KEYTEC VISION

KEYTEC PRODUCTS GUIDE No. 06

60th

“CIRCLE”

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Progressively Widening “Circle” Beyond The 60th Anniversary

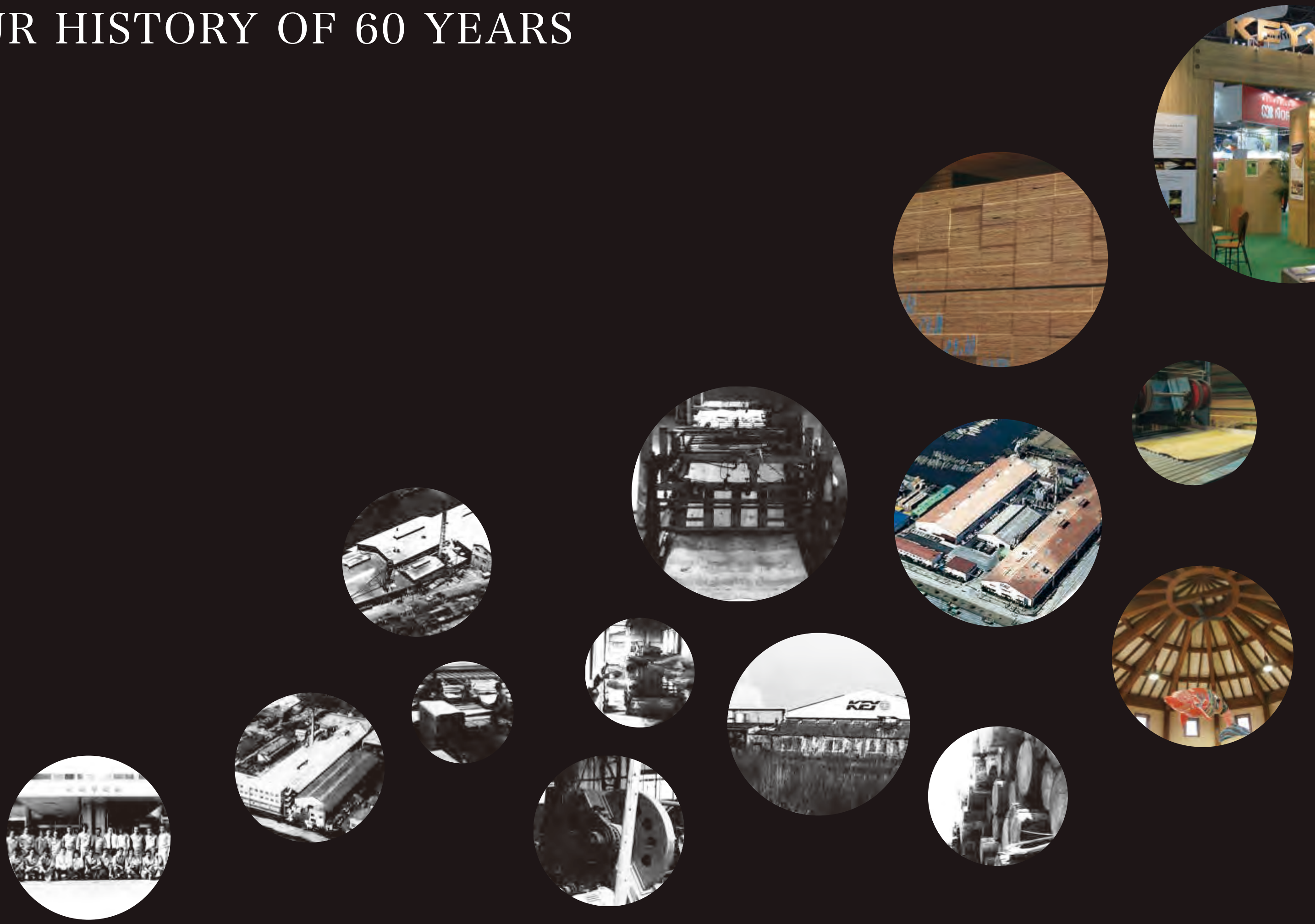
KEYTEC Celebrated The 60th Anniversary In April 2018.

Our history started from the manufacturing of plywood from natural logs imported from the Southeast Asian countries. Afterwards we had a turning point when we started the manufacturing of laminated veneer lumber (abbr.: LVL, trade name: KEYLAM®), for the first time in Japan, which had become one of our key products and with which we developed various composite building materials. We have been challenging various innovations, including the installation of wood processing and remanufacturing machinery for processing and remanufacturing large dimension LVL.

Recently, environment surrounding the timber and plywood industries has been radically changing. Our company is no exception; the manufacturing of plywood from Southeast Asian wood species was shifted from our own manufacturing in Japan to OEM (Original Equipment Manufacturer) at the local factories in Southeast Asia, and we are gradually shifting to the use of sustainable and recyclable resources of planted trees. Also now, we are actively working so that all of the raw materials for manufacturing plywood and scaffold planks and about 50% for manufacturing LVL are from domestic forests. Moreover, we are promoting the “local production for local consumption” and utilizing LVL of domestic wood for the construction of various buildings and houses in the local region, resulting in trust in and satisfaction with our service.

KEYTEC never stops growing. From now on, we will surely extend our “CIRCLE” by adding annual rings one by one around it, and based on our pioneer spirit which has been cultivated over the years, we are certain that we can continue manufacturing expertise contributing to the local community and extending well into the future.

OUR HISTORY OF 60 YEARS

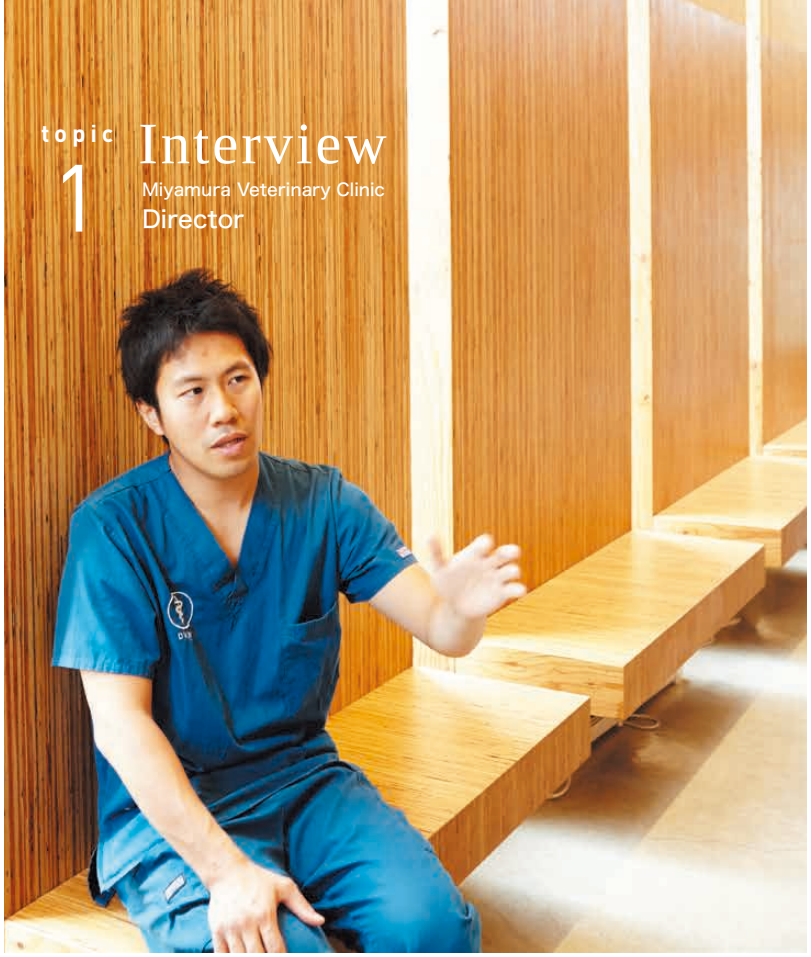


- **1958** April — Construction of plywood factory in Ariake, Koto-ku, Tokyo and establishment of Harumi Plywood Co., Ltd.
- **1963** April — Construction of plywood factory in Osone, Yashio-shi, Saitama, and establishment of Yashio Plywood Co., Ltd.
- **1981** March — Construction of Kisarazu Factory in Mokuzai-minato, Kisarazu-shi, Chiba.
- **1985** October — Merger between Harumi Plywood Co., Ltd. and Yashio Plywood Co., Ltd. and the company name was changed to Keyo Co., Ltd.
- **1991** March — Construction of LVL Factory No. 1 in Mokuzai-minato, Kisarazu-shi, Chiba.
- **1997** April — The company name changed to KEYTEC CO., LTD. and its headquarters moved to Kiba Park Bldg. in Kiba, Koto-ku, Tokyo.
- **1998** November — Construction of LVL Factory No.2 in Mokuzai-minato, Kisarazu-shi, Chiba.
- **2001** May — Housing Performance Type Approval given to "KEEL METHOD".
- **2003** December — (ISO 9001) certification obtained.
- **2004** March — Acquisition of stocks of Nihon Paneform Co., Ltd.

60th

- **2005 April** — Affiliated company JK Industry Co., Ltd. started operation.
- **2005 November** — Integration of Nihon Paneform Co., Ltd. Kisarazu Office, and changed its name to Kisarazu Remanufacturing Factory.
- **2006 February** — Acquisition of stocks of Akita Glulam Co., Ltd.
- **2006 June** — CoC (Chain of Custody) certification obtained.
- **2007 October** — Headquarters moved to Wood Land Tower 8F in Shinkiba, Koto-ku, Tokyo.
- **2008 April** — KEYBOARD Co., Ltd. established.
- **2013 April** — JK Industry Co., Ltd. merged.
- **2014 April** — Construction of LVL Remanufacturing Factory in Mokuzai-minato, Kisarazu-shi, Chiba.
- **2018 April** — The 60th anniversary of KEYTEC's foundation.

Mastering The Property Of “WOOD”



This booklet is a product catalog of KEYTEC as well as a journal with contents of interviews with various people.
This booklet is edited and published in order to share the vision of what KEYTEC is thinking of and is aiming at. We hope to be able to introduce our products and convey the concepts conceived within.

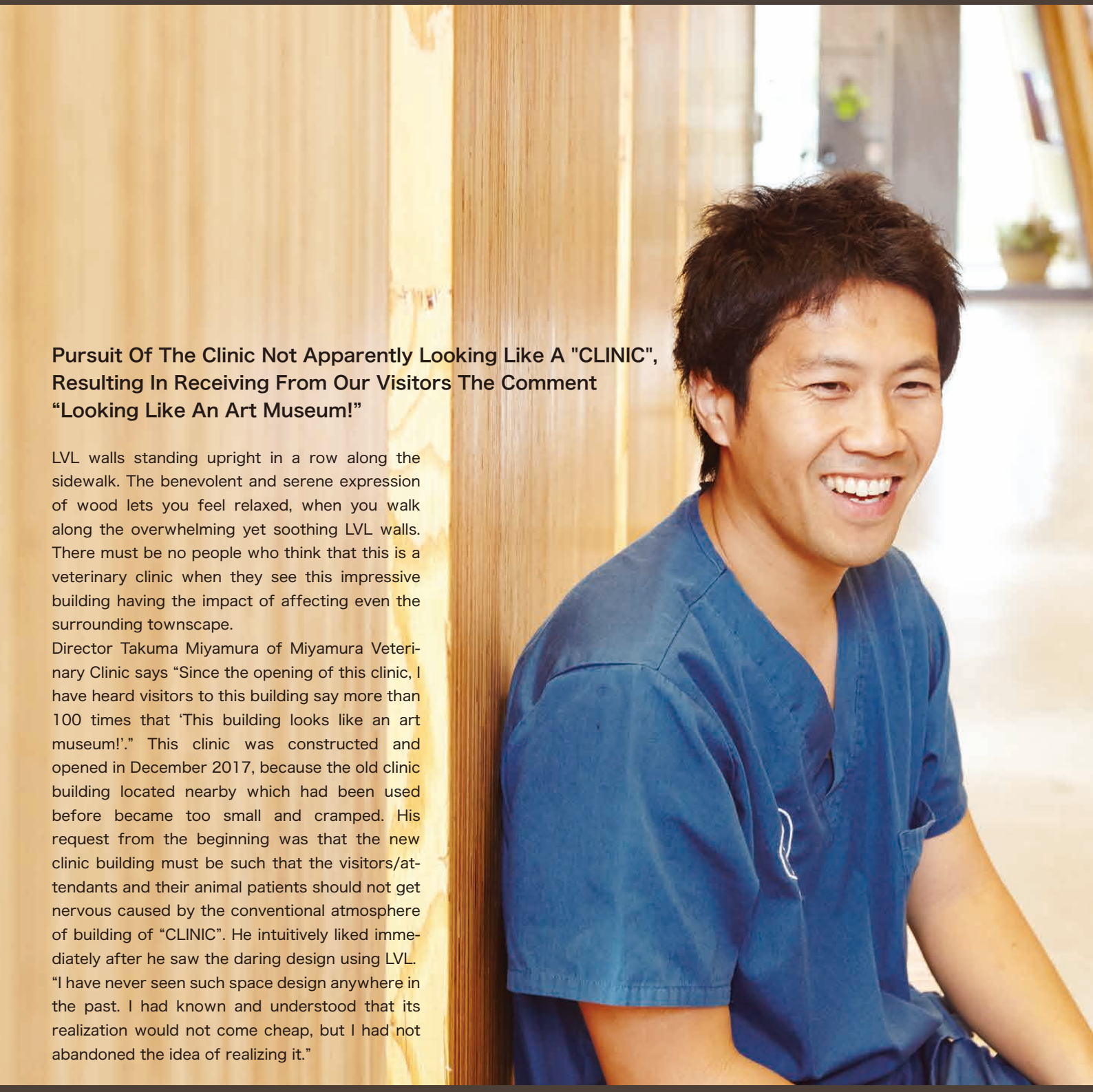
Contents

topic 1

Interview

Miyamura Veterinary Clinic Director

As If It Were An Art Museum! Shaking Our Veterinary Clinic Free From The Conventional Image Of “CLINIC”.



Pursuit Of The Clinic Not Apparently Looking Like A "CLINIC", Resulting In Receiving From Our Visitors The Comment “Looking Like An Art Museum!”

LVL walls standing upright in a row along the sidewalk. The benevolent and serene expression of wood lets you feel relaxed, when you walk along the overwhelming yet soothing LVL walls. There must be no people who think that this is a veterinary clinic when they see this impressive building having the impact of affecting even the surrounding townscape.

Director Takuma Miyamura of Miyamura Veterinary Clinic says “Since the opening of this clinic, I have heard visitors to this building say more than 100 times that ‘This building looks like an art museum!’.” This clinic was constructed and opened in December 2017, because the old clinic building located nearby which had been used before became too small and cramped. His request from the beginning was that the new clinic building must be such that the visitors/attendants and their animal patients should not get nervous caused by the conventional atmosphere of building of “CLINIC”. He intuitively liked immediately after he saw the daring design using LVL.

“I have never seen such space design anywhere in the past. I had known and understood that its realization would not come cheap, but I had not abandoned the idea of realizing it.”

Director
of Miyamura Veterinary Clinic
Takuma Miyamura

Graduated from School of Veterinary Nursing and Technology (presently named as, Nippon Veterinary and Life Science University); worked at three veterinary hospitals in Tokyo; opened his first private veterinary clinic on December 14, 2009.
Opened the second private veterinary clinic on December 14, 2015.

Conclusion; The Best For Visitors/Attendants, Animal Patients And Clinic Staffs Make A Good Future of The Clinic.

Behind the door of the consultation room, it suddenly becomes a place of medical practice where a life of animal is in question. Top priority should be given to the functionality of space of the place, but an effort to take visitors'/attendants' and animal patients' feelings into consideration is not forgotten. We dared to use a pane of glass for the partition wall between the consultation room and the treatment room. The Director says, "The owner or attendant of the animal patient feels uneasy if she or he cannot see what is being done in the treatment room. Also, we staffs working in the next room can keep our consciousness high if we are being watched through the glass partition wall." On the other hand, the staff room has an atmosphere of resort villa securing mental and physical comfort. Diversified architectural spaces composed with sudden slow and rapid changes make the staff maintain a high level of motivation.
He continues, "When I was a hospital veterinarian, I could see many symptoms at the busy hospital. Then, I started private practice 7 years ago. Professional skill is important, of course, but in addition to that I consider human nature very important when I employ a staff. This is because of the fact that professional skill can be improved through practical experience." After this clinic was opened, the number of the staff of veterinarians increased to 7, making highly demanding medical practice possible. There has been a 30% increase in the number of visitors/attendants and animal patients since the opening of this clinic. The young and vigorous director may be good at a design for the future.

topic 2

Interview

Miyamura Veterinary Clinic Architect × Structural Engineer × Constructor

All Were Groping Efforts, For Pioneering The New Possibilities Of LVL.

Consultation room
Space with priority given to functionality

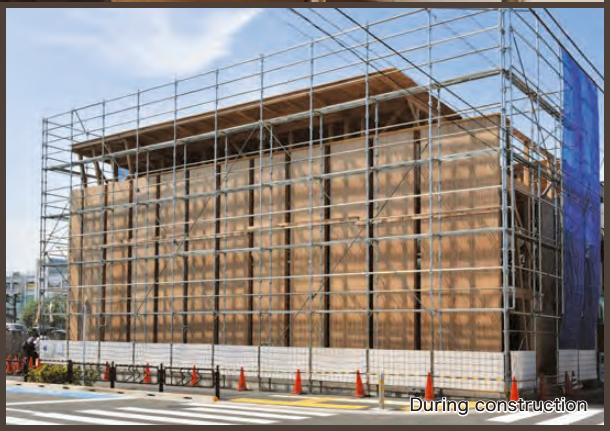
Looking from the waiting room
toward the door of consultation room

View from the southwest

The Architecture Which Cast A New Attractiveness Into Urban Landscape Was Created By Trial And Error In The Trinity.

The “Laminated Wood Wall”, which gives the first impression of the building of Miyamura Veterinary Clinic, has such expression that has never been seen before and that fascinates us greatly. This wood wall construction with quasi-fireproof property was developed as a result of hard work with concentrated challenge spirit by professionals for extending the possibility of timber buildings in urban areas.

Constructor
Kurashi Koubou Daiwa Co., Ltd. / President
Haruyuki Suzuki



During construction

—Please let us know the development of design works.

Architect Nishizawa : To begin with, the narrow strip of land having a width of 6.3 m was divided into three parts and each part 2.1m wide was allocated to a waiting room, a consultation room and a treatment room. Next, in consideration of the fact that required floor areas increase gradually for upper floors and of the north side slant line regulation, the open ceiling trapezoidal space of hall was created. In addition, due to the special conditions required for a veterinary clinic such as keeping out the heat and the prevention of animals from running away, the ratio of the widths of the window and the wall, etc. were determined. In the beginning, the whole building was designed to be of LVL construction, but in consideration of rationality, we concluded to combine the LVL construction with the conventional post and beam construction.

Architect Yamashiro : We have verified and shown clearly that the “Laminated Wood Wall” having the functions of “Structural”, “Finishing” and “Fireproofing” at the same time could be utilized in a relatively small thickness of the wall.

—For the realization, were there any newly-tried and worked-outs points?

Structural Engineer Sato : The characteristic of LVL is, for good or bad, “STRONG”. In the modern structural analysis, the high toughness of structure is required and it was necessary to give special considerations to various matters such as metal connectors used for joint connecting. For the future of the “Laminated Wood Wall”, we have verified its structural property which is strong enough against an earthquake of an upper 6 scale on the seven-point Japanese seismic scale. Also, the ground was soft and the crushed-stone piling method, which is highly effective against soil liquefaction, was used in the ground and foundation works. The piles are not regarded as “buried structure” and are advantageous for re-construction and the sales of land.

Constructor Suzuki : During the site construction work phase, we had difficulties as there were no past examples of any actual works of this kind. The structure is basically of timber framed post and beam construction, but the process of erection works of the structural frames is similar to that of steel frame construction, requiring high degree of construction accuracy. However, unlike the common and conventional timber construction, it is not possible to make fine adjustment once the framework is erected. At the construction site, there was distrust in the new material of LVL with which we had a very short and limited experience. Because of that, we, together with the framers (steeplejacks), went to the LVL Factory to have a factory tour. After the tour, we all felt that “Oh, we gotta problem!” (laughing). Then, we repeatedly made studies and did image training of how to erect, and checked how many days are required for erection, etc. In the night, when the scaffoldings were all removed at the work site, the workmen had their breath taken away by the view of the whole structure. After all, there was no person who could not or did not say “Very Good!” at the end of construction.

Proceed With The Construction Of Actual Project Examples Of The Products By Taking Advantage Of Their Fate Of "Heterogeneity" As Wood Materials.

—Any problems in promoting "Timber Buildings in Urban Areas"?

Constructor Suzuki : For example, when we wish to construct timber framed public buildings in urban areas, the process of ordering the project is commonly based on that of RC or steel framed buildings. This becomes a bottleneck. We hope that, in conformity with the process of construction of timber framed buildings, a firm order to proceed with the project of timber framed building can be placed before the design work is completed.

Architect Nishizawa : Properly speaking, an HVAC system engineer, a structural engineer, an architectural design engineer and a constructor must gather and discuss at the same table. If we exchange our ideas and views at the design phase, we should be able to solve coming problems in advance. By increasing the number of example or reference projects, we wish to lower and remove barriers.

—The reasons why you are attracted by "WOOD" and "Timber Buildings in Urban Areas"?

Structural Engineer Sato : The substance of LVL is "Living Creature". It changes its form by shrinking and swelling, hence it cannot fit into "Complete or Perfect Engineering". My unfailing interest is in compensating that disadvantage with sensation and experience.

Architect Yamashiro : In the past, I regarded LVL as a building material which should be similar to the homogeneous material of concrete, thereby making it possible for me to express "LVL Uchihanashi" or "Fair-faced LVL without Surface Treatment". However, I was beginning to understand that by specifying the building material with the commonly used word "TIMBER", you will face a wide variety of usages and species, etc. of "TIMBER", each of which having its own aesthetic value. When we understand the complexity, which is unique to wood based materials and cannot be analyzed with one fundamental rule, and gather to discuss, we can sincerely face "SUBSTANCE" of the material. This is very creative.

buildingLandscape, ltd,
first-class licensed architect office
Satoru Yamashiro

Born 1969 in Shimane.
Graduated from Department of Architecture, Faculty of Engineering, The University of Tokyo; Completed the Master's degree course at Department of Architecture, Graduate School of Engineering, The University of Tokyo in 1995.
1995 ~ 2002 After working at the office of Maki and Associates - Architecture and Planning, established as a co-founder, buildingLandscape, ltd, first-class licensed architect office.
2002 ~ 2009 Research Associate and later Assistant Professor at Department of Architecture, Graduate School of Engineering, The University of Tokyo Presently, Visiting Professor at School of Architecture and Fine Art, Dalian University of Technology; Part-time Lecturer at Japan women's University, Tokyo. University of Science, and Tokyo Denki University.

buildingLandscape, ltd,
first-class licensed architect office
Takao Nishizawa

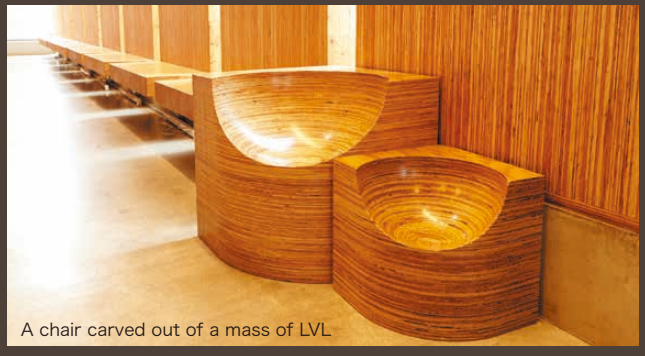
Born 1971 in Tokyo.
Graduated from Department of Architecture, Faculty of Engineering, Yokohama National University in 1993; Completed the Master's degree course at Department of Architecture, Graduate School of Engineering Science, Yokohama National University 1995.
1994 ~ Jointly founded the media art unit, Responsive Environment.
1995 ~ 1998 After working at the office of Itsuko Hasegawa Atelier, jointly founded buildingLandscape, ltd, first-class licensed architect office.
2007 ~ 2012 Associate Professor at Product Design Department, Tohoku University of Art and Design.
2012 ~ Associate Professor at Architecture and Environment Design Department, Tohoku University of Art and Design.

Team Sakura (Group of designers and engineers)
first-class Registered Architect
Takahiro Sato

Born 1975 in Hokkaido.
2000 Completed the course at Graduate School of Architecture, Kogakuin University.
Working as Member of Structural Design Group (SDG) and as Assistant at Koshihara Laboratory, Institute of Industrial Science, The University of Tokyo, and from 2010 to the present, Member of Team Sakura. Director at team Timberize (NPO).
Main structural design works:
Seismic Retrofitting of Yawatahama-shi Hizuchi Elementary School.
Apartment Building in Shimouma.
New Building of Kochi Prefectural Autonomous Hall, etc.

Kurashi Koubou Daiwa Co., Ltd.
President
Haruyuki Suzuki

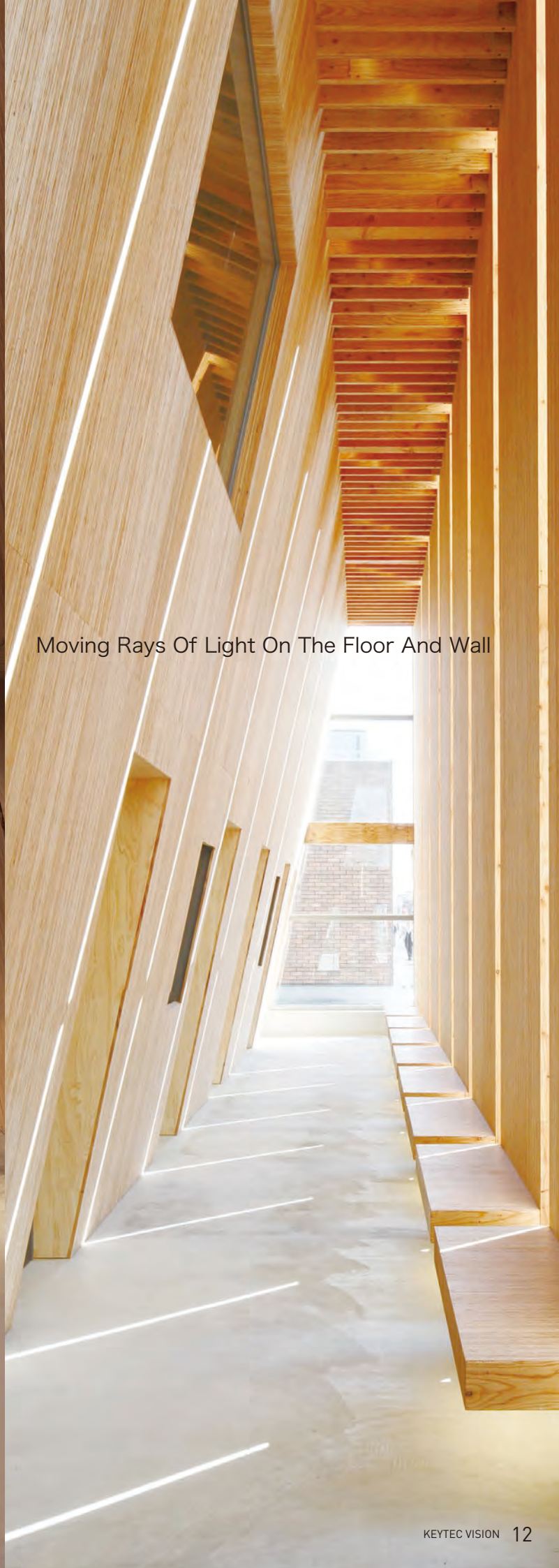
Born 1967 in Yokohama.
1989 Graduated from Faculty of Social Sciences, Hosei University. Worked at Daiwa Koumuten Co., Ltd. and at the same time studied at the night course of architecture at Chuo College of Technology. Became First-class Licensed Architect in 1996. Became the President of Daiwa Komuten Co., Ltd. in 2007. Daiwa Koumuten Co., Ltd. is a 160 years old long-established company specialized in the field of construction of high performing and long lasting houses incorporating the high heat-insulating and highly airtight housing system. In recent years, they are putting effort into the construction of large and medium size timber framed apartment houses and non-residential buildings. Left Daiwa Koumuten Co., Ltd. to establish and become the President of Kurashi Koubou Daiwa Co., Ltd. in 2017.



A chair carved out of a mass of LVL

Staff room
Extending the bearing surface of sofa to transform to a bed

Soft Glows Of Light Gathering In The Hall



Moving Rays Of Light On The Floor And Wall

topic
3

Local Report
Kawakami Village

The Future Created With “WOOD”. Building The Village With Local “WOOD”.


Kawakami Nursery School


Kawakami Nursery School


Kawakami Nursery School


Forestry Research Center


Kawakami Nursery School


Forestry Research Center

Throughout The Three Generations, The Villagers Living Near And Having Close Relationship With The Forest Appreciate And Show By Themselves The Value Of Locally Grown Japanese Larch.

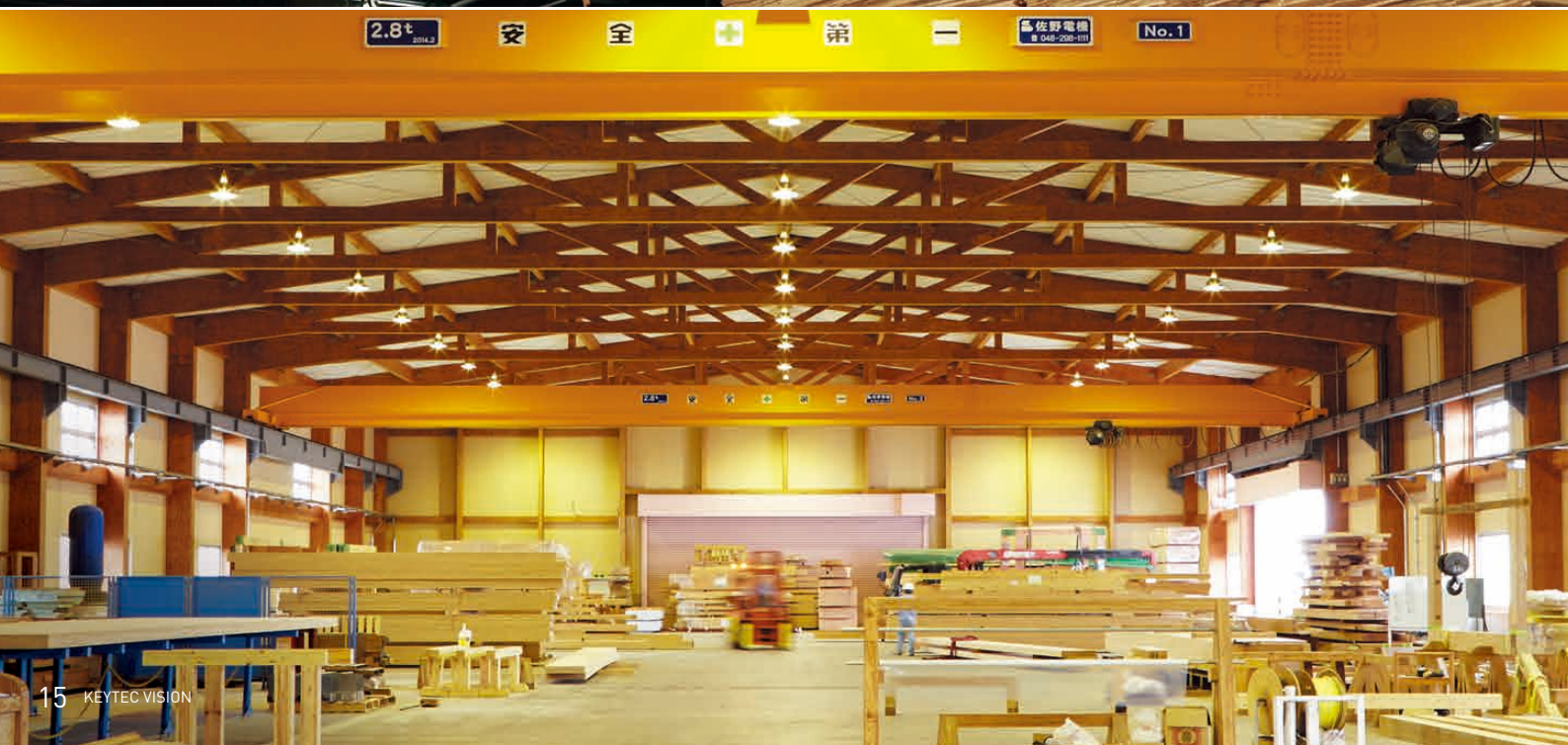
Kawakami Village in Nagano is proud of being Japan' s No.1 producer of lettuce. The village became one of the major producers of highland vegetables in Japan under cool climate of the highland region. It won a nation-wide fame as "The Agricultural Village with Villagers having an Average Annual Income of JPY 25 million." Village Mayor Tadahiko Fujiwara who has been responsible for the administration of the village 26 years says, "Agriculture and forestry are the life support device of the village, hence the management of the forest is one of the most important tasks of the management of the village." He has been active in promoting the revitalization of forestry. Among his promotional activities, the unique program of "Locally Grown Natural Trees of Japanese Larch for All Public Facilities!" is drawing attention all over the country.
In the first place, the Japanese larch tree has been the "Tree of Our Birthplace" . In the past, for a long period of time, it had been used as a temporary construction material and a piling or supporting material for the mining industry, etc., but the number of people engaged in the forestry industry decreased radically as Japan' s forestry declined. On the other hand, seedlings planted extensively after World War II are now grown to 50 - 60 years old trees, waiting for felling. The Village Mayor came to think that "There is no way not to utilize the tree we are so much proud of!" and he introduced a guideline for the promotion of the use of the tree in all public facilities to be constructed in the future. This was before the "Act for Promotion of Use of Wood in Public Buildings" that was enforced in 2010 by the Government of Japan.
The building structure of Forestry Research Center of Kawakami Village completed in 1997 shows clearly the usage value of the tree of Japanese larch which was remanufactured with the most modern wood working technology at that time. Planted and natural trees of Japanese larch were used extensively and properly for structural framing, interior and exterior finishing in the forms of "solid" , "glulam" and "LVL" in the building. During the construction phase, new ways of utilizing the wood material were developed as well. They build valuable facilities and make products with Japanese larch by themselves and show their values. For the villagers who have been coexisting for years with the trees of Japanese larch, this is the task what they should engage in. Also, it is worth mentioning that 7,000 trees of Japanese larch felled from the surrounding village-owned forests were used for the construction of Kawakami Junior High School, 2009. With the existence, at the same period of time, of the three living generations of grandparents who planted, parents who had been cultivating, and children who were to study in the school building after its completion, 60 years old trees of Japanese larch were felled in the forest. The school building is a multi-purpose facility having also the functions of a public facility of the village. Pupils use in the daytime and villagers use in the nighttime.
"Forest is 'School without Roof' . It is a place where people learn the living nature and wisdom thoughout generations." This school building, in which one chain of "afforestation-felling-utilization" of trees can be experienced, is valuable also in view of the fact that it is a place where people of three generations with different feelings about the trees of Japanese larch gather and strengthen the bond between the forest resources and the villagers.

The Administration Of Forestry Is The Pillar Of The Administration Of The Village, And The Forest Resources Are The Essence Of The Country. There Should Be Means Of Finding The Value Of Forestry Other Than Its Economical Value.

In developing the village with the two wheels of agriculture and forestry, it is no exaggeration to say that the healthy existence of forestry is a matter of life or death. Therefore, Village Mayor Fujiwara would not turn away his eyes from the difficulty of making forestry economically independent, but try to find and make a way of life and survival. "The added values of products made of the trees of Japanese larch cannot be measured in terms of economical value alone. The added values together with the basic economical value can bring out a desired effect. The added values can easily compensate for the cost of managing the forest resources." The administration of forestry is the pillar of the administration of the village, and the forest resources are the essence of the country. While keeping such unwavering conviction, there have been certain changes in living of the villagers and surrounding landscape. The future of Japan' s overall policies of agriculture and forestry lies in the direction the village mayor is looking forward to.

Born 1938 in Kawakami-mura, Minami-Saku-gun, Nagano. Studied and dropped out of Nagano Prefectural Usuda High School. After engaged in agriculture, became a Village Office staff. After working as the Manager of Planning Section at the village office, became the village mayor of Kawakami Village in 1988. 24th year since taking office as the village mayor, now in the 6th term. From 2005, Chairman of the Board of Directors, Nagano Association of Towns and Villages. From 2010 to 2017, Chairman of the Board of Directors, National Association of Towns and Villages.

Village Mayor of Kawakami Village
Tadahiko Fujiwara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Product Index

KEYLAM®
KEYLAM CROSS®

JAS (Japanese Agricultural Standard) certified product | F★★★★ | AQ (Approved Quality) certified product

High-Strength and High-Quality Structural Wood Material.

KEYLAM® is a structural LVL which can be manufactured from logs with warps and bends unsuitable for manufacturing lumber.

KEYLAM®

KEYLAM CROSS®

Photo above : Fuchu-shi Regional Civic Center (Photo by: SusumuKOSHIMIZU©2014)
Photo lower left : KEYTEC Kisarazu Factory Photo lower right : Matsuo Civic Center “Senshin-Kan”

KEYLAM®

KEYLAM® is an LVL (Laminated Veneer Lumber) manufactured from rotary-peeled veneers, all of which are glued and pressed together in the grain direction.

Advantages

Excellent Bending Strength

As all of veneers are glued in the grain direction, its property is excellent for using as timber frames such as beams and posts. Especially, when it is used as a beam to support vertical loads, it shows high bending strength.

Environmentally Friendly Material

B-grade logs with the defects of warps and bends unsuitable for manufacturing lumber are reborn as structural building materials.

Optimally Kiln Dried

Because of the fact that kiln drying of the material is done when it is in the form of thin veneer, the moisture content of finished product of LVL is low (about 14 %), hence there is less possibility of causing problems such as deformation, crack, loose joint connection, etc. which can lead to claim after the completion of building.

Homogenous Material with Low Dispersion

Since KEYLAM® is manufactured by laminating multiple sheets of thin veneer, it has a physical property of lower dispersion in comparison with that of lumber and glulam, even if there are defects in strength such as knots in some parts of some veneers. Because of that, the lower limits of strength are higher in comparison with those of the other materials, and the allowable design stresses are higher.

Suitable for Preservative, Anti-termite Chemical Treatments

By mixing a preservative in the adhesive, preservation can be done easily and thoroughly.

Possibility to Manufacture Long and Straight Lumber

By scarf jointing veneers, long veneer sheets can be made available for manufacturing long LVL beams and panels. (Max. 12 m)

Application

Structural material

Wood Species

Japanese larch・Siberian larch

(For Japanese cedar, red pine, and other wood species, please contact us.)

Specifications

Thickness(㎜)	Width(㎜)	Length(㎜)	Strength
max. 600㎜ (In case width 600㎜)	max.1200	max.12000	As per JAS criteria

※ If the width of beam is equal to or more than 600㎜, please contact us.

Manufacturing Process

Reliable Integrated System

The structural LVL of KEYLAM® is manufactured by gluing most of dried thin veneers (approx. 3~4 ㎜ thick) in the grain direction, and its excellent properties of strength and dimensional stability have been highly valued.

Veneer (Veneers rotary-peeled from logs)

Strength tests passed

Primary lamella product

Primary lamella product (Primary lamella)

Inspection of dimensions and test of bonding property, passed.

Multiple glued lamella product

Multiple glued lamella product (Post/column, joist/beam/girder, thick panel and others)

Inspection of dimensions and test of bonding property, passed.

Product quality inspection/ Checking of finished dimensions Inspection passed

Dispatch

KEYLAM CROSS®

KEYLAM CROSS® is different from KEYLAM®. The difference is that two or more of veneer sheets are glued crosswise. This veneer composition improves the lateral bending strength and stiffness of LVL lamella.
The use of LVL as a structural panel product is made possible.

Advantages

Excellent Dimensional Stability and Good Physical Property for Stronger Joints.

An ideal structural material utilizing characteristics of LVL and offering excellent dimensional stability and good physical property for stronger joints.
KEYLAM CROSS® is the best answer to those who have been involved in construction and remanufacturing businesses and facing the problems inherent in design limitation and dimensional stability of wood.

Application

Structural material

Wood Species

Japanese larch・Japanese cedar

Specifications

Japanese larch

Thickness(mm)	Width(mm)	Length(mm)
30	max.1200	max.12000
50	max.1200	max.12000

Please contact us for details.

Japanese cedar

Thickness(mm)	Width(mm)	Length(mm)
25	max.1200	max.12000
30	max.1200	max.12000

Please contact us for details.

Composition

Japanese Larch - Composition of Veneer Sheets

Thickness(mm)	No. of all veneer lamination layers(nos.)	No. of veneer sheets glued in the grain direction(nos.)	No. of veneer sheets glued crosswise(nos.)	Composition of veneer sheets
30	10	8	2	‖—|||—‖
50	16	12	4	‖—|||—‖—|||—‖

Japanese Cedar - Composition of Veneer Sheets

Thickness(mm)	No. of all veneer lamination layers(nos.)	No. of veneer sheets glued in the grain direction(nos.)	No. of veneer sheets glued crosswise(nos.)	Composition of veneer sheets
25	9	7	2	‖—|||—‖
30	11	9	2	‖—||||—‖

AQ Certification: AQ-225-D1-1・2

“KEYLAM® AQ DODAI SEKKON K3” (AQ certified Class K3 Preserved Wood Sill) is certified by Japan Housing and Wood Technology Center as Class 2 (equivalent to Category K3 of JAS) of "Approved Quality (AQ)”.
Also, it meets the requirements of Grade 2※ or better for the reduction of deterioration factor of the Housing Performance Indication System, hence for housing loan, the basic rate of interest specified by Japan Housing Finance Agency which provides housing loans is applied.

※ For the certification of Grade 2 or better, wood sills need to be treated with a preservative to Category K3 or better.

KEYLAM® - Technical Data

Design Strengths

According to the Government of Japan's Ministerial Notification No.1024, Ministry of Land, Infrastructure, Transport and Tourism, dated 2001, the Design Strengths of structural LVL are defined as follows:

A-type Structural LVL

Out of structural LVL, those not having veneer sheets whose grain direction is orthogonal to the main grain direction, or those having veneer sheets whose grain direction is orthogonal to the main grain direction only for the adjacent parts of outermost layer.

Design Strengths of Compression, Tension and Bending

Classification of Young's modulus of bending	Grade	Design Strength (Unit : N/㎟)		
		Compression	Tension	Bending
160E	Grade special	41.4	31.2	51.6
	Grade-1	40.2	27.0	44.4
	Grade-2	37.2	22.2	37.2
140E	Grade special	36.0	27.0	45.0
	Grade-1	34.8	23.4	39.0
	Grade-2	32.4	19.8	32.4
120E	Grade special	31.2	23.4	39.0
	Grade-1	30.0	19.8	33.0
	Grade-2	27.6	16.8	27.6
100E	Grade special	25.8	19.8	32.4
	Grade-1	25.2	16.8	27.6
	Grade-2	23.4	14.4	23.4
90E	Grade special	23.4	17.4	28.8
	Grade-1	22.8	15.0	25.2
	Grade-2	21.0	12.6	21.0
80E	Grade special	21.0	15.6	25.8
	Grade-1	19.8	13.2	22.2
	Grade-2	18.6	11.4	18.6
70E	Grade special	18.0	13.8	22.8
	Grade-1	17.4	12.0	19.8
	Grade-2	16.2	9.6	16.2
60E	Grade special	15.6	12.0	19.8
	Grade-1	15.0	10.2	16.8
	Grade-2	13.8	8.4	13.8
50E	Grade special	12.7	9.5	15.9
	Grade-1	12.3	8.2	13.7
	Grade-2	11.1	6.7	11.1

Design Strengths of Horizontal Shear

Horizontal shear class	Design Strength (Unit : N/㎟)
65V-55H	4.2
60V-51H	3.6
55V-47H	3.6
50V-43H	3.0
45V-38H	3.0
40V-34H	2.4
35V-30H	2.4

Design Strength of Partial Compression

Class of marking of partial compression	Design Strength (Unit : N/㎟)
180B	18.0
160B	16.0
135B	13.5
90B	9.0

※Out of A type structural LVL, only for those LVL marking the partial compression property (in the direction of vertical use).

Design Strengths of Partial Compression (Classification by Wood Species)

Wood Species	Design Strength (Unit : N/㎟)
Red pine Siberian larch Douglas fir	9.0
Japanese cypress Japanese larch	7.8
Radiata pine Japanese cedar	6.0

B-type Structural LVL

Out of structural LVL, those other than A-type structural LVL and conforming to the stipulation as described below.

Item	Criteria
Location of cross grain veneer sheets	1 Cross grain veneer sheets shall be placed in the 3rd layer from the outermost layer. 2 Cross grain veneer sheets shall not be placed continuously.
Consecutive number of layers of parallel veneer sheets	Consecutive number of layers of parallel veneer sheets shall not be less than 2 and not more than 5, and there shall be a part where consecutive number of layers of parallel veneer sheets is not less than 3.
Composition of veneer sheets	Composition of veneer sheets shall be symmetrical to the central axis in the direction of lamination. In addition, the thickness of all composing veneer sheets shall be equal.

Design Strengths of Compression, Tension and Bending

Classification of Young's modulus of bending	Design Strength (Unit : N/㎟)					
	Compression		Tension		Bending	
	Stronger direction	Weaker direction	Stronger direction	Weaker direction	Stronger direction	Weaker direction
140E	21.9	4.3	18.3	2.9	32.2	5.8
120E	18.7	3.7	15.6	2.5	27.5	4.9
110E	17.2	3.4	14.4	2.3	25.3	4.5
100E	15.7	3.1	13.2	2.1	23.2	4.1
90E	14.0	2.8	11.7	1.8	20.6	3.7
80E	12.5	2.5	10.5	1.6	18.4	3.3
70E	10.8	2.1	9.0	1.4	15.9	2.8
60E	9.3	1.8	7.8	1.2	13.7	2.4
50E	7.6	1.5	6.3	1.0	11.1	2.0
40E	6.1	1.2	5.1	0.8	9.0	1.6
30E	4.6	0.9	3.9	0.6	6.8	1.2

There is no category of Grade special, -1 or -2 for B-type Structural LVL.

Design Strengths of Horizontal Shear

Horizontal shear class	Design Strength (Unit : N/㎟)	
	Direction of vertical use	Direction of horizontal use
65V-43H	4.3	2.8
60V-40H	4.0	2.6
55V-36H	3.6	2.4
50V-33H	3.3	2.2
45V-30H	3.0	2.0
40V-26H	2.6	1.7
35V-23H	2.3	1.5
30V-20H	2.0	1.3
25V-16H	1.6	1.0

Preservative and Anti-Termite Treatment

1) The treatment is very simple. As the adhesive is already a chemical mixture of adhesive and preservative/insecticide, the treatment is completed when the LVL is manufactured.
2) The chemical will be uniformly distributed throughout the treated LVL. No need to treat cut and exposed faces with a new preservative/insecticide.
3) Unlike the pressure impregnation method, there is no need for the preservative/insecticide to penetrate the wood; making it possible to manufacture and treat such hardwood LVL as Siberian larch.
4) It is environmentally friendly and much safer than the pressure impregnated type of LVL. In comparison to the pressure impregnated LVL which is treated by impregnating the preservative from the surfaces of product, in this method the ingredients of the preservative in the mixture of adhesive and preservative permeate into the wood from glued faces inside the product and do not come in contact with the surface of LVL product; thus, making it much safer for the end user and environmentally friendly.

KEYLAM WOOD WALL®

Highly Strong and Quasi-Fireproof Load Bearing Wall.

"Laminated Wood Wall" is a structural exterior wall system with a thick LVL panel of wood whose natural properties of physical strength and fire prevention/proofing are made use of wisely.

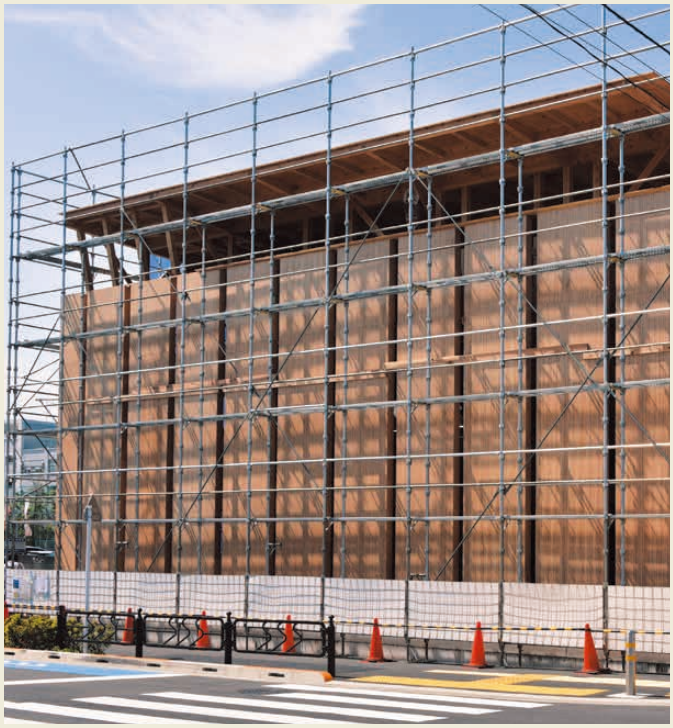


Photo above : Nakoso Certified Kindergarten
Photo lower left : Miyamura Veterinary Clinic　　Photo lower right : International Center, Kanagawa University

KEYLAM WOOD WALL®

Advantages

Excellent Design Possibility & Flexibility

KEYLAM WOOD WALL® has two expressions of surfaces with flat grain and laminated glue lines in stripe pattern. The surface with laminated glue lines in stripe pattern, especially, can give architectural space the unique expression which cannot be given by any other wood materials.

Quasi-Fireproof Property

It is known that LVL manufactured by gluing veneers with a fire-resistant adhesive burns slowly, even if it is a wood material. It can be used as a structural wall in quasi-fireproof buildings in accordance with the Ministerial Notification about Fireproof Construction issued in 2015 which stipulated “Fire Resistance Design Method of Solid/Massive wood Construction”.

Excellent Structural Performance

In addition to the advantage of higher strengths generally, compared with glulam, it is possible to achieve a short-term allowable shear strength of wall of 40 kN/m or more (equivalent to 20 or more of “the wall magnification factor” for shear strength of wall). It can be used on the condition that structural analysis is done properly for each case.

Applicable to Various Structures

Making good use of its high strength properties, it is possible to reduce the number of shear walls against earthquake, and to have large openings in walls. It can be applicable not only to wood structures but also to steel and RC structures.

Application

Walls and wall columns of wood for wood and other types of buildings

Wood Species

Japanese larch・Japanese cedar

Specifications

Specifications of wood species and strength grades
A-type or B-type (with veneer sheets glued crosswise) structural LVL
120E Grade-1 (Japanese larch A-type)
80E (Japanese larch B-type)
60E Grade-1 (Japanese cedar A-type)
Equivalent to 50E (Japanese cedar B-type)

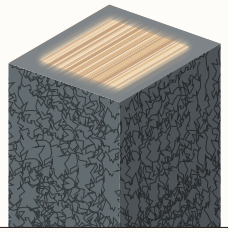
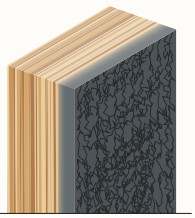
※ Surface with laminated glue lines in stripe pattern is available only in A-type.

Thickness (㎜)	Width (㎜)	Length (㎜)
90	1000	3000
		6000
120		3000
		6000
150		3000
		6000

Fire Resistance Design

KEYLAM WOOD WALL® can be used as a structural wall in quasi-fireproof buildings in accordance with the Ministerial Notification about Fireproof Construction issued in 2015 which stipulated “Fire Resistance Design Method of Solid/Massive wood Construction”.

Fire Protection Cover of Charring Layer of Structural LVL by Required Rate of Fire Resistance

Required rate of fire resistance	Cover of charring layer	
	post / beam	wall / floor / roof
		
30 min. quasi-fireproof	—	25㎜
45 min. quasi-fireproof	35㎜	35㎜
60 min. quasi-fireproof	45㎜	45㎜

The adhesive must be of phenol or resorcinol resin.
Reference:
Design Manual for Fire Resistive and Fireproofing of Wood Buildings (Published by The Building Center of Japan in March 2017)
For details, please refer to P.108 of the Manual.

Structural Design

By using connectors embedded in the thick panel of KEYLAM WOOD WALL®, it is possible to design a building with strong shear walls against earthquake. The following is an example of design of walls based on the tensile strength per connector.

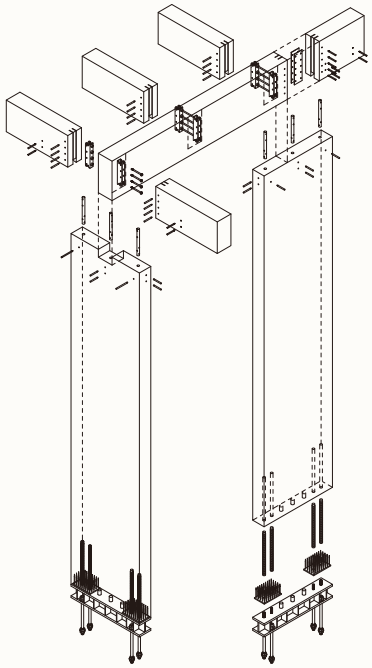
Example of Calculation of Wall Magnification Factor for Shear Strength of Wall

Wood species and Category	Connector (LSB: Lag screw bolt) (GIR: Glued in rod)	2/3Pmax (kN)	Stiffness K (kN/㎜)	Specification of anchor bolt	Yield stress Py (kN)	Wall magnification factor Pa (times)
Japanese cedar A-type	LSB 35㎜ dia. x 445㎜ long - 2 pcs	90.3	281.4	M16 x 400㎜ long - 2 pcs	73.8	12.6
	GIR 24㎜ dia. x 300㎜ long - 4 pcs	153.7	884.3	M22 x 400㎜ long - 2 pcs	142.4	24.2
Japanese cedar B-type	LSB 35㎜ dia. x 445㎜ long - 2 pcs	121.4	220.1	M20 x 400㎜ long - 2 pcs	115.2	19.6
	GIR 24㎜ dia. x 300㎜ long - 4 pcs	173.8	674.9	M24 x 400㎜ long - 2 pcs	165.9	28.2
Japanese larch A-type	LSB 35㎜ dia. x 445㎜ long - 2 pcs	141.8	717.3	M20 x 400㎜ long - 2 pcs	115.2	19.6
	GIR 24㎜ dia. x 300㎜ long - 4 pcs	111.0	579.3	M16 x 490㎜ long - 2 pcs	102.1	17.4
Japanese larch B-type	LSB 35㎜ dia. x 445㎜ long - 2 pcs	256.4	528.8	M24 x 490㎜ long - 2 pcs	229.5	39.0
	GIR 24㎜ dia. x 300㎜ long - 4 pcs	216.5	815.7	M27 x 400㎜ long - 2 pcs	215.7	36.7

2/3 Pmax：2/3 of Pmax (max. stress in connector)　K：the average of initial stiffness of connector
Specification of anchor bolt：designed so that the yield stress of anchor bolt is less than 2/3 of Pmax
Py：Yield stress of anchor bolt　Pa：Py/(3×1.96)　LSB：Manufactured by Stroog Inc.　GIR：Home Connector manufactured by SCRIMTEC JAPAN Co., Ltd.
Wall dimensions：thickness 150㎜ × width 1000㎜ × length 3000㎜
Calculation：Only tensile stresses at wall column bases are checked
Concept：The ductile anchor bolt is made to yield before the connector

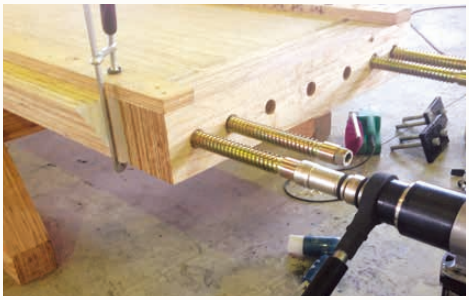
For more information such as the tensile strength of each connector, etc., please see
"The Manual of Structural Design, 2014 Report of Development of Massive Wall made from LVL of Japanese Cedar"
published by National LVL Association and available from HP of the Association at: www.lvl.ne.jp/data/index.html.

Isometric Drawing of the Construction



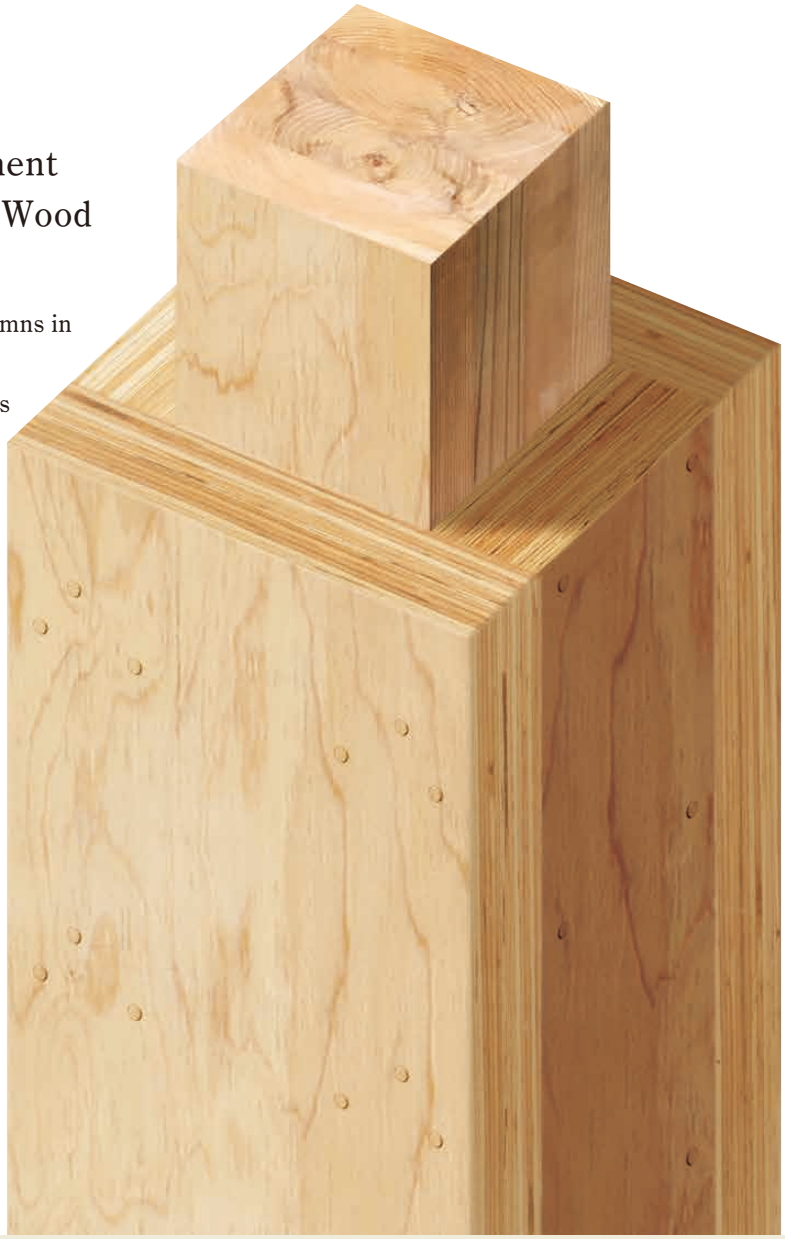
Ryotaro Sakata Structural Engineers Co., Ltd.
(Metal Connectors (LSB)：Manufactured by Stroog Inc.)

Embedding of Lag Screw Bolt (LSB)



Metal Connectors/Fasteners for Wall Column

KEYLAM TAIKA®



Fireproof Structural Element Composed of Engineered Wood of LVL Only.

By covering the surfaces of wood columns in sizes of 150～600mm with 60mm thick fire-retardant treated LVL panels (rated as “quasi non-combustible”), a 60-min. fireproof structural element is manufactured.

Fire Preventive and Fireproof Performance Test and Evaluation

Test specimens of column were made and fire tested under loading in a laboratory furnace of General Building Research Corporation of Japan to develop 60-min. quasi fireproof columns.
After 60 minutes of incineration, the test specimen was left for 4 hours in the furnace for load testing columns until the temperature went down to near the room temperature. The picture below shows the cut section of the specimen after the test.
No charred parts on the surfaces of the load bearing glulam column of Japanese cedar were seen.


Cut section after testing


Before testing


After testing

Advantages

Possibility of All-Wood Structural Construction

As all-wood structural elements are made available, it is possible to design and construct buildings with these structural and finishing materials even if higher degree of fire-resistivity is required.

Application as Interior Finish Material

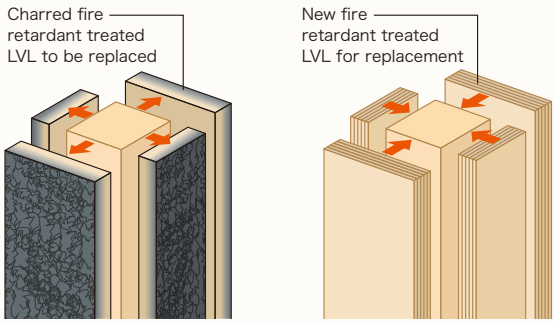
By choosing the beautiful looking LVL panels of LVL as a fireproofing material, they can be used as decorative finish materials at the same time. That means the development of the material functioning both as a fireproofing and decorative finish material has been realized.

Possibility of Site Fabrication/Installation

The fireproofing material is basically fabricated at factory, but fabrication and installation at construction site are also possible.

Replaceable at Site after Fire

If by any chance fire occurs, the damaged fireproofing cover material can be replaced with a new one at site.



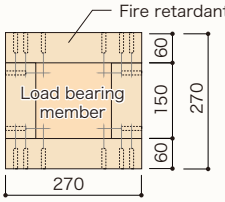
Application

Column for 60-min. fireproof construction

Wood Species

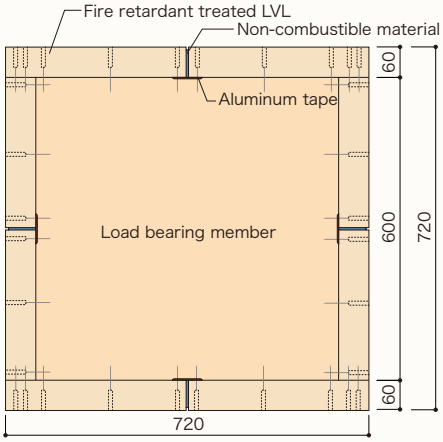
Load bearing member: Japanese cedar (lumber, glulam and LVL)
Fire-protection covering: LVL of Japanese cedar

Specifications



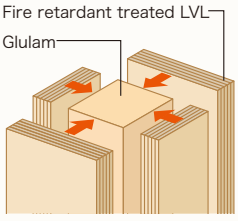
Cross sectional dimensions of load bearing member (㎜)
150~600

※ In case of a dimension exceeding 240㎜, there is a vertical joint.



Composition

By covering the surfaces of wood columns in sizes of 150~600㎜ with 60㎜ thick fire-retardant treated LVL panels (rated as "quasi non-combustible"), a 60-min. fireproof structural element can be manufactured.



Ministerial Certification
(Dimension of load bearing member : 150㎜)

FP060CN-0706: Fire-protection covering of LVL, treated with a phosphorous & nitrogen-based fire retardant, on surfaces of column of Japanese cedar.
General Incorporated Association of "National LVL Association" has received the ministerial certification.

※ For the sizes of over 150 ㎜ ~ 600 ㎜, the certification will be obtained in the near future.

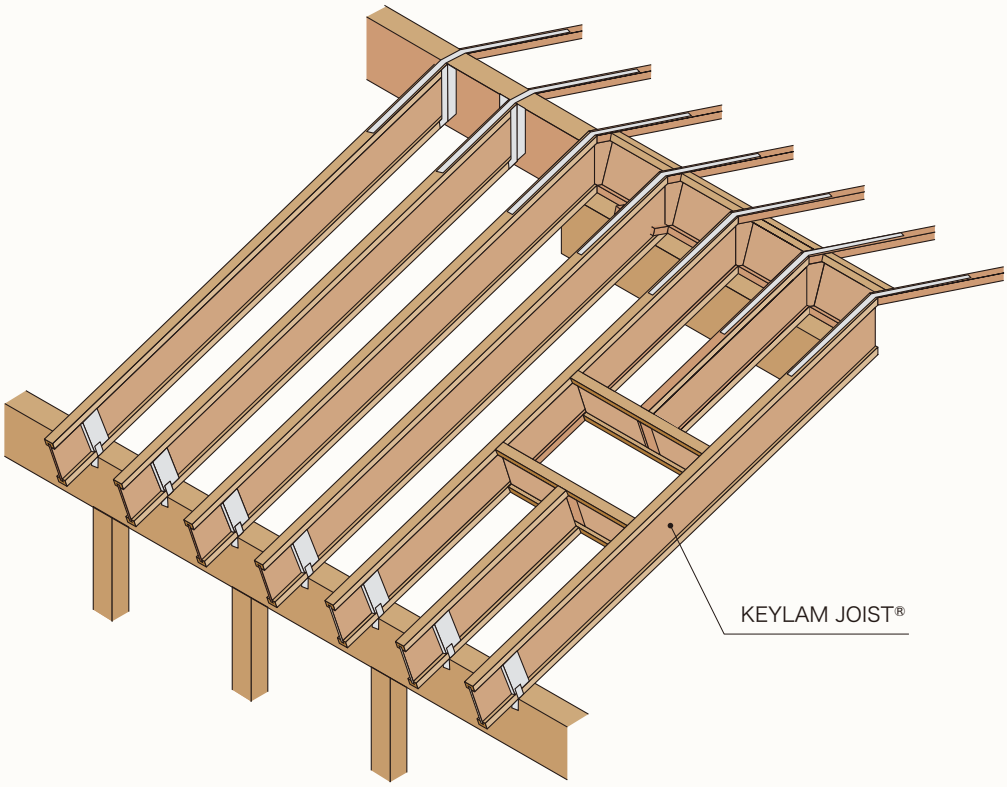
KEYLAM JOIST®

Structural Wood Material Assembled from Flange of LVL and Web of Panel Glued Together.

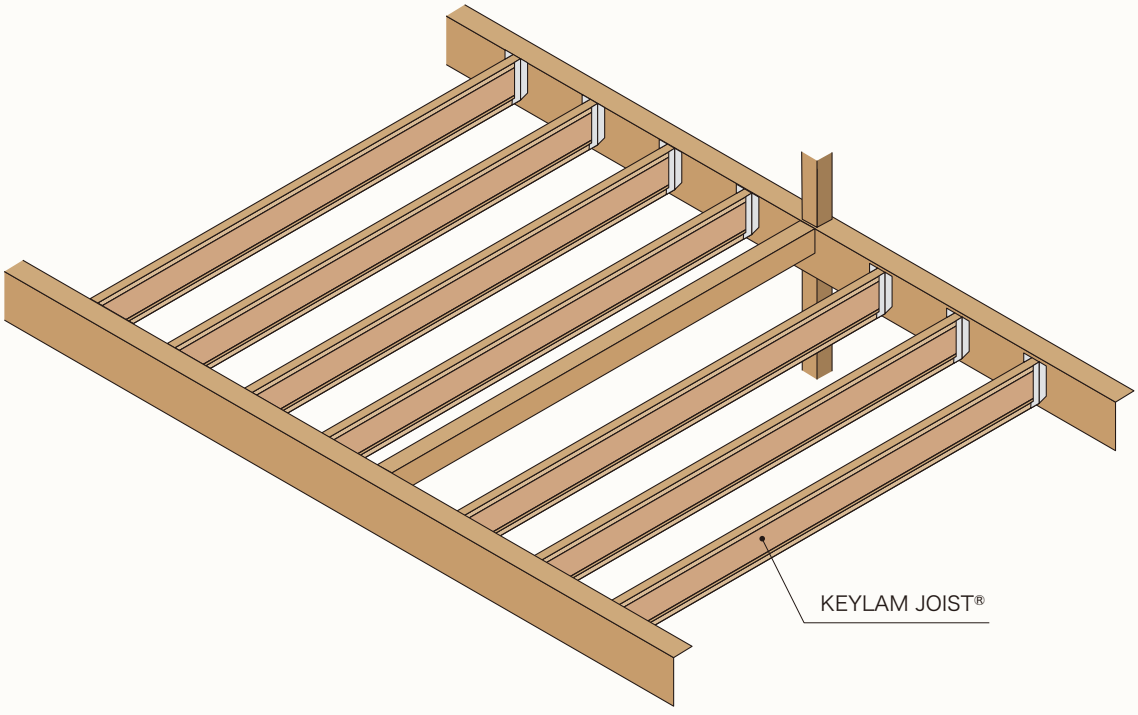
An innovative structural material most suitable for use in floor and roof constructions, reassuring that there is no possibility of leading to a claim against defects such as shrinkage, twist, warp, bow, etc.

Photo above : Residential house built with the conventional post and beam structural system
Photos lower left & lower right : Actual application examples of KEYLAM JOIST®

KEYLAM JOIST® ROOF



KEYLAM JOIST® FLOOR



Advantages

Reliable Quality
This reliable structural product is certified by the Minister of Land, Infrastructure, Transport and Tourism in accordance with the Article 37 of the Building Standard Law of Japan.

Use of Domestic Wood
KEYLAM® (LVL:Class 120E) manufactured from domestic wood of Japanese larch is used for the flange of the I-joist.

High Stiffness
The stiffness of floor and wall structures can be improved for less twisting and warping of the structures.

Possibility of Longer Spans
It is possible to use in large-scale buildings having long spans of frame structures to create large architectural space.

Definition of Shear Strength
The shear strength properties of the horizontal plane of structure and of the load bearing metal joint connectors are defined clearly.

Easy Installation
Light and easy to handle so that installation can be completed in shorter time. It is possible to simplify the works of installation onto beams and bearing walls.

Certified 60-min. Fireproof Floor Construction (with or without Heat Insulating Material)
A 60-min.fireproof floor construction certification has been obtained. Please contact us for details.
[FP060FL-0125] [FP060FL-0131]

Drilling Holes
It is possible to drill holes of up to dia. 220㎜ in the web for installation of ventilation ducts in typical residential houses.

Application

Beam, joist, rafter, etc. used in the wood frame and post and beam construction methods
Also used as joist header or end joist in the wood frame construction method

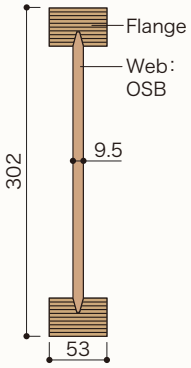
Wood Species

Flanges : Japanese larch

Specifications

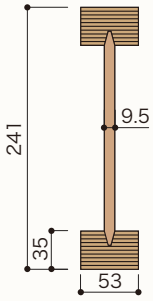
KEYLAM JOIST® 53-302
(Regular)

Height(㎜)	Width(㎜)	Length(㎜)
302	53	3660(12 ft)
		4575(15 ft)
		5490(18 ft)

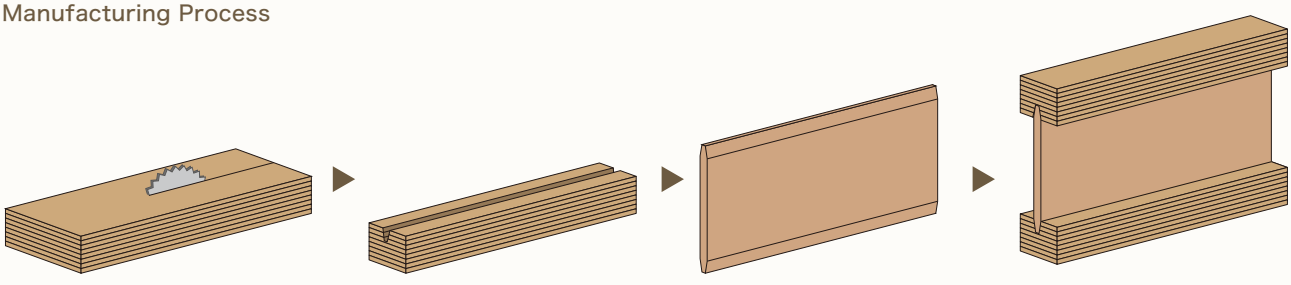


KEYLAM JOIST® 53-241
(Order-made product)

Height(㎜)	Width(㎜)	Length(㎜)
241	53	3660(12 ft)
		4575(15 ft)
		5490(18 ft)
		7320(24 ft)
302	53	7320(24 ft)



Manufacturing Process



Ripping LVL lamella to make a flange

Making a groove in the flange

Bevelling the edges of the web

Assembling the flange with the web by gluing together

KEYLAM JOIST®

Span Table for Floor Joist

Span Table

Type	Spacing of floor joists (mm)				
	303	333	406	455	500
	Span (m)	Span (m)	Span (m)	Span (m)	Span (m)
53-241	4.78	4.67	4.44	4.31	4.20
53-302	5.30	5.17	4.92	4.78	4.66

The above table is prepared on the following conditions:

- Evenly distributed loading
- Design load for floor W
  = Dead load WF + Live load P (N/m)
- Dead load WF = Self-weight of floor framework
  x Spacing of floor joists + Self-weight of floor joists
- Self-weight of floor framework = 600N/m²
- Live load = 1800N/m²
- Allowable max. deflection of floor joists is 10mm.

Design Strength

Design Strength

Height h (mm)	Weight (N/m)	Design Strength				Bending stiffness EI (×10⁹N·mm²)
		Bending moment M (N·m)	Shear V (N)	Reaction force R (N)		
				45mm (End support)	89mm (Mid-span support)	
241	32.4	11200	15300	10500	23000	570
302	36.3	14000	18000	10500	23000	870

- The reaction forces shown above are based on the condition that the length of support is 45 mm at the ends and 89 mm at the mid-span.
- The formula below is used to estimate the deflection Δ (mm) at the mid-span caused by the evenly distributed loading.
- Deformation enhancement coefficient = 2.0

Estimate of the Deflection Δ (mm) caused by evenly distributed loading

$$\Delta = \frac{5WL^4}{384EI} + \frac{WL^2}{74706h}$$

Δ : Deflection (mm)
W : Design load for floor (N/mm)
EI : Bending stiffness (N/mm²)
h : Height (mm)
L : Span length (mm)

Notes: 74706 = 1400N/mm² × 9.5mm × hw/h ÷ CQ
1400N/mm²: Shearing modulus of the web
9.5mm: Thickness of the web
CQ: Coefficient according to loading condition
(1/8 in case of evenly distributed loading)
hw/h : Height of the web

Allowable strength shall be as per the following table:

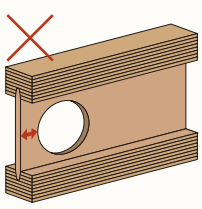
Long term allowable strength			Short term allowable strength		
Bending	Shear	Reaction force	Bending	Shear	Reaction force
1.1M/3	1.1V/3	1.1R/3	2M/3	2V/3	2R/3

M: Design bending strength (N·m) V: Design shear strength (N) R: Design reaction force strength (N)

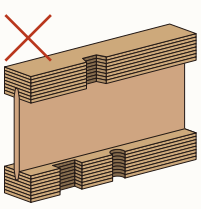
In accordance with "The building Standard Law of Japan, Article 82, Rules No.1~No.3", when checking structural stability under snow loading the allowable strength in relation to long term force shall be the value shown in the above table multiplied by 1.3, and in relation to short term force shall be the value shown in the above table multiplied by 0.8.

Precautions for Use

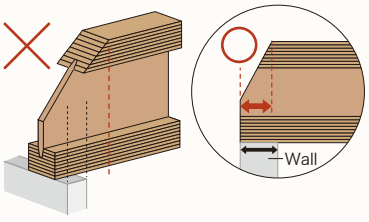
It is prohibited to use the I-joist under the following conditions:



Do not drill a hole too close to the point of support.



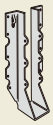
Do not make cuts or notches in the flange.



When cutting the rafter diagonally, the range of cutting must be within the thickness of the supporting wall.

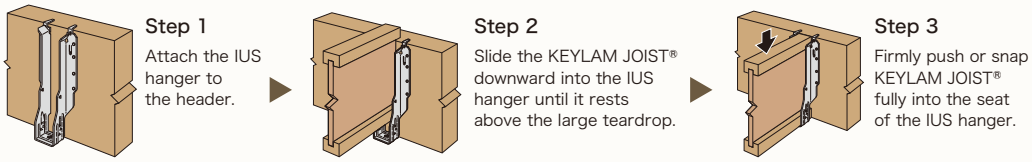
Metal Joint Connectors/Fasteners

Simpson Strong-Tie® Wood Construction Connectors

KJI joist height (㎜)	Single I-joist — on face mount hanger				Double I-joist — on face mount hanger			
	 Simpson I-Joist Hangers (With the Simpson Strong-Grip® seat which secures I-joists in position without joist nails)				 (Stiffeners are required at ends)			
	Metal Connectors	Allowable strength (N)	Nailing		Metal Connectors	Allowable strength (N)	Nailing	
			Face (to header or beam)	Joist (to lower flange of I-joist)			Face (to header or beam)	Joist (to lower flange of I-joist)
241	IUS2.06/9.5	2990	8-ZN65	—	MIU4.28/9	7580	16-ZN90	2-ZN40、4-ZN65
302	IUS2.06/11.88	3740	10-ZN65	—	MIU4.28/11	7580	20-ZN90	2-ZN40、4-ZN65

Simpson I-Joist Hangers (With the Simpson Strong-Grip® seat which secures I-joists in position without joist nails)

Steps of Installation
(Simpson IUS I-Joist Hanger)

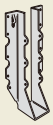


Step 1
Attach the IUS hanger to the header.

Step 2
Slide the KEYLAM JOIST® downward into the IUS hanger until it rests above the large teardrop.

Step 3
Firmly push or snap KEYLAM JOIST® fully into the seat of the IUS hanger.

Yamabishi Kogyo I-Joist Hangers (With the protrusion on the bottom secures I-joists in position without joist nails)

KJI joist height (㎜)	Single I-joist — on face mount hanger				Double I-joist — on face mount hanger			
	 (Without joist nails)				 (Stiffeners are required at ends)			
	Metal Connectors	Allowable strength (N)	Nailing		Metal Connectors	Allowable strength (N)	Nailing	
			Face (to header or beam)	Joist (to lower flange of I-joist)			Face (to header or beam)	Joist (to lower flange of I-joist)
241	I-JOIST55241 CZ	2990	8-ZN65	—	I-JOIST 108241 CZ	7540	14-ZN90	6-ZN65
302	I-JOIST55302 Z	2990	8-ZN65	—	I-JOIST 108302 CZ	7540	14-ZN90	6-ZN65

The allowable strength of the hanger may be more or less than that of the I-joist supported by the hanger; therefore it is recommended to check the strengths of both parts. For further information, please contact us.

Remarks

- Allowable strength of the hanger is only for the loads on floor. For the allowable strength of the hanger in case of snow loading, please contact us.
- Have a clearance of 1~2㎜ or more between the faces of supporting header/beam and the end of I-joist.
- Use proper nails to fix the hanger as specified in the table.
- The height of the hanger must be more than 60% of the height of KEYLAM JOIST®.
- If the slope of KEYLAM JOIST® is over 0.2/10, please use slopeable I-joist hangers.

Design Conditions

- Classification of the duration of continuous loading is assumed to be the long term (equivalent to 50 years).
- The smaller value of the allowable design strengths of ZN nails and KEYLAM JOIST® (on 45㎜ support at end) is assumed to be the design strength.
- The design strengths of hanger shown in the table are the values based on the condition that the supporting beam or header is of SPF softwood lumber.
- The width of supporting beam or header must be not less than 89㎜ to fix the hanger.

For further details, please contact the following:
Simpson Strong-Tie® Wood Construction Connectors：Tanaka Co., Ltd. (The distributor in Japan)
Yamabishi Kogyo I-Joist Hangers：Yamabishi Kogyo Co., Ltd.

Certification by the Minister of Land, Infrastructure, Transport and Tourism

MWCM-0017

KEYLAM MEGA BEAM®

Highly Stiff I- or Box-Shaped LVL Beam and Girder in whose Web Holes for Pipes and Ducts can be Made.

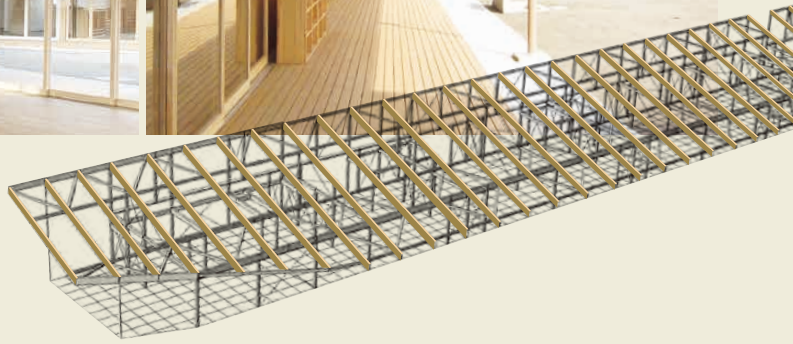
Only the web (LVL) is assumed to take the bending and shear forces alone, while the flange part contributes to increasing the stiffness of floor construction to reduce environmental vibration.

Box-shaped

I-shaped

“Tokyo Yurikago Kindergarten Project” built with KEYLAM MEGA BEAM (T-Shaped Type)® received the Prime Minister's Award of “Kids Design Awards 2016”

The project of “Tokyo Yurikago Kindergarten + Satoyama Educational Initiative” (or initiative for the realization of societies in harmony with nature through conservation and advancement of socio-ecological production landscapes and seascapes) received the Prime Minister's Award which was the highest among the awards of “Kids Design Awards 2016”.



A single story wood building with large openings in walls and the characteristic deep pent roof veranda of 100 m long made of KEYLAM MEGA BEAM (I-Shaped Type)®.
The longest beams of KEYLAM MEGA BEAM (I-Shaped Type)® extend from one end of the classroom to the edge of pent roof to create wide open-space for various activities.

Photo above : Tokyo Yurikago Kindergarten - Front view
Photo lower left : Classroom Photo lower right : Veranda

KEYLAM MEGA BEAM®

Advantages

Possibility of Longer Spans
It can be used for composing floor and roof structures having the long spans of 6m~12m in residential houses and medium-high multi-story and large-scale wood buildings.

Light Weight and Low Cost
It is 30% lighter in self-weight compared with a glulam with the equivalent bending property, hence excellent cost performance.

Suitable for Use in Hybrid Construction Systems
It can be used as a floor beam/girder and roof rafter/girder in light-weight structural elements of floor and roof of wood, steel and RC framed buildings.

Design Method
Only the web (LVL) is assumed to take the bending and shear forces alone, while the flange part contributes to increasing the stiffness of floor construction to reduce environmental vibration.

Drilling Holes
It is possible to drill holes of up to dia. 220㎜ in the web for installation of ventilation ducts in typical residential houses.

Certified 60-min. Fireproof Floor Construction (with or without Heat Insulation Material)
A 60-min.fireproof floor construction certification has been obtained. Please contact us for details.
(I-Shaped/Girder only) [FP060FL-0124] [FP060FL-0128]

Application
Floor beam/girder・Roof rafter/girder

Wood Species
Japanese larch・Siberian larch

Specifications

I-shaped

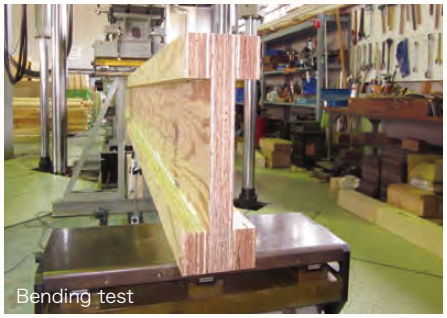
Width(㎜)	Height(㎜)	Length(㎜)
114	356	max.12000
	450	
	500	
	550	
	600	

Box-shaped

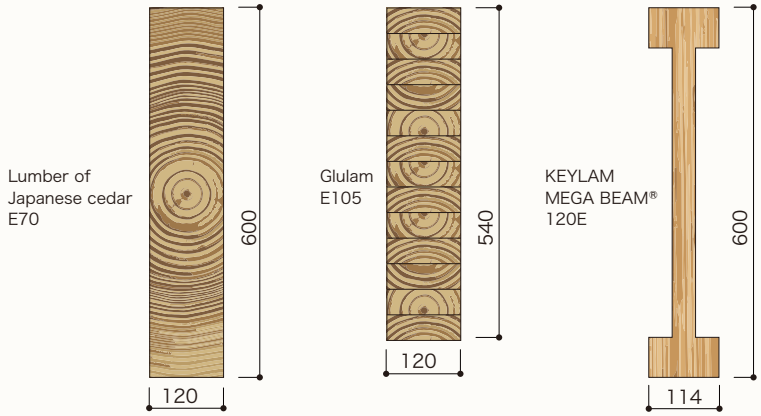
Width(㎜)	Height(㎜)	Length(㎜)
181	750	max.12000
	900	
	1200	

Can be custom-ordered. LVL Class 60E (Japanese cedar), 100E, 120E, 140E(Japanese larch・Siberian larch)

Design of Sectional Dimensions of Structural Members


Bending test

In comparison with glulam, KEYLAM MEGA BEAM® can have the same bending stiffness with a smaller sectional area of the material. Bending property has been verified by conducting bending tests at laboratories.



Span Table

Span Table[Floor]

Product	Spacing(㎜)						Live load
	333	455	500	667	910	1000	
KMB - I-shaped 356 120E	8.1	7.1	6.8	—	—	—	Residential house 1800N/m²
KMB - I-shaped 356 120E	7.1	6.1	5.8	—	—	—	Office building 2900N/m²
KMB - Box-shaped 550 120E	—	—	10.6	9.9	9.1	8.9	Office building 2900N/m²

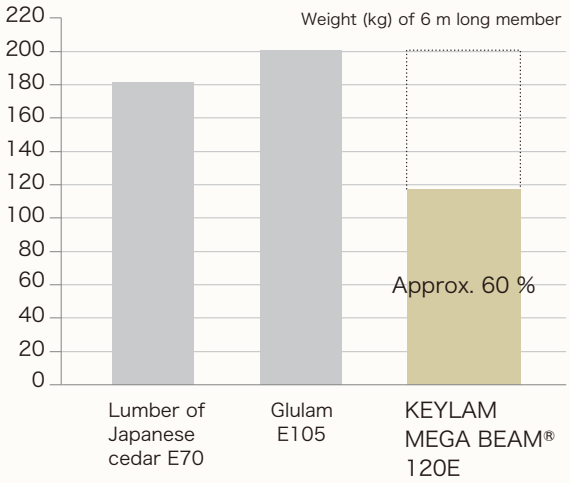
Evenly distributed load, dead load = 1200N/m²(Residential house・Office building)
1.Deflection 15㎜ (Stiffness EI = With full cross sectional area)
2.Span L/ 400 (Stiffness EI = With full cross sectional area)
3.Bending・shear(Checking the long term allowable stresses of the web only)

Span Table[Roof]

Product	Spacing of rafters (㎜)	General region				Heavy snowfall region					
		30㎝		50㎝		100㎝		140㎝		200㎝	
		Low-gradient	High-gradient	Low-gradient	High-gradient	Low-gradient	High-gradient	Low-gradient	High-gradient	Low-gradient	High-gradient
KMB - I-shaped 356 120E	455	10.6	10.0	10.1	9.5	7.9	8.2	6.9	7.2	5.9	6.2
KMB - Box-shaped 550 120E	910	12.7	11.9	12.0	11.4	10.1	9.8	9.4	9.1	8.9	8.7

Evenly distributed load, dead load = 530N/m²
1.Deflection 20㎜ (Stiffness EI = With full cross sectional area)
2.Span L/200 (Stiffness EI = With full cross sectional area)
3.Bending・shear(Checking the long term stresses under snow loading of the web only)

Light-Weight Structural Member



The weight of KEYLAM MEGA BEAM® is approx. 60% of that of glulam with the same bending property, and because it is light-weight, it is easier to design, transport and install.

Ministerial Certification
KEYLAM MEGA BEAM®
(I-Shaped Type)

60-min. Fireproof Floor Construction
FP060FL-0128
(with heat insulation material)
FP060FL-0124
(without heat insulation material)

KEYLAM SS Panel®

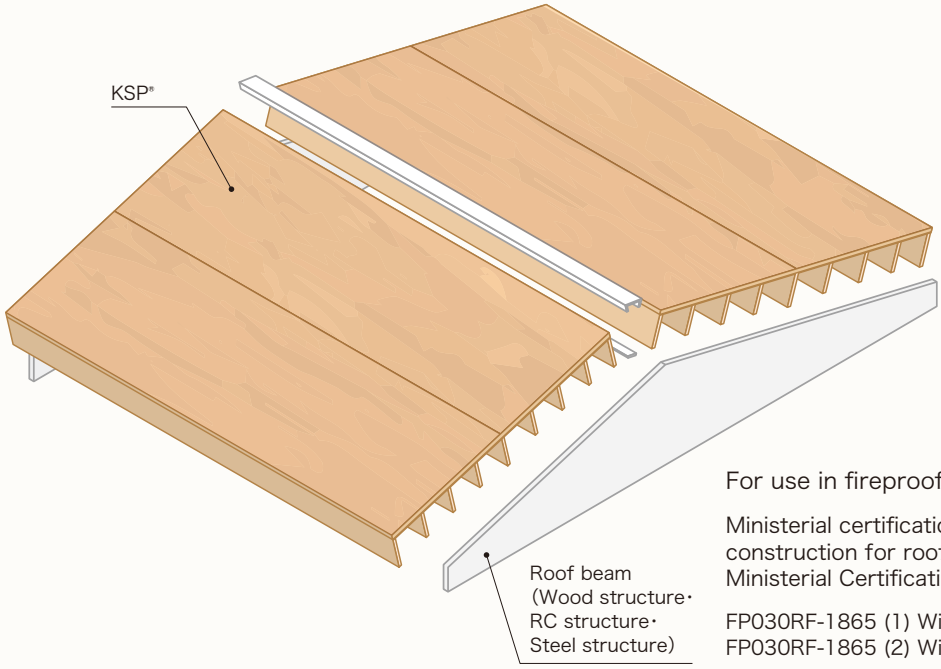
Composite Beam by Integrating both Faces of Framework of Beams with Panels for Improving Efficiency against Out-of-Plane Bending Moment.

This is a hollow wood slab construction suitable for creating flat slab space without joists or rafters, and can be used effectively as a large floor element with a relatively longer span while securing a greater ceiling height in non-residential buildings.

Photo above : Clubhouse of Shimonoseki Golf Club (Photo by : Shimizu Corporation)
Photo lower left : Suzunoki-dai Nursery School Photo lower right : KEYLAM SS Panel® in construction

KEYLAM SS Panel® Roof

The depth of KSP® (KEYLAM Stressed-Skin Panel) is smaller and it can be used for composing light-weight shed and flat roofs.



For use in fireproof construction

Ministerial certification of 30-min. fireproof construction for roof obtained,
Ministerial Certification No.

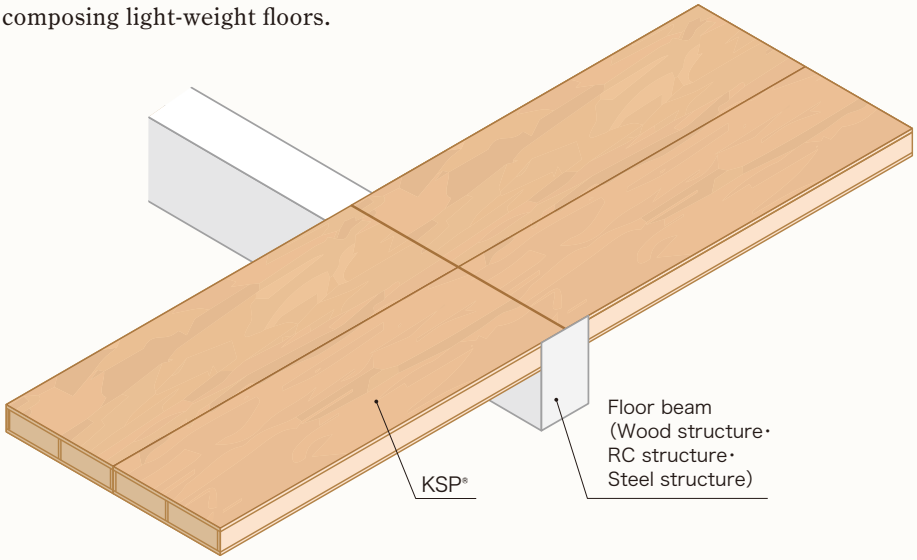
FP030RF-1865 (1) Without heat insulation material
FP030RF-1865 (2) With heat insulation material

- Fire protection with 21mm thick fire-resistant gypsum board
- Possible to use as a fireproof roof of factory, warehouse, etc.
- No restriction on span
- Many types of roof finishing material can be used.

For details, please see "The Manual of Fire-Resistive Structures" published by National LVL Association and available from HP of the Association at www.lvl.ne.jp/data/index.html.

KEYLAM SS Panel® Floor

The depth of KSP® is smaller and it can be used for composing light-weight floors.



Advantages

Possibility of Longer Spans
It can be used for composing floor and roof structures having the long spans of 6m~12m in residential houses and medium-high multi-story and large-scale wood buildings.

Light-Weight and High Thermal Insulation
As it is a hollow construction, it is lighter than large dimension solid engineered wood, and a thermal insulation material can be filled in the hollow space of panel.

Shorter Construction Time
As it is prefabricated at factory and delivered to construction site, erection works can be completed in a shorter time, making cost reduction possible.

Suitable for Use in Hybrid Construction
It can be used as a floor beam/girder and roof structural roof component/girder in light-weight structural elements of floor and roof of wood, steel and RC framed buildings.

Design Method
Only the web (LVL) is assumed to take the bending and shear forces alone, while the flange part contributes to increasing the stiffness of floor construction to reduce environmental vibration.

Certified 30-min. Fireproof Roof Construction (with or without Heat Insulation Material)
A 30-min. fireproof roof construction certification has been obtained. Please contact us for details.
[FR030RF-1865(1)、(2)]

Application

Structural floor and roof panels for longer spans used in large-scale buildings of wood, steel and RC constructions

Wood Species

Web：Japanese larch
Flange：Japanese larch
(In case the width is more than 1200㎜, spruce is used)

Specifications

Width(㎜)	Height(㎜)	Length(㎜)
1200	max.650	max.12000
1820	max.650	max.12000

Span Table

Span Table For Roof

Max. span (㎜)	Panel depth(㎜)					
	Snow depth	General region		Heavy snowfall region		
		30㎝	50㎝	100㎝	140㎝	200㎝
8000		300	300	300	300	350
9000		300	350	300	350	350
10000		400	400	350	350	400
11000		450	500	350	400	450
12000		500	550	450	450	500

※Snowfall 30㎝・50㎝：Bottom face of panel open, width 1820㎜, web spacing 600㎜
Snowfall 100㎝～200㎝：Box-Type, width 1820㎜, web spacing 600㎜
Loading condition：Evenly distributed load, dead load = 440 N/m² (with pressed cement tile roofing)

With the EI value of full sectional area, deflection 20mm or L/400,
only bending and shear stresses in the web under snow loading are considered in the structural analysis
The above is an example only for your information.

Span Table for Floor

Max. span (㎜)	Panel depth(㎜)	
	Max. allowable load (N/m²)	
	2900	4000
7000	450	500
8000	500	550
9000	550	600
10000	600	650*

※Box-Type, width 1820㎜, web spacing 600㎜
Loading condition：
Evenly distributed load, dead load = 1200N/m²
With the EI value of full sectional area,
deflection L/800, only bending and shear stresses
in the web are considered in the structural analysis
The above is an example only for your information.
*With a different spacing of webs.

KEYLAM® Earthquake-Resistant Portal Frame

Earthquake-Resistant Portal Frame requiring No Complex Structural Analysis normally required for Use of Conventional Rigid Frames.

For simple installation in places such as built-in garage and open-space living room with large openings.

Photos above & lower left & lower right :
KEYLAM® Earthquake-Resistant Portal Frame in construction

KEYLAM® Earthquake-Resistant Portal Frame

Advantages

Free & Flexible Design of Openings

KEYLAM® Earthquake-Resistant Portal Frame is made of wood materials and easy to remanufacture so that it can be made freely in various designs and sizes.

Suitable for Use in Narrow & Small Land

By using it as an alternative to load bearing walls, sufficient openings for realization of houses with light rooms can be secured.

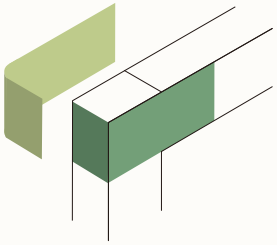
Design of Openings

By reinforcing the openings to increase the resistance to shaking and twisting forces caused by earthquake, the structural balance can be improved.

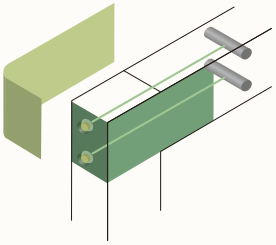
Two Types of Rigid Framing System

Two types of frame are available. You can choose either or both according to your needs.

Box-type frame
Connection with aramid fiber sheet



Portal-type frame
Connection with aramid fiber sheet and bolts



Application

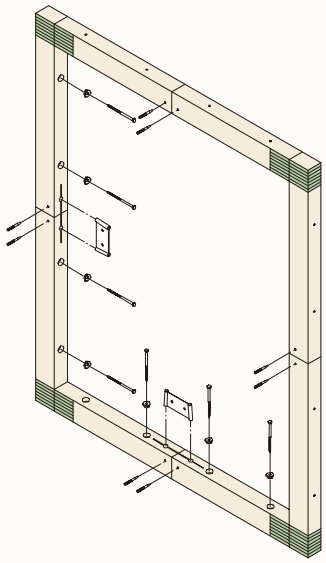
For openings in newly built houses and buildings of the post and beam construction, improvement in renovation of resistance of opening part against earthquake, spacious built-in garages with wide openings, and for flexible design of openings in interior space

Wood Species

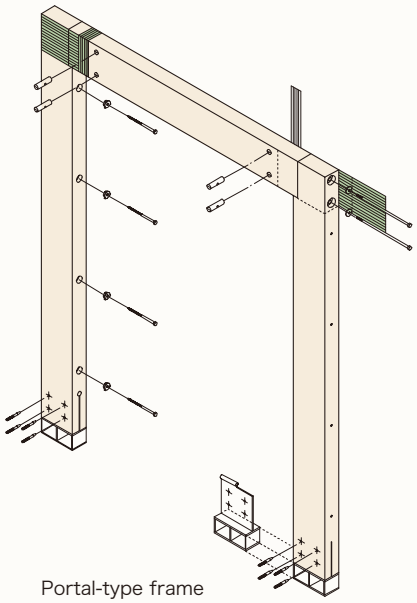
Japanese larch･Siberian larch

Specifications

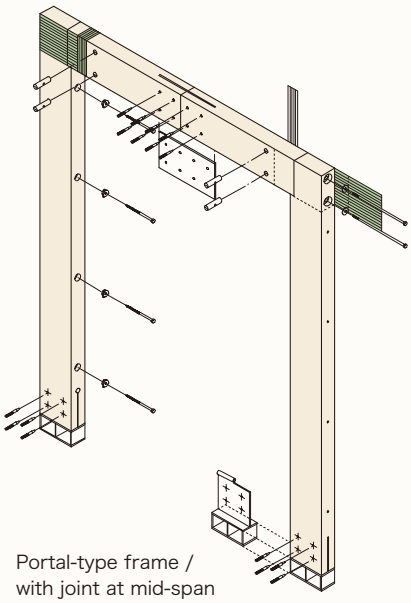
Product	Sectional dimensions of frame(㎜)		Distance between centerlines of post(㎜)
Box-type frame	105	150	910～3640
Portal-type frame	105	240	910～6370
Portal-type frame / with joint at mid-span	105	240	910～6370



Box-type frame

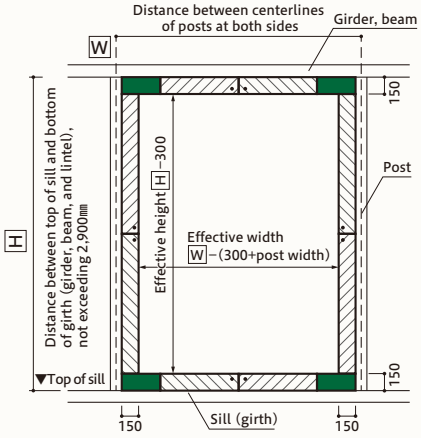


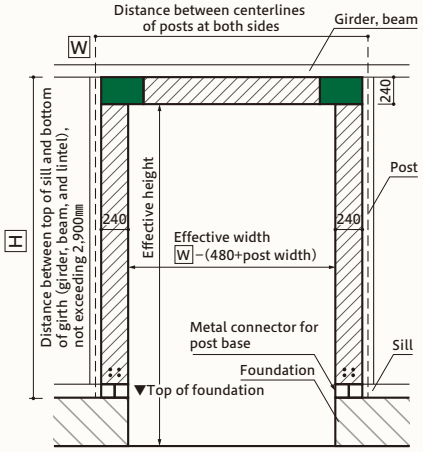
Portal-type frame



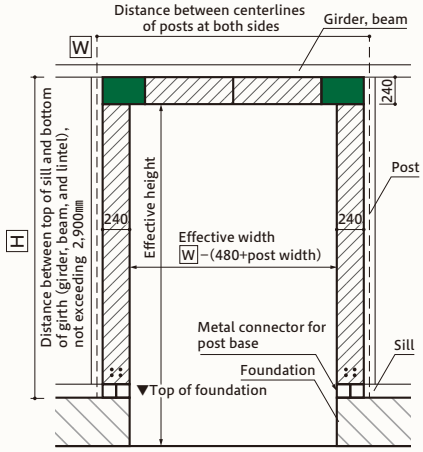
Portal-type frame / with joint at mid-span

Shear Strength Table





※ Use only at the 1st floor level



※ Jointed at mid-span with metal connector
※ Use only at the 1st floor level

Box-type frame			
Distance between centerlines of post *W* (㎜)	Allowable shear strength (kN)	Magnification coefficient of equivalent wall	Magnification coefficient per unit length
910.0	2.89	1.47	1.62
1137.5	3.24	1.65	1.45
1365.0	3.54	1.81	1.32
1592.5	3.80	1.94	1.22
1820.0	4.00	2.04	1.12
2047.5	4.16	2.12	1.04
2275.0	4.26	2.17	0.96
2502.5	4.31	2.20	0.88
2730.0	4.31	2.20	0.81
2957.5	4.25	2.17	0.73
3185.0	4.14	2.11	0.66
3412.5	3.99	2.04	0.60
3640.0	3.79	1.93	0.53
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

Portal-type frame			
Distance between centerlines of post *W* (㎜)	Allowable shear strength (kN)	Magnification coefficient of equivalent wall	Magnification coefficient per unit length
1820.0	9.83	5.01	2.75
2047.5	9.84	5.02	2.45
2275.0	9.86	5.03	2.21
2502.5	9.88	5.04	2.01
2730.0	9.89	5.04	1.85
2957.5	9.91	5.05	1.71
3185.0	9.91	5.05	1.59
3412.5	9.93	5.06	1.48
3640.0	9.94	5.07	1.39
3867.5	9.96	5.08	1.31
4095.0	9.97	5.08	1.24
4322.5	9.98	5.09	1.18
4550.0	9.99	5.09	1.12
4777.5	10.00	5.10	1.07
5005.0	10.01	5.10	1.02
5232.5	10.03	5.11	0.98
5460.0	10.04	5.12	0.94
5687.5	10.05	5.12	0.90
5915.0	10.06	5.13	0.87
6142.5	10.07	5.13	0.84
6370.0	10.08	5.14	0.81

Portal-type frame / with joint at mid-span			
Distance between centerlines of post *W* (㎜)	Allowable shear strength (kN)	Magnification coefficient of equivalent wall	Magnification coefficient per unit length
1820.0	7.73	3.94	2.16
2047.5	7.58	3.87	1.89
2275.0	7.43	3.79	1.67
2502.5	7.29	3.72	1.49
2730.0	7.15	3.65	1.34
2957.5	7.00	3.57	1.21
3185.0	6.86	3.50	1.10
3412.5	6.73	3.43	1.01
3640.0	6.59	3.36	0.92
3867.5	6.45	3.29	0.85
4095.0	6.32	3.22	0.79
4322.5	6.19	3.16	0.73
4550.0	6.05	3.09	0.68
4777.5	5.92	3.02	0.63
5005.0	5.87	2.99	0.60
5232.5	5.79	2.95	0.56
5460.0	5.65	2.88	0.53
5687.5	5.53	2.82	0.50
5915.0	5.40	2.76	0.47
6142.5	5.27	2.69	0.44
6370.0	5.14	2.62	0.41

KEYLAM Interior®

Unique Expression made possible Only with LVL, completely Different from SOLID WOOD.

Face of LVL with stripe pattern created from production process of lamination is exposed to view for special architectural effects and interior designs.

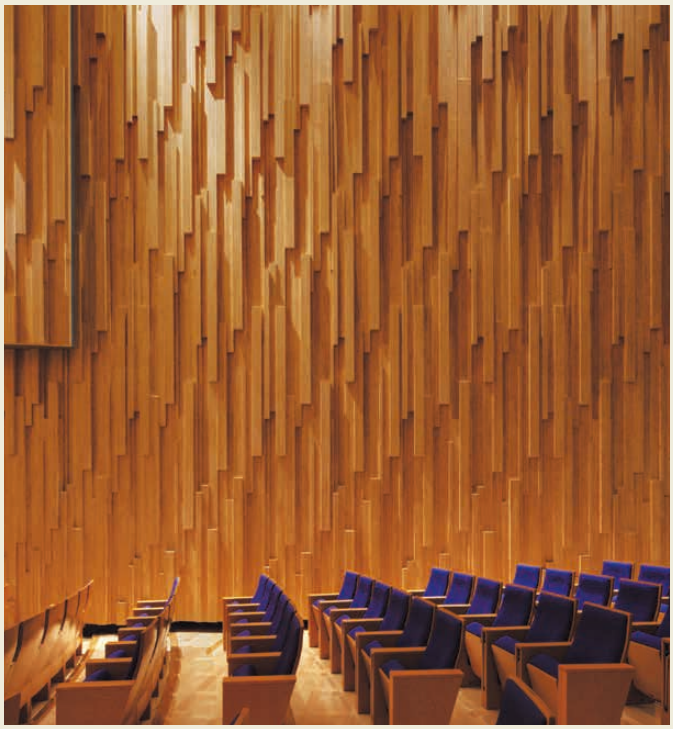


Photo above : Yokohama Campus Building No. 29, Kanagawa University
Photo lower left : Megrez Hall, Polaris College of Nursing
Photo lower right : Sato Dental Clinic(Photo by: Satoshi Asakawa / Design by: Architect-cafe mikio tai architect & associates)

KEYLAM Interior®

Interior finishing wood material with characteristic stripe pattern made possible only with LVL.

KEYLAM Interior® Board

Edge glued boards of KEYLAM Interior® for interior finishing of a wide range of surfaces.

KEYLAM Interior® T&G

Tongued and grooved boards of KEYLAM Interior® for easier interior finishing work.

Tongue-and-groove joint specification

KEYLAM Interior® FR

By giving KEYLAM Interior® a quasi non-combustible property, an interior finish material for versatile interior finishing work with fewer limitations from fire regulations is now available.

KEYLAM Interior® FR is quasi non-combustible, so that it can be used in parts of building where the restriction on interior finish of the Building Standard Law prohibits the use of material without the quasi non-combustible property. (Quasi non-combustible property only, certified by the Minister of Land, Infrastructure, Transport and Tourism)

LVL treated with a phosphorous & nitrogen-based fire retardant [QM-0821 (3)]
(General Incorporated Association of "National LVL Association" has received the ministerial certification.)

Advantages

Unique Stripe Pattern

Face of LVL with unique stripe pattern created from production process of lamination is exposed to view for special architectural effects and interior designs.

Use of Domestic Wood

Domestic or local wood can be used on request.

Application

Interior finish material

Wood Species

Japanese cedar・Japanese larch

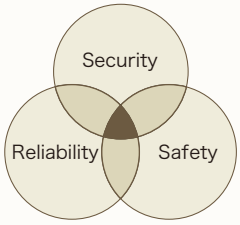
Specifications

Product name		Wood Species	Thickness (㎜)	Width (㎜)	Length (㎜)
KEYLAM Interior®	General specifications	Japanese cedar・Japanese larch	15	150	2000
					4000
			30		2000
					4000
KEYLAM Interior® Board	General specifications	Japanese cedar・Japanese larch	30	600	4000
KEYLAM Interior® T&G	T&G board product Packed in corrugated cardboard (10 pcs/pack)	Japanese cedar・Japanese larch	15	140 ※Effective width	2000
KEYLAM Interior® FR	Quasi non-combustible property	Japanese cedar	15	150	2000
					4000
			30		2000
					4000

※KEYLAM Interior® FR needs to be surface coated.

Quality and Property Control System

Quality is controlled thoroughly and jointly by KEYTEC Co., Ltd. and General Incorporated Association of “National LVL Association”. Reliable, secure and safe material is supplied.



Ministerial certification (KEYLAM Interior® FR)

QM-0821(3):
LVL treated with a phosphorous & nitrogen-based fire retardant

(General Incorporated Association of “National LVL Association” has received the ministerial certification.)

Precautions for Use of KEYLAM Interior® FR

1. The product is for interior use only, and cannot be used outdoors.
2. The product is pressure impregnated with inorganic fire retardants. If it is exposed to moisture or high humidity in storage or during construction, an efflorescence phenomenon may occur, making the surface covered with whitish crystallized ingredients of the fire retardant which leached out from the inside of pressure impregnated LVL. This phenomenon can spoil the beauty of surface.
3. It is necessary to always surface coat the product in order to prevent an efflorescence phenomenon from occurring. For surface coating, use an acrylic urethane or urethane resin coating material. Some coating materials recommended by us are; “Safety Waltz New Rescue Coat” manufactured by Otani Paint Co., Ltd. and “Pure Flat” by Gen Gen Corporation.
4. The coating material shall be a solvent based coating material. If a water based coating material is used, an efflorescence phenomenon from occurring. can occur and impair the quasi non-combustible property of treated LVL.
5. As the product is dispatched soon after pressure impregnation and drying are completed without further processing for dimensional adjustment, it may be necessary to adjust the dimensions after delivery.
6. When installing the product, joints must be protected with a fire-resistive material in order to prevent fire from burning through the joints. Please be informed that without such joint protection, the product is not qualified as a quasi non-combustible material.

KEYLAM Interior® FR Sheet

This is an ultra-thin sheet sliced off with innovative technology from the stripe patterned face of LVL for flexible interior finishing.

Advantages

Unique Stripe Pattern of LVL

A new lineup in the series of KEYTEC's designs of interior finishing products has been added.

Certified Non-Combustible Material

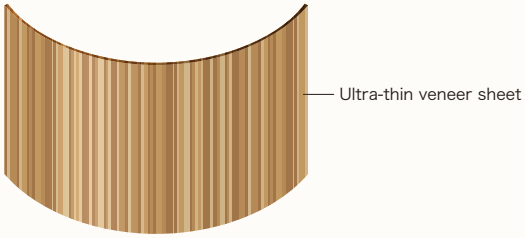
A ministerial certification as a non-combustible material has been obtained. It can be used in places where fire safety restrictions on interior finishing are applied.

Use of Local Wood

Local wood from forests around Japan can be used.

Foldable

The ultra-thinness of the sheet excels in plasticity making it possible to stick it to curved and uneven surfaces.
Around a projected corner part, the sheet can be folded around parallel to the stripe.



Application

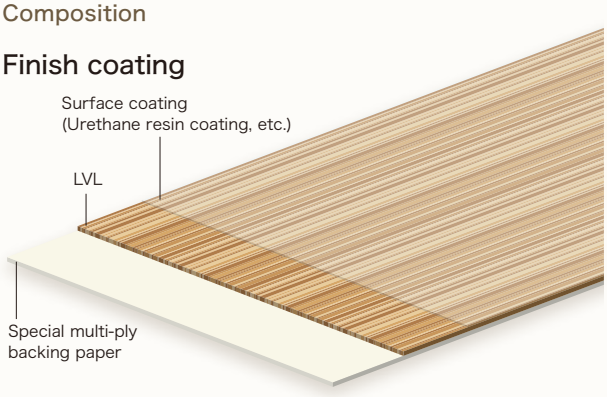
Interior finish material

Wood Species

Japanese cedar

Composition

Finish coating



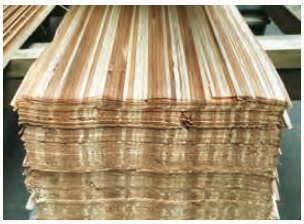
Specifications

Product name	Specifications	Width (㎜)	Length (㎜)	Thickness (㎜)
KEYLAM Interior® FR Sheet	Finish coating	910	2430	approx. 0.28

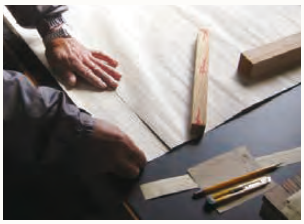
※Order-made product , width 630㎜ and length 2730㎜.

Manufacturing Process

LVL is manufactured



Sliced to ultra-thin veneer strips

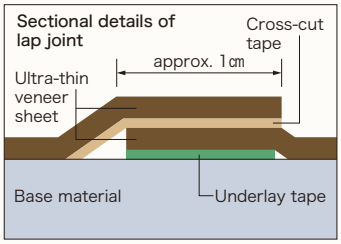


Welding veneer strips
to make full size veneer sheets

Non-combustible veneer sheets
for interior finishing

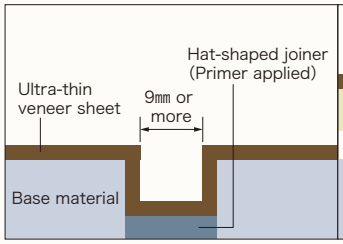
Procedure of Installation

Sticking with lap joint

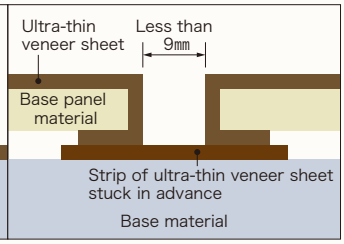


Sticking with lap joint is a method similar to that of sticking vinyl cloth on wall with lap joint.

Sticking with grooved joint (Joint width 9㎜ or more)



Sticking with grooved joint (Joint width less than 9㎜)



Groove width 9㎜ or more	**①In case plasterboard is the base** Stick widthwise; along the grooved joint, the edge of veneer sheet shall be aligned. The following features are noted: ・The use of hat-shaped joiners eliminates the need for extra layer of plasterboard. ・If the surfaces of the base material cut at construction site need to be covered with the veneer sheets, use always hat-shaped joiners. ・Insert a joint rod along the grooved joint until all installation work is completed. (Recommended width of joint is 9㎜ or more, and that of depth 8㎜ or more.) **②In case calcium silicate board or flexible board is the base** Use boards cut with a panel saw to exact dimensions. In case the board is cut at construction site, and for the width and depth of joint, refer to the procedure similar to that of plasterboard.
Groove width less than 9㎜	Stick a strip of ultra-thin veneer sheet on the base material in advance.

Certification by the Minister of Land, Infrastructure, Transport and Tourism

The certification is given on the condition that KEYLAM Interior® FR Sheet is used to surface finish the non-combustible base materials listed in accordance with NM-4383: (Steel & Other Metals), NM-4384: (Aluminium based Materials) and NM-4385: (Inorganic Materials such as Fiber Reinforced Cement Boards, Glasses, Mortar, Stones, Plasterboards of 12mm or thicker).

Manufacturer : BIG Will Co., Ltd.

Plywood

JAS (Japanese Agricultural Standard) certified product

(Scaffold plywood plank of domestic wood excluded)

100 Years Since the Start of Manufacturing Plywood in Japan.

Plywood has for years been regarded as an indispensable material in our wood loving Japanese lifestyle for its good workability and usability in making DIY items, furniture, houses, buildings, etc.

Plywood

Scaffold plywood plank of domestic wood

Photos above & lower left : KEYTEC Kisarazu Factory
Photo lower right : Scaffold plank of domestic wood in use

Lauan Plywood

JAS marked plywood for general use

JAS (Japanese Agricultural Standard) certified product

Advantages

Southeast Asian Wood Species

Plywood manufactured from Southeast Asian wood species (broad-leaf tree or hardwood).

Beautiful Face Veneers

Its face veneers are beautiful and smooth, so that it is widely used as a base board of decorative panel, as well as for general and structural uses.

Softwood Plywood

JAS marked structural plywood

JAS (Japanese Agricultural Standard) certified product

Advantages

Domestic Wood

Plywood manufactured from 100% domestic wood.

Use of Thinned Wood

Structural plywood is manufactured from thinned trees of softwood from the forest.

Use of Local Wood

Logs felled in designated areas can be used for manufacturing plywood.
Logs used are in conformity with SGEC and FSC®.

Plywood treated with Insecticide

JAS marked plywood treated with insecticide

JAS (Japanese Agricultural Standard) certified product

Advantages

Strong against Insect Attacks

The injurious insect of Lyctus brunnus is kept off.

Safe Material

It is treated with a non-organophosphorus-based insecticide and highly safe.
Also, in conformity with the criteria of the VOC Regulation in force.

Reliable Material

As the insecticide is mixed in the adhesive, it is much safer for a human body in comparison with surface treated plywood.

Microcapsule

The insecticide contained in the microcapsule reacts only when the insect bites, hence the ingredients of insecticide do not disperse or emit under usual conditions.

No Unpleasant Odor

Human-friendly and odorless.

Scaffold Plywood Plank of Domestic Wood

Strong scaffold plank of plywood

Advantages

Wide Range of Application

It can be used in the fields of chemical, electric and ceramics industries, plant construction, etc. as well as for temporary stands of entertainment events, etc. where metallic scaffold planks are not suitable.

Possibility of Nailing and Easy to Cut and Drill

Unlike the metallic scaffold plank, it can be nailed, cut, drilled, etc. easily.

Application

Scaffold planks in conformity with the various forest certification systems can be manufactured FSC certified scaffold planks can also be manufactured

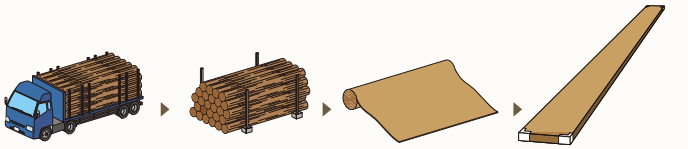
Wood Species

Japanese larch

Specifications

Thickness (mm)	Width (mm)	Length (mm)
35	240	4,000
		2,000

Manufacturing Process



Thinned trees of Japanese larch and B-grade logs are transported from the forests of various regions

Storing at Kisarazu Factory

Veneers

Product (yield rate 50%)

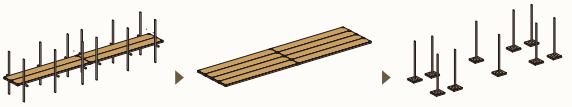
The remaining 50% (by-product) is burnt in the boiler of the factory to generate heat energy used for drying and hot pressing veneers.

Flow of Utilization

Scaffold planks

Dunnage boards and floorboards

Square footboards



After using as scaffold planks, next as dunnage boards and floorboards

After that, cutting further to use as square footboards

Carbon Dioxide Fixing

Precautions for Use

- Excessive impact loads induced by jumping up/off must be avoided.
- Do not overload the plank exceeding the allowable payload.

Allowable Payload

Cross section		Load	Span			
Thickness (mm)	Width (mm)		0.9m	1.2m	1.5m	1.8m
35	240	Concentrated load (kg)	240	180	144	120
		Evenly distributed load (kg)	480	360	280	240

※ The distance between adjacent supporting points shall be 1.8 m or less.

Service Life

The analysis of correlation for 6-month, 12-month and 24-month durabilities based on the bending test results of test specimens after 3-month weathering and exposure to radiation outside shows that the service life of the scaffold plank is estimated to be about 3 years in normal usage and under proper management.

(Source: General Incorporated Association - "Association of Safety Technology for Scaffold Planks of Plywood")

Test Results and Criteria of Safety Technology of Scaffold Plywood Planks of Domestic Wood

	Bending strength (N/mm²)		Young's modulus of bending (N/mm²)	
	Result of experiment	Safety standard value	Result of experiment	Safety standard value
New product	63.0	44.0	11,205	8,820
Product after 3-month weathering and exposure to radiation	59.0	27.5	10,261	7,840

Q & A

Products

Q From where does the raw material of wood come?

A Chiba, Yamanashi, Nagano, etc. in Japan, and from overseas, Russia, Malaysia, Indonesia are the main suppliers.

Q What wood species?

A Japanese cedar, Japanese larch, red pine, Siberian larch, etc. are the main wood species.

Q Can custom-made products be manufactured?

A Of course, yes. Product sizes differ depending on the intended purpose and place of use. We can manufacture custom-made products upon request if the products of requested sizes can be manufactured.

Q What are the applicable standards of stressed-skin panels and massive wall panels?

A These products are manufactured in accordance with the required specifications and sizes for particular projects. For further information, such as relevant standards and application, please contact our Division of Business Development and R&D.

Q Is it possible to request to use local wood of a specified region for manufacturing LVL or plywood?

A Generally, yes, but it depends on whether or not it is possible to get a suitable raw material of wood from the specified region. Please contact us case by case.

Q What is thinned wood?

A Thinned wood is trees coming from the forest after thinning to prevent trees growing too densely.

Q Do all products meet the requirements of F☆☆☆☆?

A Yes. All of our products are JAS graded as F☆☆☆☆ or equivalent to F☆☆☆☆.
※Except plywood for concrete formwork, which is graded as F☆☆☆.

Adhesives / Insecticides, Preservatives, Anti-Termite Treatments

Q Can your products be treated against rot and termite attack?

A Yes. The preservative or insecticide is mixed in the adhesive, so that the inside of product can be treated well. Like the treatment by pressure impregnation, it is an environmentally friendly and highly safe treatment.

Q Isn't the adhesive bad for environment and a human body?

A The adhesives used in our products are certified as F☆☆☆☆ .

Q When the products are burnt, no toxic substances are emitted?

A No toxic substances such as dioxin are emitted when our products are burnt.

Q Service life of adhesives?

A It depends on the usage conditions.
In USA there is a 100 years old building in which similar adhesives were used.

Support System

Q Please tell how to use products other than posts/columns and joists/beams.

A Even with the posts/columns and joists/beams, you can use construction methods, in which longer spans of frames than those in the conventional post and beam and wood frame construction methods, can be constructed. In addition to structural posts/-columns, joists/beams and panels, there are products suitable for use in massive wall construction and interior finishing. Feel free to contact us with any questions. We can forward information on reference projects which can be of interest to you.

Q We cannot understand about structural analysis.

A We are pleased to help you. The experts at Department of Wood Structure Business of one of our group companies can support you.

Q What is the extent of your business activities?

A Project by project, we can design, manufacture and use products for a particular project. Please contact us for details.

Q Any seminars held by your company?

A We hold seminars now and then non-periodically. We announce any scheduled seminar in our HP on the web.

Q Before deciding to use LVL, we want to make a factory tour.

A Those wishing to make a factory tour, please contact us in advance.

Q Can you consider developing a new product?

A Please contact us.
We have many experiences of the developments of various structural products and of research works on fire resistive construction, etc. in cooperation with outside experts in the past and at the present.

Our Company

Company Outline

Company name	KEYTEC Co., Ltd.
Executive officer	Hirokazu Nakanishi / President
Employees	approx. 200 persons
Establishment	April 18, 1958
Capital	JPY 268,400,000.-
Product line	Plywood for general use , Structural Plywood , Plywood treated with insecticide , Scaffold planks , Structural LVL , LVL for interior finishing , I-joist , I-Shaped/girder , Earthquake-resistant frame , Laminated wood wall , Stressed-skin panel , Fireproof structural member/element
Business outline	Manufacturing and sales of plywood, LVL and other wood based building materials
Major shareholders	JK Holdings Co., Ltd. Employee Stock Ownership Plan of KEYTEC The Shoko Chukin Bank, Ltd.
Main customers and sales contacts	SMB Kenzai Co., Ltd. ITOCHU Kenzai Co., Ltd. Japan Kenzai Co., Ltd.
Main business connections	ITOCHU Corporation Sumitomo Corporation Sumitomo Forestry Co., Ltd. Oshika Corporation
Main bank connections	Sumitomo Mitsui Banking Corporation / Nihonbashi-Higashi Branch The Shoko Chukin Bank, Ltd. / Fukagawa Branch
Affiliated companies	JK Holdings Co., Ltd. Japan Kenzai Co., Ltd. JK CARGO Co., Ltd. Nihon Paneform Co., Ltd. KEEL WEST JAPAN Co., Ltd. Akita Glulam Co., Ltd. KEYBOARD Co., Ltd.

Headquarters, Factory, Delivery Center

Headquarters	Wood Land Tower, 1-7-22 Shinkiba, Koto-ku, Tokyo, 136-0082 Japan TEL:03-5534-3741　FAX:03-5534-3750
Kisarazu Factory	15 Mokuzai-minato, Kisarazu-shi, Chiba, 292-0837 Japan TEL:0438-36-9311　FAX:0438-37-2102

http://www.key-tec.co.jp/

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KEYTEC™

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