liability. Also, among the items considered as the same facility construction, there was difference in the performance and price, while the defect repair period or term of warranty liability were set equivocally despite of the difference. For example, a plate glass that is inexpensive with lower insulation performance has the same defect repair period or warranty period of defect with an expensive and high-performance low-E glass. Under these regulations, the consumer's right who paid high price expecting for superior performance cannot be protected and also the efforts of business owners who pursuit differentiation based on superior quality can become useless.

3. Scope and Method

3.1 Scope

The warranty period of defect under current Housing Law is applied to the whole house but actually, the major party in defect disputes is the apartment. Therefore, the research range was limited to window and door construction of apartment.

3.2 Method and Flow

The research method and process are as follows. First, the defects occurred in actual apartment were studied and the number and rate of defects occurred every year were analyzed. Second, the occurrence rate and cumulative rate of defect occurred were calculated by each year until the 10th year, which is the range of term of warranty liability. Third, the point reaching 95% cumulative rate of defect occurred was identified. Fourth, it was compared to the current term of warranty liability in the Housing Law.

4. Case Study

4.1 Outline of Defect Case

The relationship between defects and the term of warranty liability occurred in window construction were reviewed for 177 apartment complex and 125,816 houses constructed during 2002~2011. Total of 1,449,745 defects were occurred in the examined apartments. In terms of defect frequency, defects on finish work were accounted for 42%, defects on water supply, drainage, and sanitary arrangement work accounted for 14% and defect on window and door work accounted for 12% (Fig. 1). The defects occurred by detailed classification of window work are as follows (Fig. 1). The defects occurred on window frame and door work were accounted for 79%, metallic material work for window and door accounted for 13% and glass work for window and door accounted for 8%.

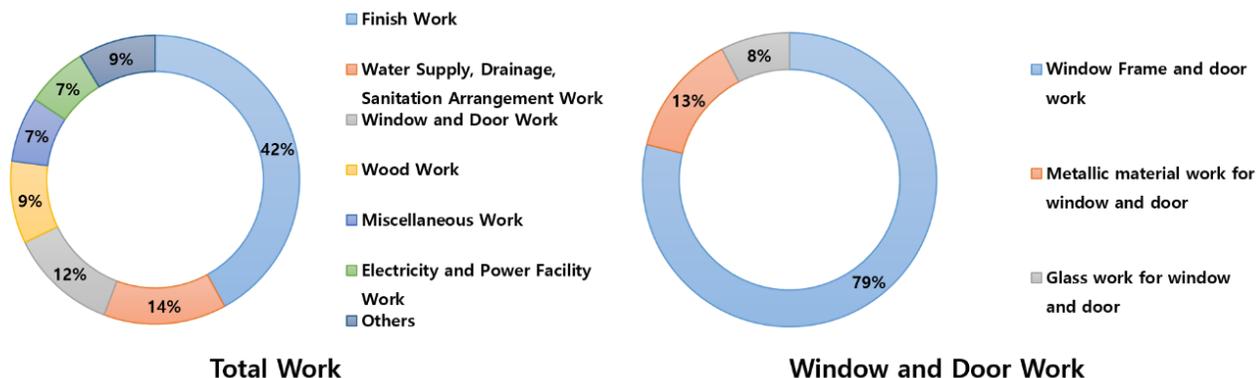


Fig. 1: Current Status of Defect

4.2 Analysis on Occurrence Trend

In the chapter, the occurrence trend by each year and cumulative rate tendency were examined on the total number of defects occurred in window construction. And the period reaching 95% cumulative rate of defect occurred was compared with the warranty period of defect in current regulation to review its propriety.

4.2.1 Occurrence Trend of Total Defect

The occurrence trend of total defects was as follows (Fig. 2). The defects occurred the most during the 1st year and the number is drastically decreased from the 2nd year. Especially, the number of accumulated defect occurrence until the 3rd year accounts for 97.9% of the total defects. It is verified that defect occurrence of window construction is concentrated on the early period of warranty period of defect.

As the warranty period of defect in terms of detailed construction types defined by current Housing Law is different from 1~2 years, it is difficult to compare the term of warranty liability of total window construction defects. However, since window frame and window metallic material construction with two years term of warranty liability account for 92% of total defects, the overall term of warranty liability can be regarded as 2-years. Therefore, when comparing the two standards above, the warranty period of defect for window construction was 2 years but the point reaching 95% cumulative rate of defect occurred is 3 years, which showed 1 year difference.

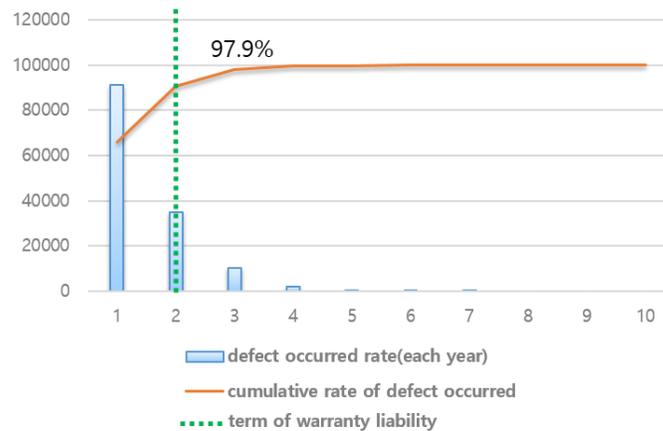


Fig. 2: Occurrence Trend of Total Defect

4.2.2 Window Frame and Door Work Defect

The window frame and door construction accounting for 79% of the total window construction defect had similar tendencies of the overall window construction (Fig. 3). Based on the cumulative rate of defect occurred, the accumulated defects occurred by the 3rd year accounted for 98.2% of total defects while current term of warranty liability is 2 years, which also showed 1 year difference.

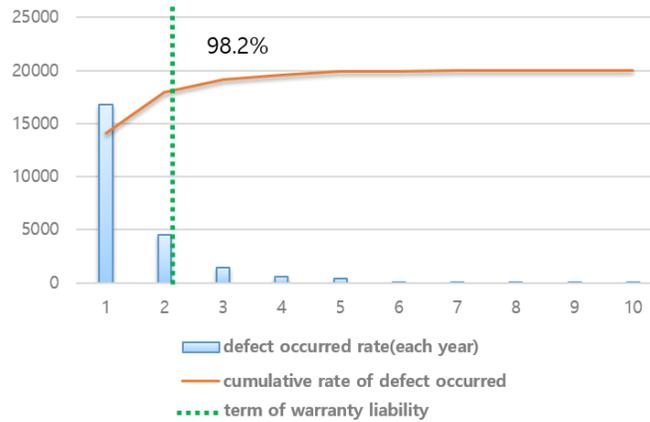


Fig. 3: Window Frame and Door Work Defect

4.2.3 Metallic Material Work Defect for Window and Door

Next is the window metallic material construction that accounts for 13% of window construction defects and it showed similar tendencies of the overall window construction (Fig. 4). Based on the cumulative rate of defect occurred, the accumulated defects occurred by the 3rd year accounted for 95.6% of total defects while current term of warranty liability is 2 years, which also showed 1 year difference.

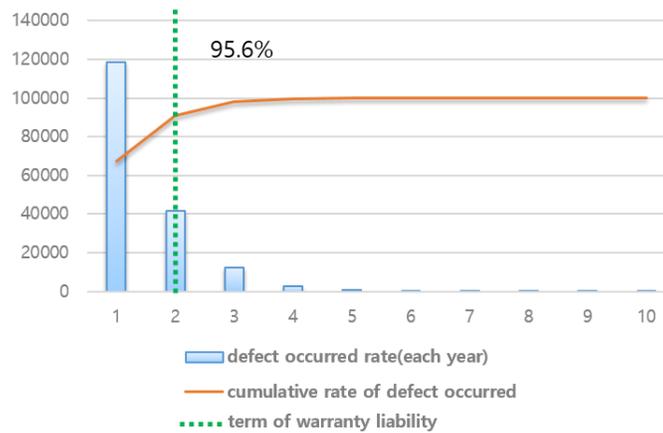


Fig. 4: Metallic Material Work Defect for Window and Door

4.2.4 Glass Work Defect for Window and Door

Lastly, the window glass work had rather different tendencies compared to other window constructions (Fig. 5). The number of defects occurred during the 1st year was the highest and accumulated defects occurred by the 2nd year accounted for 95.2% of total defects. Since the current term of warranty liability is 1 year, the difference between the cumulative rate of defect occurred was 1 year.

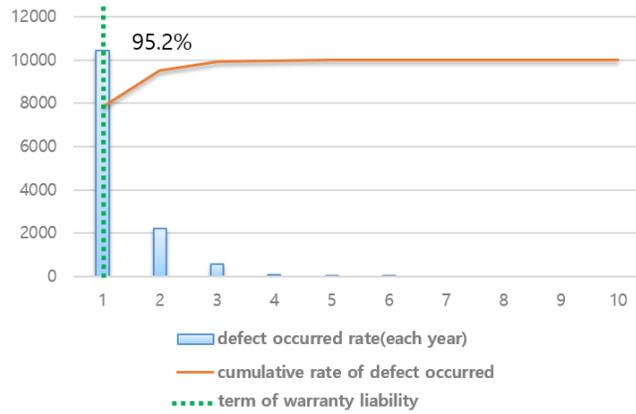


Fig. 5: Glass Work Defect for Window and Door

4.3 Results

The results of comparing the point reaching 95% cumulative rate of defect occurred and current term of warranty liability by detailed window construction process are as follows. First, the point reaching 95% cumulative rate of defect occurred was confirmed to be 3 years. However, there is no term of warranty liability set by the total window construction and the term is different at 1~2 years by the construction types. Assuming that term of warranty liability for window construction is 2 years, the difference with the point reaching 95% cumulative rate of defect occurred is 1 year. Second, point reaching 95% cumulative rate of defect occurred for window frame and door and window metallic material construction was 3 years, while the term of warranty liability was 2 years, showing 1 year difference. Third, point reaching 95% cumulative rate of defect occurred for window glass construction was 2 years, while the term of warranty liability was 1 year, showing 1 year difference. The results are organized in the Table 1.

TABLE I: Difference between Term of Warranty Liability and Term of Cumulative Rate 95%

Detailed Work	Term of Warranty Liability (A)	Cumulative Occurrence (95%) (B)	Difference (A-B)
Total Defect of Window and Door Work	2 years	3 years	1 years
Window Frame and Door Work Defect	2 years	3 years	1 years
Metallic Material Work Defect for Window and Door	2 years	3 years	1 years

4.4 Discussion

The results above have following implications. As a result of comparing the point reaching 95% cumulative rate of defect occurred and the term of warranty liability, defect occurrence was rather slower than the term of warranty liability. Therefore, it is required to properly adjust the term of warranty liability. But to revise warranty period of defect, more detailed standards should be prepared. In order to define warranty period of defect on window work and door work in the future, experimental researches considering the characteristics of each construction process should be followed.

5. Conclusion

In Korea, the defect disputes in apartments are becoming social issue. And in these defect disputes, warranty period of defect is an important legal standard and also the key issue point. However, the current warranty period of defect is unrealistic and lack solid basis for regulations, and improvement in the legal system is required.

This research intends to identify the issues of current standards and prepare for reasonable basis to supplement the issues. The research scope was focused on window and door construction of apartments and defect occurrence tendencies and the term of warranty liability were compared and analyzed. The summary of study results is as follows. First, as a result of comparing the tendencies of defect occurrence by the years and 95% cumulative rate of defect occurred of window and door constructions in apartments, the defect period of 95% cumulative rate of defect occurred was 3 years for both window frame and door construction and window metallic material construction. Also, it was 2 years for window glass construction, which was shorter than other work process. Second, the point reaching 95% cumulative rate of defect occurred and term of warranty liability in current Housing Law is different in each work process. Third, in general, the point reaching 95% cumulative rate of defect occurred was 1 year longer than the warranty period of defect on current regulation. Therefore, it is required to properly adjust the term of warranty liability. However, there was some deviations by the construction fields thus it is not recommended to prejudge based on the results of this study. More extensive collection of data and analysis are required in the future.

6. Acknowledgements

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7. References

- [1] J. Park and D. Seo “Basic Study on Standard Process Model for Defect Consulting in Korea,” presented at International Workshops Material, Architecture and Civil Engineering, Jeju, Korea, June, 2014.
- [2] J. Park and D. Seo “Basic Study on Influence Factors for Defect Repairing Cost of Apartment Building in Korea,” presented at International Conference on Applied Mathematics and Mechanics, Bangkok, Thailand, October, 2016.
- [3] J. Park and D. Seo “Basic Study on Term of Warranty Liability for Window and Door Work Defect in Apartment Building,” presented at International Conference on Research & Innovation in Environment, Civil and Architecture Engineering, Bangkok, Thailand, 2017.
- [4] J. Park and D. Seo “Analytic Study on Term of Warranty Liability for Roofing and Waterproofing Work Defect in Apartment Building based on Performance Data,” presented at 2017 International Conference on East Asian Architecture and City, Jeju, Korea, 2017.
- [5] J. Park and D. Seo “Suggestion on Estimating Rate for Defect Repairing Deposit through Case Study of Defect Lawsuit in Korean Apartment Building,” presented at International Conference on Nanotechnology, Environmental and Civil Engineering, Bangkok, Thailand, 2016.
- [6] J. Park and D. Seo “Basic Study on Term of Warranty Liability for Finish Work Defect in Apartment Building,” in Proc. International Journal of Research in Chemical, Metallurgical and Civil Engineering, 2017, pp. 58-63.