

Achieves 2-hour fire resistance
with Steel and Non-combustible Wood combination

“NS SHUGOSHIN* 120”

for the New Wooden High-rise Buildings

* “Shugoshin” is the naming of double meanings in Japanese “Guardian Deity” and “Guarding Cores”



CG creation by Nikken Sekkei, Copyright owned by Nippon Steel Engineering

What is “NS SHUGOSHIN 120” ?

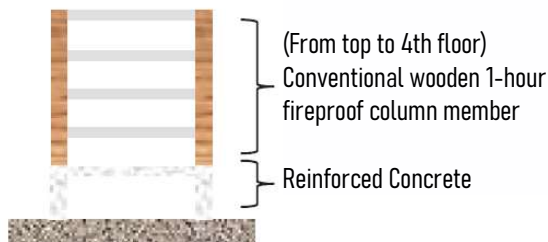
It's a brand new Fireproof Wood material created by the collaboration of Nippon Steel Engineering, ASANO FUNEN, Nikken Sekkei, and Kobayashi-Maki Design Workshop.

Application for buildings

- Used as a column of steel-framed construction and finished with non-combustible wood to give it a presence
- By adopting it on the face of buildings such as entrance halls and showrooms, and creates an impressive space.
- Adopted in places with strict fire resistance requirements, and can achieve both fire resistance and design.

“2 hour Fireproof” performance of Steel +Non-combustible Wood

- 1) According to the ISO heating curve, it should be allowed to cool after heating for 2 hours and extinguished after 24 hours.
- 2) Being able to support a vertical load at all times below the specified shrinkage amount and shrinkage rate



(Case of 1 Hour Fireproof members)



(Case of 2 Hour Fireproof members)

Construction of Steel + Non-combustible Wood Column

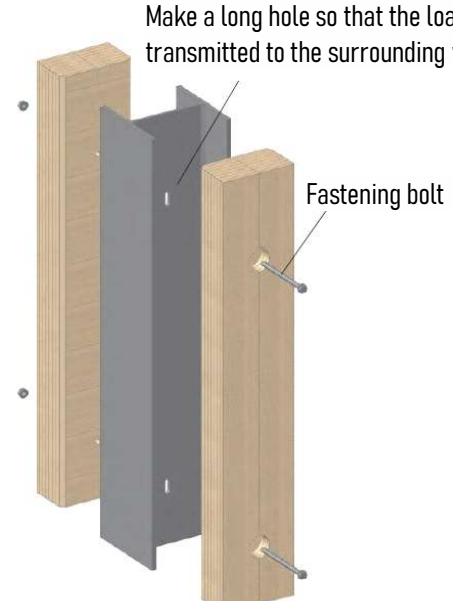
Load-bearing material (H-shaped steel)

Non-combustible wood (chemically treated cedar LVL)

(Notice)
Make a long hole so that the load is not transmitted to the surrounding wood



Look from (A) Cut line



Assembly drawing

Obtaining 2-hour fire resistance certification makes it easier to apply wood to buildings with 5 floors or more.

● KEY FEATURES

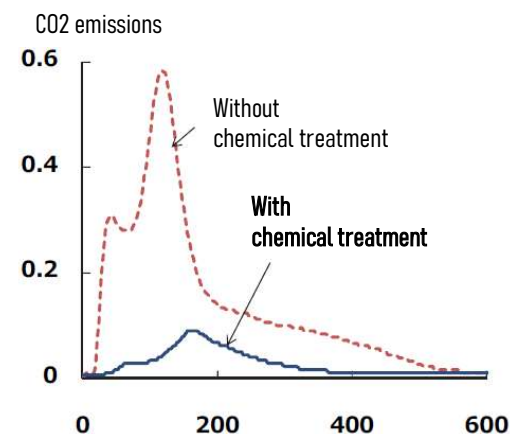
1 Structural designing as a “Steel Structure” is possible

- The steel frame that supports the load can be used in a wide range of sizes from <H300x300x10x15> to <H498x432x45x70>.
- Compared to the conventional wood-based column material, the entire column has a smart cross section by incorporating H-shaped steel and supporting the load.
- The joint with the beam can be handled with the conventional steel frame joint.
(A separate fireproof coating is required)

2 Use of non-combustible wood (LVL) treated with boron-based chemicals

(Laminated Veneer Lumber)

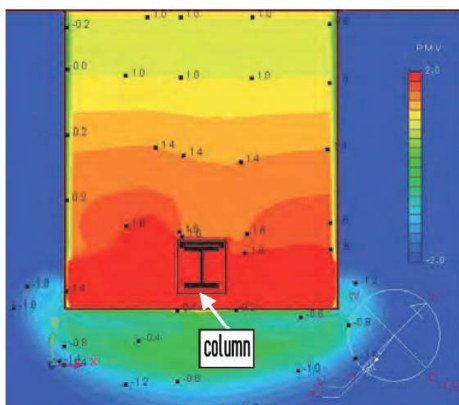
- Our unique “Cell-Funen” technology that utilizes the effects of boric acid and borax suppresses the burning reaction of wood in the event of a fire.
- Since the generation of smoke and harmful gas is suppressed, it is easy to secure an evacuation route and protect human life and property.
- Contributes to promoting demand for domestic timber by using domestic cedar LVL



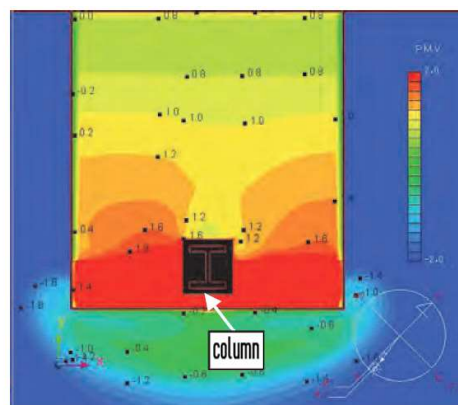
3 Improvement of indoor thermal environment

The heat insulating effect of non-combustible wood mitigates the effects of sunlight and outside air on the indoor thermal environment and improves the dissatisfaction rate for the heat and cold that humans perceive.

Assuming the office space of a building, we analyzed the thermal environment around the windows with "steel columns + non-combustible wood" and "steel columns + conventional fireproof coating" cases.



steel column + conventional fireproof coating



steel column + non-combustible wood

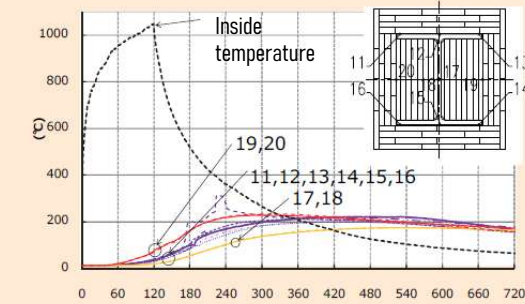
Outline and Results of Fire Resistance Test

●TEST:

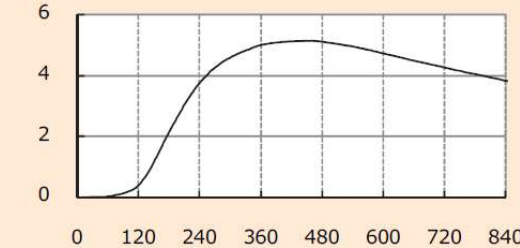
2 hour Loading & Heating test was conducted assuming a column in the lower part of a 10-story building.



BEFORE THE TEST



1) Temperature changes in the furnace and specimen



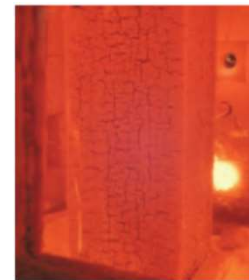
2) Contraction change



AFTER THE TEST
(24 hours later)

1) After the test, there was no embers on the non-combustible wood and it was confirmed that the interior was undamaged and completely stopped burning.

2) It was confirmed that the contraction amount and contraction speed of the steel column were below the specified values.



Heating in the furnace



24 hours later

●PUBLIC EVALUATION:



On July 4, 2013, Nippon Steel Engineering and ASANO FUNEN jointly obtained the certification of the Minister of Land, Infrastructure, Transport and Tourism in Japan.



NIPPON STEEL ENGINEERING
Building and Steel Structure Division