C I N T R A F O R

Working Paper 120

Japanese F-4Star Formaldehyde Rating Process for Value-Added Wood Products

Ivan L. Eastin
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CINTRAFOR
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Center for International Trade in Forest Products
School of Forest Resources
University of Washington
Box 352100
Seattle, WA 98195-2100

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Executive Summary

After the Kobe earthquake in 1995, the Japanese Government introduced a series of changes to improve the integrity of new homes. Part of the changes included a rating system designed to indicate the potential for formaldehyde off-gassing by a variety of primary and value-added wood products. Excessive off-gassing of formaldehyde has been identified as a contributor to a phenomenon known as "Sick House Syndrome" that has resulted in a large number of home owners having to leave their houses. Referred to as the F Four Star system (F****), the program was designed to cover much more than interior air quality and was not targeted at any particular product or building system. However, it is the interior air quality provision that concerns North American firms looking to export laminated products into Japan.

Products covered by the F**** regulation include:

- kitchen cabinets,
- bathroom cabinets,
- finished wood flooring,
- engineered wood flooring,
- wooden doors,
- wall and ceiling paneling,
- fixed shelving in cabinets,
- wooden stair treads and risers,
- wooden countertops and
- edge-glued panels.

The regulation does not apply to the following products:

- lineal wood moulding and millwork,
- door and window casings,
- wooden windows,
- wooden furniture,
- removable wood shelving,
- wooden stair railings, banisters and stringers,
- unfinished solid wood flooring and
- finger-jointed lumber.

There are three ways to ensure that wood products have been approved for sale in Japan:

- the product is on the exempt list shown above;
- use only raw materials in a product that are rated F****; or
- submit a product for Ministerial Approval in Japan after testing it in the US.

Of the two methods related to products that are not listed as being exempt, using F**** raw materials in the manufacture of a product is the easiest and cheapest route for value-added manufacturers to follow. Obtaining Ministerial Approval can cost up to US$5,000.

Value-added wood products manufacturers should ensure they comply with the provisions of this regulation to protect and maintain market access.

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1.0 Background

The objectives of this research project are targeted towards providing value-added wood products manufacturers with an understanding of how the F**** (Sick House Regulations) affect the marketing of their products in Japan and how to gain regulatory approval for their products in Japan. The specific objectives of the project address the following questions:

- What are the actual in-market test parameters for gaining regulatory approval for imported value-added wood products in Japan?
- How are the testing programs applied?
- What value-added wood products require testing?
- Can associates (such as BC Wood) provide input to the testing agency to enable exporters to meet the testing requirements without actual testing of products? (In other words, can they merely indicate the product standards and avoid testing?)
- What changes to product design or standards would provoke the need to gain new regulatory approval?
- What independent testing agencies in Japan are available for product testing?
- Do they provide documentation in English as well as Japanese?
- Can these agencies communicate with North American value-added wood manufacturers in English?
- What do they charge?
- How do these services compare to PSI in Oregon in terms of costs and documentation?

The 1995 Kobe earthquake sent tremors throughout the residential construction industry that are still being felt today. Immediate regulatory reforms were targeted at improving the structural performance of new homes, particularly with respect to earthquake resistance. However, the combined impact of these reforms fundamentally changed the way that homes were built in Japan. A brief overview of the regulatory reforms that have had the greatest impact on the residential construction industry in Japan is provided in the following section of this report.

F**** is a component of those regulatory changes and this report is focused primarily on how the F**** rating impacts value-added manufacturers. The objectives of the study detailed above are covered by the analysis contained in this report. and a summary is provided in Section 9.0.

2.0 Regulatory Reforms

The following section describes the extent, and details, of legislative and regulatory changes that occurred as a result of the 1995 Kobe earthquake. From this information it can be seen that interior air quality and the F**** rating system are a small component of a number of sweeping changes that have affected the residential construction industry in Japan. The F**** rating system is, however, important to value added wood manufacturers and could limit or eliminate their access to the Japanese market.

2.1 Building Standard Law Amendment of 1999

In May 1998 the Building Standard Law of Japan (BSL) received its first major revision since 1950. The major revisions to the BSL, which were enforced beginning in May 1999, were to:

(1) specify interim and final building inspections; and
(2) transform the BSL from a specification-based building code to a performance-based building code.

The first revision of the BSL requires that all residential housing units receive both an interim and a final visual inspection. Further, completion of the interim inspection is required before a building is eligible to receive its final inspection. Since there were only approximately 1,800 building inspectors in Japan at the time this revision was implemented, the BSL revision also enabled private construction inspection firms to be established. To provide guidance to the private inspection firms, a qualification system and standards was established within the revised BSL. Consequently, contractors are allowed to obtain a construction inspection from either a private construction inspector or an inspector from the local government agency.

The second revision transformed the BSL from a specification-based standard to a performance-based standard. As a result, any building material that meets the performance standards can be used in residential construction. While there was no mention about whether there will be reciprocity on test standards, the use of foreign test data is allowed in principle. Reciprocity allows North American firms to use the results of product tests conducted in the US and Canada to meet the performance standards in Japan.

2.2 Housing Quality Assurance Act of 2000

In addition to revising the BSL, the Housing Quality Assurance Act (HQAA) was promulgated to provide homebuyers with specific safeguards in resolving disputes with building contractors. The four objectives of the HQAA were to:

1. improve the quality and performance of residential homes;
2. provide homebuyers with a mechanism for resolving disputes with building contractors;
3. establish a system of “Housing Performance Indication Standards” against which specific houses can be compared; and
4. establish a housing completion guarantee system.

The HQAA, which went into effect in April 2000, significantly changed the nature and structure of the residential construction industry in Japan, including the specification and use of domestic and imported wooden building materials. A more detailed assessment of the individual components of the HQAA is presented below.

The first objective of the HQAA was aimed at improving the quality and performance of new homes by requiring homebuilders to provide homebuyers with a ten-year warranty against structural defects and low durability (e.g., water infiltration into the structure). Under the guidelines of the HQAA, homebuyers may make claims against homebuilders if the structural performance or durability of a home is judged to be sub-standard relative to a specific set of judgment criteria.

The second objective of the HQAA was to establish a mechanism for resolving disputes between homebuyers and home builders. To accomplish this objective, the HQAA mandates the establishment of Alternative Dispute Resolution (ADR) bodies in each prefecture in Japan. Each ADR will employ a lawyer to reconcile disagreements between builders and their customers during the ten-year warranty period. Using the "Judgment Standards for Defects" as a guide, the lawyer will judge the severity of the defect against the standard to determine if a defect exceeds the allowable guidelines. If a defect is judged to be in excess of the allowable standard, the builder will be required to correct the defect or compensate the homeowner.

The third objective of the HQAA was to establish a voluntary system of "Housing Performance Indication Standards" (HPIS) against which the performance of individual houses can be compared. While using the HPIS are not required, many home builders adopt them as a strategy for differentiating their homes in the marketplace. The specific types of performance characteristics contained in this provision of the HQAA include:

1. structural performance,
2. fire safety,
3. durability,
4. ease of maintenance and management,
5. energy efficiency,
6. ***air quality****,
7. ratio of exterior openings to total wall area,
8. noise transmission,
9. barrier free design, and
10. security against break-in.

* The focus of this report

The performance of individual houses is assessed by a "Designated Evaluation Body" using the criteria established in the "Japanese Housing Performance Indication Standards". These evaluation bodies are responsible for approving the architectural design of the house and performing inspections of the home during construction; including the foundation process, structural framing process, and the interior finishing phase of the project. Houses that meet or exceed the performance indication standards receive a "Performance Recognized House" certification.

Finally, the HQAA included a provision for a Completion Guarantee System to protect homebuyers against default by, or the bankruptcy of, their contractor before the home is completed. The framers of the HQAA included this provision for two reasons. It is typical in Japan for the homebuyer to provide financing to the contractor up front. For example, it is not unusual for the homebuyer to pay the contractor one-third of the price of the home before construction begins, with an additional third due after the house has been framed, and the remaining funds due upon completion of the house. This system may have worked well in the past but, given the recent economic recession in Japan, a number of contractors went bankrupt, leaving homebuyers with partially completed homes and outstanding payments due on building materials. The aim of the Completion Guarantee System was to provide homebuyers with a form of insurance that would help ensure the completion of the house in the event that their builder went bankrupt.

2.3 Building Standard Law Amendment of 2003

Beginning around 1995, a new term was being used within the Japanese media: "*sick house syndrome*". This term referred to the phenomenon where the build-up of volatile organic compounds (VOC's) within newly built homes became so serious that they triggered a variety of ailments and caused some families to abandon their homes because of health concerns. The occurrence of sick house syndrome is generally attributed to off-gassing of VOC's from construction materials including carpeting, paint, vinyl wall coverings and their glue, although some wooden building materials (such as plywood and particleboard manufactured in SE Asian countries and China) have also been found to emit high levels of formaldehyde. The relatively sudden occurrence of sick house syndrome is widely thought to be associated with improved construction techniques that resulted in a tighter building envelope which reduced the flow of air through the house without the attendant use of central mechanical air circulation systems; systems which are seldom used in Japan. This problem reached a peak in May 2002 when the Labor Standards Inspection Office awarded monetary compensation to a group of pre-school employees suffering from chemical exposure attributed to their being temporarily housed in a prefabricated building. During the course of the case it was found that high levels of formaldehyde were present in the building materials used in the prefabricated building.

The attendant publicity associated with this and other cases of sick house syndrome led the Ministry of Construction to amend the Building Standards Law by implementing the Sick House Regulations effective on July 1, 2003. The Sick House Regulations were designed to ban the use of chloropyrifos and regulate the acceptable levels of formaldehyde emissions in a house or public building such as schools and clinics. It also required the use of ventilation equipment in new home construction. It is against this background that the current research project was developed to provide manufacturers of value-added building with an understanding of the process for gaining regulatory approval for their products within the guidelines of the Sick House regulations.

3.0 The Sick House Formaldehyde Countermeasures

The Ministry of Construction amended the Building Standards Law (BSL) by implementing the Sick House Regulations effective on July 1, 2003. The Sick House Regulations were designed to ban the use of chloropyrifos and regulate acceptable levels of formaldehyde emissions in a house. This change had significant impacts on many North American manufacturers and exporters of value-added wood products. The goal of this section of the report is to explain the impact of the changes in the BSL and describe how North American manufacturers and exporters can comply with these changes to gain or maintain access to the Japanese market.

The BSL Sick House regulations were specifically designed to address health problems caused by chlorpyrifos and formaldehyde emissions in residential construction. The Sick House regulations state that building materials that emit chlorpyrifos shall not be used for buildings or houses having habitable rooms and thus will not be discussed further in this report. The Sick House regulations also limit the amount of formaldehyde emissions from building materials to an established level, including wooden building materials. The Sick House regulations addressed formaldehyde emissions in residential housing by specifying three Countermeasures as illustrated in Figure 1 and listed below:

- F**** rating of materials
- Mechanical Ventilation
- Attic, etc

3.1 Countermeasure 1. F**** Rating of Materials

The first Countermeasure imposes restrictions on the use of interior finishing materials that emit formaldehyde and it imposes surface area restrictions on the use of building materials that receive a rating below F****. (Note that there are no restrictions on the use of wooden building materials that have received an F**** rating) (See Table 1). This Countermeasure generally applies to wooden building materials that are considered to be built-in (permanent), visible, and that are used in a habitable room in a house. This group of products includes:

- kitchen cabinets,
- bathroom cabinets,
- finished wood flooring,
- engineered wood flooring,
- wooden doors,
- wall and ceiling paneling,
- fixed shelving in cabinets,
- wooden stair treads and risers,
- wooden countertops and
- edge-glued panels.

As a general rule, structural glulam and LVL did not fall under the Sick House regulations. There has been a recent inclusion, however, that is referred to as the “1/10 Calculation”. Linear glulam and linear LVL are subject to the Sick House regulations if the exposed area of the glulam or LVL member exceeds 1/10 of the surface area of the room (surface area is the sum of the wall areas, floor area and ceiling area). Embedded glulam or LVL (ie. members hidden within a wall and not visible within the room) are included in the Attic, etc. section of the regulations and are exempted from the 1/10 Calculation.

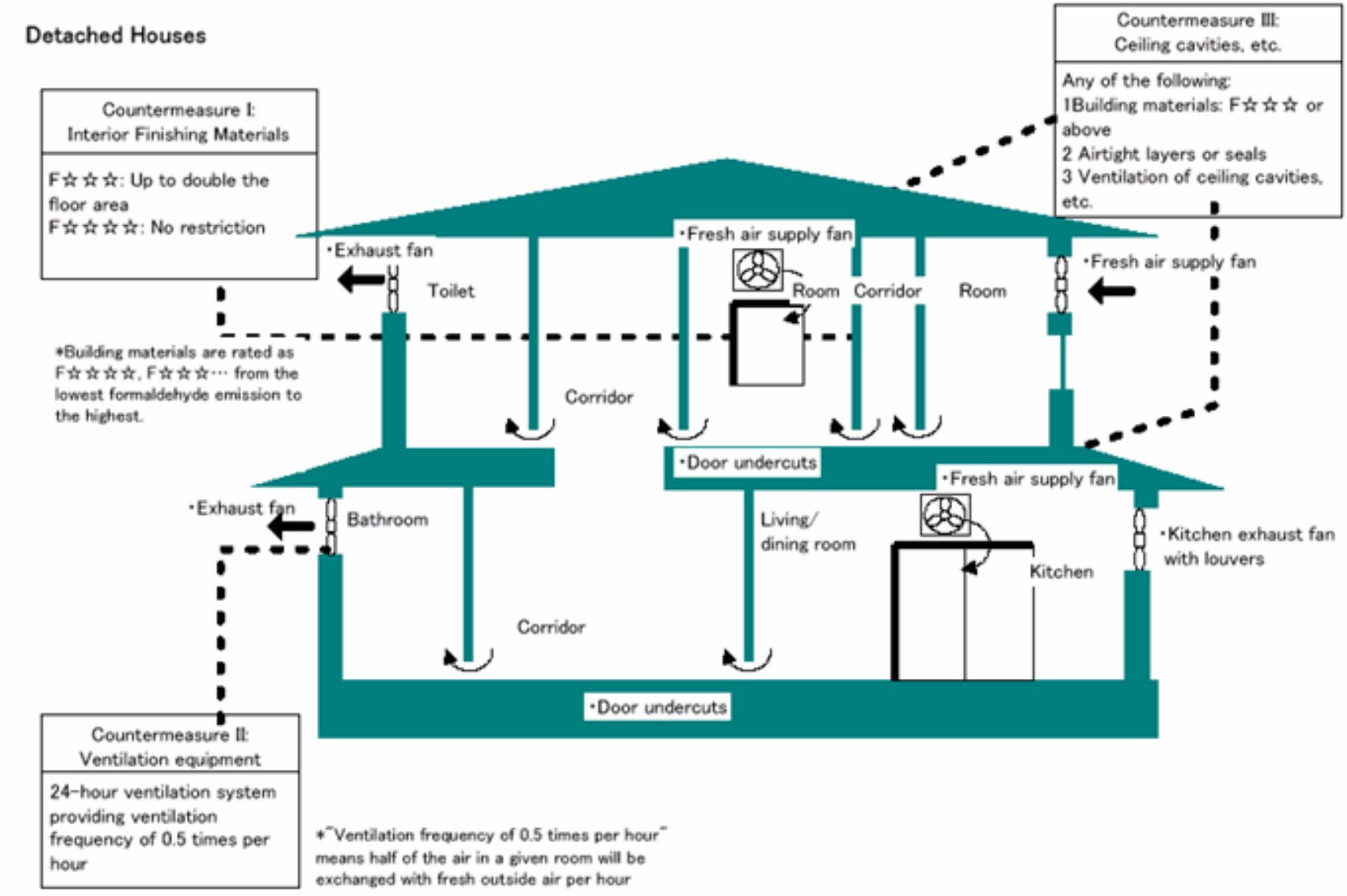


Figure 1. Summary of the three countermeasures designed to reduce formaldehyde levels in habitable spaces in residential houses.

There is a group of wooden building materials that are exempted from the Sick House regulations and whose use in a house is unrestricted. These products are either considered to be movable or of a small enough surface area that formaldehyde emissions would be low enough so as not to pose a significant health risk to the buildings inhabitants. These unrestricted products include:

- lineal wood moulding and millwork,
- door and window casings,
- wooden windows,
- wooden furniture,
- removable wood shelving,
- wooden stair railings, banisters and stringers,
- unfinished solid wood flooring and
- finger-jointed lumber.

Any product within a room that is movable is exempted from the formaldehyde emission restrictions (for example, furniture and removable cabinet shelves). If a product is listed as an exempted product, then it is also unaffected by the formaldehyde emission restrictions within the BSL.

Table 1. Formaldehyde emission levels for the F* rating system.

Formaldehyde Emission Rating	Formaldehyde Emission Rate, X (mg/m^2h)
F*	$X > .12$
F**	$.12 \geq X > .02$
F***	$.02 \geq X > .005$
F****	$X \leq .005$

As an aside comment, it is important to note that while the Sick House regulations allow the use of F*** and F** building materials, home buyers are reluctant to accept these products in their homes. Responding to these concerns, most home builders prefer to use F**** rated building materials whenever possible (and many are demanding that only F**** be used in their homes, even in areas where they are not specifically required). As a result, building material importers and wholesalers in Japan may specify that building materials achieve an F**** rating to coincide with this market preference.

Wherever possible value-added wood product manufacturers should use F**** rated raw materials for all components in their products to avoid the possibility of being shut out of the Japanese market. For those building materials that emit formaldehyde and are subject to the Sick House regulations, a formaldehyde emission rating system was developed (see Table 1 above).

Any building material or value-added wood product that receives an F* rating can be used without restriction anywhere within a residential house or public building.***

Building materials that receive a lower F star rating (either F*** or F**) can be used in habitable rooms in residential homes subject to specific area restrictions, based on Equation 1. Building materials that receive an F* rating cannot be used in a residential house at all.

Equation 1:

$$N_2S_2 + N_3S_3 \leq A$$

where:

N_2: value for F** material (type 2)
N_3: value for F*** material (type 3)
S_2: Surface area of type 2 building material
S_3: Surface area of type 3 building material
A: floor area of habitable room

3.2 Countermeasure 2. Mechanical Ventilation

The second Countermeasure requires that ventilation equipment must be installed in new homes (with very few exceptions) to remove formaldehyde emissions from the indoor environment before they can build up to noxious levels. The efficiency of the ventilation system is generally measured in the number of times it can replace the air in a room per hour. Mechanical ventilation systems are required since there are many point sources of formaldehyde in a house and even small amounts of formaldehyde off-gassing from a large number of materials can build up to substantial levels and have substantial health impacts. Significant point sources of formaldehyde in Japanese rooms include vinyl wall coverings and adhesive (most Japanese houses use vinyl wall coverings rather than having the wall painted), synthetic carpeting, upholstered furniture, and vinyl floor coverings. The efficiency of a mechanical ventilation system is important since it determines the N value used in the area restriction equation and therefore influences the amount of F*** and F** wooden building materials that may be used in a house.

Table 2. Standard N values for calculating area restrictions.

Type of habitable room	Ventilation (times/hr)	N_2	N_3
Habitable room in house	0.7	1.2	0.20
	$\geq$ 0.5 but < 0.7	2.8	0.5
Habitable room in other buildings	$\geq$ 0.7	0.88	0.15
	$\geq$ 0.5 but < 0.7	1.4	0.25
	$\geq$ 0.3 but < 0.5	3.0	0.5

3.3 Countermeasure 3. Attic, etc

The third Countermeasure applies restrictions on building materials used in attic spaces, *etc.* This Countermeasure is designed to prevent the infiltration of formaldehyde from the attic into the living spaces of a house. If an air barrier is installed in the attic (for example an impermeable plastic or vinyl sheet), then the building materials used in the attic and roof system are not subject to the Sick House regulations. This also applies if a ventilation system is installed in the attic area. However, if an air barrier or ventilation system is not installed in the attic area, then only F*** or F**** materials can be used in the attic area.

The specification of the etc. in the Attic spaces, etc, refers to the inclusion of non-visible surfaces in habitable rooms which are included in the Sick House regulations but are not included in the third Countermeasure. This portion of the Countermeasure applies to materials that are installed or used in habitable rooms but which are not visible (and thus are not covered by the first Countermeasure). An example of this would be the back and top of a wall mounted kitchen cabinet. Since these surfaces are not visible and they are not separated from the room by a vapor barrier, only F*** or F**** materials may be used.

4.0 Determining the Approval Process

When considering how the BSL F**** amendment might affect a specific building material and the procedure for gaining approval for its use in Japan, exporters need to determine which of the following three scenarios apply to their product:

1. the product being exported is listed as an exempted product (in this case the product may be exported to Japan with no restrictions and this scenario will not be discussed further),
2. the product being exported is manufactured entirely from exempted products and/or JAS or JIS certified materials, or
3. the product being exported is manufactured at least partially using wood products that are not exempted and that are not JAS or JIS approved and therefore must be submitted through the Ministerial Approval process.

4.1 Product Manufactured Entirely from JAS or JIS approved Material

In the second scenario, we are looking at products that are comprised entirely of components manufactured from exempted materials or JAS or JIS approved materials (for example, JAS approved OSB or plywood or JIS approved particleboard or MDF).

These materials are manufactured in mills that have received a JAS or JIS certification that specifies the F star rating of the material. If a product is manufactured exclusively from JAS or JIS rated materials (or includes materials identified as an exempted product), then it can be exported to Japan without further approvals.

However, the value-added manufacturer will need to obtain a copy of the JAS or JIS mill certification (including the relevant F star rating for the material used). A copy of the mill certification indicating the F star rating of the materials used in the product will need to be included with each product being exported to verify that it is in compliance with the formaldehyde emission requirements.

It is important to note that if a product is manufactured using materials with different F star ratings, then the finished product has a formaldehyde rating equivalent to the lowest F star rated material used. For example, if a wooden cabinet is manufactured using F**** plywood for the cabinet box and F*** MDF for the cabinet door, the entire cabinet must be rated at the F*** level. The exception to this would be to apply for a Ministerial Approval in order to potentially increase the formaldehyde emission rating for the cabinet from F*** to F**** based on a formaldehyde emission test that verifies that the product meets the emission criteria established for F**** qualification.

4.2 Ministerial Approval Process

The third case applies to value-added wood products that are manufactured from a combination of different wood materials. For example, if the cabinet described above was manufactured from plywood and MDF that was not manufactured in a JAS or JIS certified mill, the finished cabinet could be approved for use in residential homes in Japan using the Ministerial Approval process.

In this case the materials used in the products are submitted to a certified testing agency that would evaluate the actual level of formaldehyde emissions. The test results would then be sent to the Ministry of Land, Infrastructure and Transportation in Japan and a Ministerial Approval would be issued for the product. However, note that this scenario is relatively time consuming and expensive when compared to scenario 2.

5.0 Applying the Regulations

In order to provide a better understanding of how the formaldehyde regulations should be applied, a series of mini-case studies for specific products and end-uses will be presented. These will then be followed up with a couple of in-depth case studies looking at kitchen cabinets and wooden doors.

Figure 2 provides an illustration of a kitchen. In this illustration all of the shaded areas are visible and subject to the formaldehyde regulations described in the first Countermeasure. These areas include the floors, walls, ceiling, cabinet surfaces and the doors. The mouldings (both floor and ceiling), door casings, window casings and furniture are excluded products and not subject to the formaldehyde regulations.

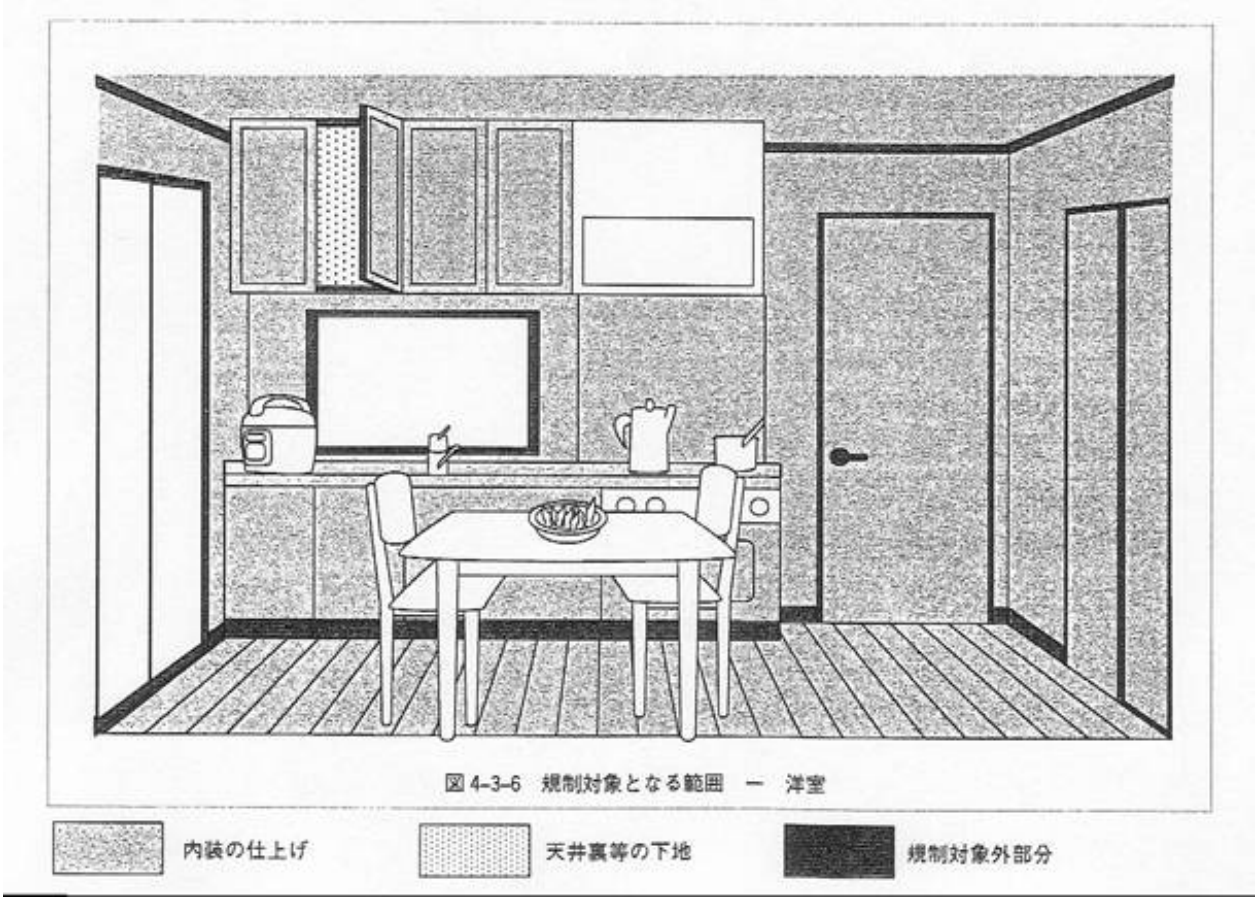


Figure 2. Applying the formaldehyde regulations to a kitchen.

In Figure 3 we will focus on the closet on the right hand side of the diagram. In this figure it is possible to see the full implications of the Sick House regulations in all their complexity. The doors and sides of the cabinet are visible and so are subject to Countermeasure 1. The lineal trim around the door is an exempted product as are the removable shelves and these are not subject to the formaldehyde regulations. If the shelves were permanently fixed in place, then they would be subject to the formaldehyde regulations in Countermeasure 3. However, since they are not visible when the doors are closed they are a good example of the etc. part of Countermeasure 3 and would require the use of F*** or F**** material. The back of the closet is not visible and another example of the etc. part of Countermeasure 3.

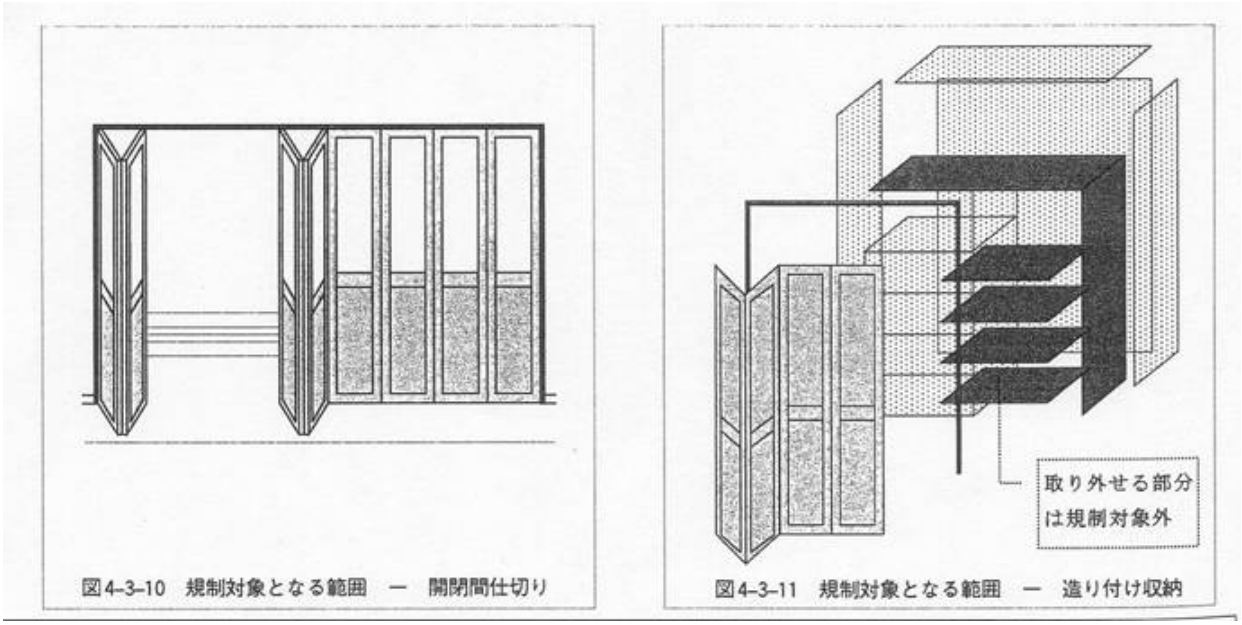


Figure 3. Applying the formaldehyde regulations to an inset closet (left) and an external closet (right).

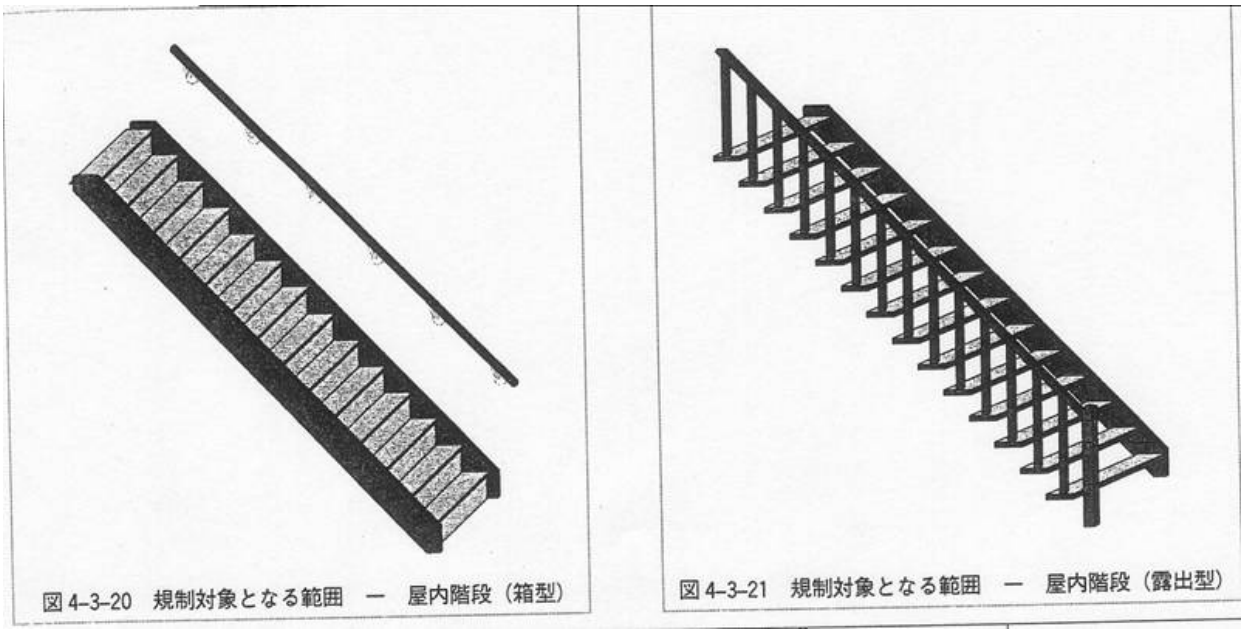


Figure 4. Applying the formaldehyde regulation to two different style of staircases.

In Figure 4 it is possible to see how the regulations do not always make sense. In the stair case on the left, the stair treads and risers are visible and would fall under Countermeasure 1. The hand railing and stringers are both exempted products and not subject to the regulations. Similarly, on the right hand side of the illustration, the hand railing, balusters and stair stringer are all exempted products while the stair treads would be subject to Countermeasure 1.

6.0 Additional Case Study Illustrations

In this section two additional case studies are used to help illustrate how the Sick House regulations apply to wooden building materials. The case studies will look at kitchen cabinets and wooden doors.

6.1 Kitchen cabinets

In Figure 5 there are two types of cabinets; wall mounted and floor mounted. All surfaces that are visible in the room are subject to Countermeasure 1 (visible sides, doors, and countertop).

Thus F**, F*** or F**** materials may be used (remember that F** and F*** materials are subject to the area restrictions). The not-visible cabinet backs, bottoms (in floor mounted cabinets), sides, tops (in ceiling mounted cabinets) and permanently fixed shelves are subject to Countermeasure 3 (attics, etc.) and require that F*** or F**** material be used. Any shelving that is removable would be exempted from the formaldehyde regulations entirely as would both base and trim moulding.

6.2 Wooden doors

To simplify the discussion, the door in this case study will be a solid panel door composed of stiles, rails, mullions and panels shown in Figure 6.

Although door frames are normally exempt from the regulation, in this Case Study the door frame (stiles, rails and mullions) would be regulated because the accumulated area of the door frame exceeds 1/10 of the projected door area. (If it were less, then the frame would be exempt). The door panels are visible and subject to Countermeasure 1 and could be made from F**, F*** or F**** material (remembering that area restrictions apply to the use of F** or F*** material).

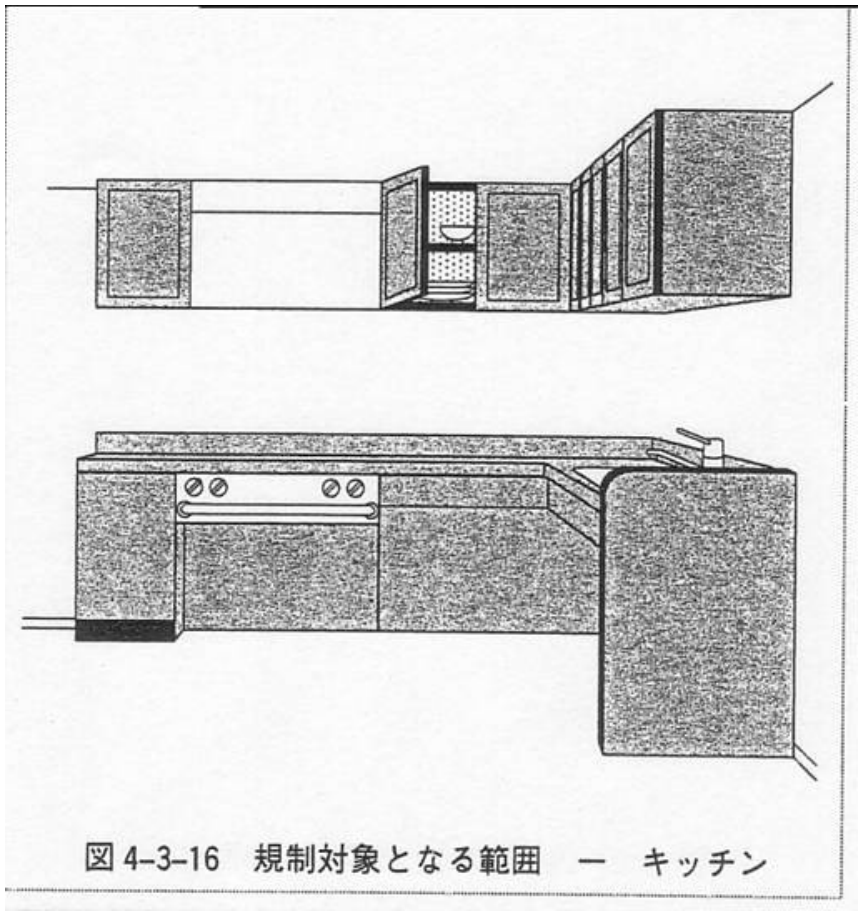


Figure 5. Applying the formaldehyde regulations to kitchen cabinets.

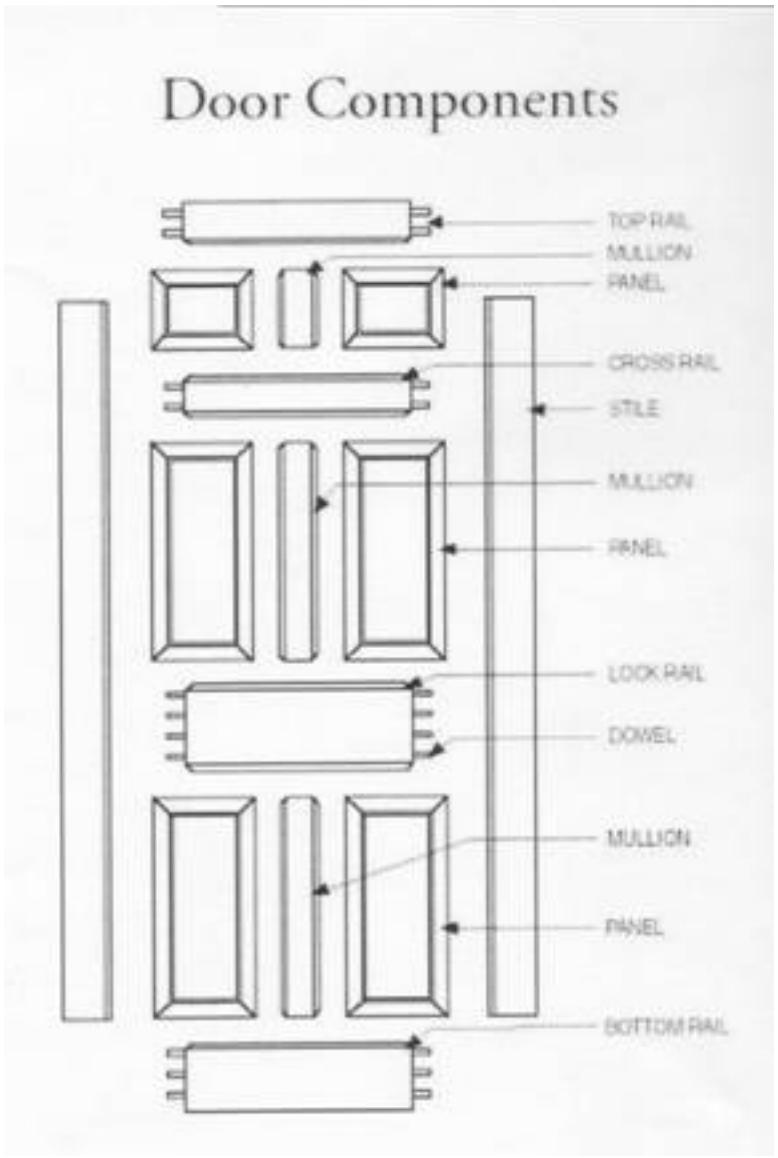


Figure 6. Applying the formaldehyde regulations to a wooden door.

7.0 Obtaining Certification for Wooden Building Materials

There are three basic methods of gaining market access under the Sick House regulation.

- Self-certification,
- Third Party Voluntary Inspection, and
- Ministerial Approval,

However, only the Ministerial Approval option is really appropriate for value-added wooden building materials. This is due to the fact that value-added wood products generally incorporate a mix of wood materials in their manufacture, making them much more difficult to evaluate in terms of formaldehyde emissions. The evaluation of formaldehyde emissions is further complicated by the fact that different materials are used in different proportions and volumes in a final product, making a simple extrapolation almost impossible to perform.

7.1 Self-Certification

Although self-certification and Third Party Voluntary Inspection are possible, they are not recommended for North American exporters. The first option, self-certification, is allowed when a product is manufactured entirely from exempted materials and/or JAS/JIS certified materials. In this case the value-added manufacturer is allowed to attached a label to the product indicating the materials used and their formaldehyde emission rating and essentially self-certify their product,

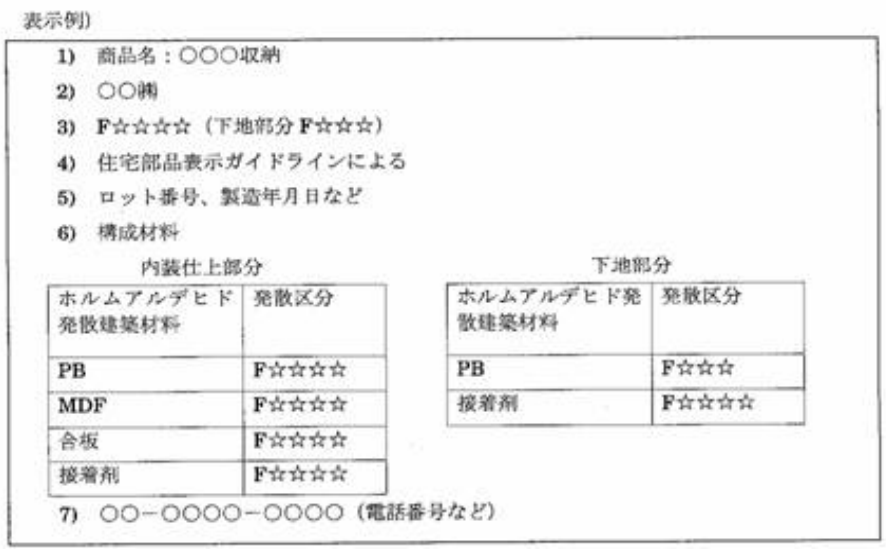
Figure 7 shows an example of a label that would be provided by the value-added manufacturer (who would then assume full liability) for a self-certified product. It shows a rough translation detailing the individual components that are identified as meeting various levels of formaldehyde emissions. All of this is based on the assumption that the formaldehyde emission rating for each individual component has been properly evaluated using accepted test methods.

Figure 8 shows a diagram of the cabinet covered by the label in Figure 7. These labels essentially constitute a self-declaration that the cabinet complies with the Housing Parts Identification Guidelines. If asked by a wholesaler, distributor, house builder or building inspector in Japan, the manufacturer must be prepared to provide supporting documentation that the formaldehyde emission rating of each individual component is as stated on the label. If the formaldehyde emission rating cannot be verified by the manufacturer, a fine will be assessed for mislabeling the product and the cost of tearing out and replacing the product will be the manufacturer's responsibility. Given the high cost of replacing improperly certified products, the difficulty in obtaining replacement products and the potential loss of reputation with their customers, many Japanese importers and builders will decline using imported building materials that have been self-certified by the manufacturer.

7.2 Third Party Voluntary Inspection

This is an industry trend within Japan, where Japanese industry associations receive administrative guidance from government ministries (such as the Ministry of Land, Infrastructure and Transport; or the Ministry of Agriculture, Forestry and Fisheries) to provide a third party voluntary inspection for individual components that are not covered by JAS or JIS standards. The industry organization providing the inspection generally requires a fee and will require that the formaldehyde emissions for the product be evaluated using their certification process.

Once the product has been certified, the industry association assumes partial liability (with the other part assumed by the manufacturer). This makes it easier to submit a building application without having to document each individual component.



表示例)

1) 商品名：○○○収納
2) ○○㈱
3) F☆☆☆☆（下地部分 F☆☆☆）
4) 住宅部品表示ガイドラインによる
5) ロット番号、製造年月日など
6) 構成材料

内装仕上部分

ホルムアルデヒド発散建築材料	発散区分
PB	F☆☆☆☆
MDF	F☆☆☆☆
合板	F☆☆☆☆
接着剤	F☆☆☆☆

下地部分

ホルムアルデヒド発散建築材料	発散区分
PB	F☆☆☆
接着剤	F☆☆☆☆

7) ○○−○○○○−○○○○（電話番号など）

1) Product Name
2) Company Name
3) F**** (Substrate F****)
4) Complies with Housing Parts Identification Guidelines
5) Lot Number, Date of Manufacture
6) Components

Interior Finishing Parts

Component Materials	Formaldehyde Emission Classification
PB	F****
MDF	F****
Plywood	F****
Adhesive glue	F****

Substrate (Attic, etc.) Parts

Component Materials	Formaldehyde Emission Classification
PB	F****
Adhesive glue	F****

7) Company Contact Telephone Number

Figure 7. Summary label for self certified wooden cabinet (see Figure 8 for product diagram).

Translation

1. Product Name
2. Company name
3. F-Star designation (Substrate)
4. Label Complies with Housing Parts Identification Guidelines
5. Lot Number
6. F-Level of Each Component (Left: Interior Finishing-Right: Attic, Etc.) PB, MDF, Plywood, Adhesive
7. Contact Telephone Number

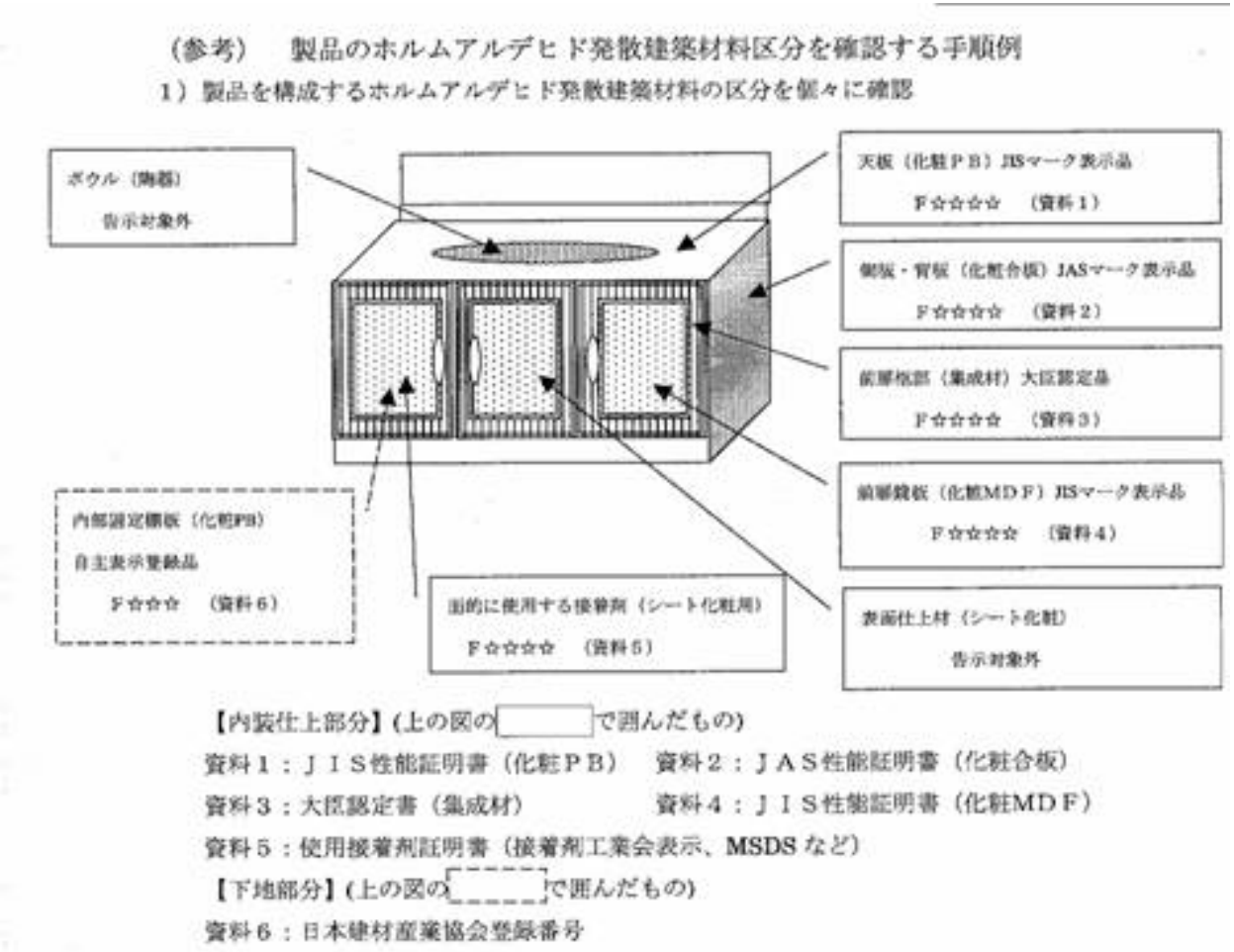
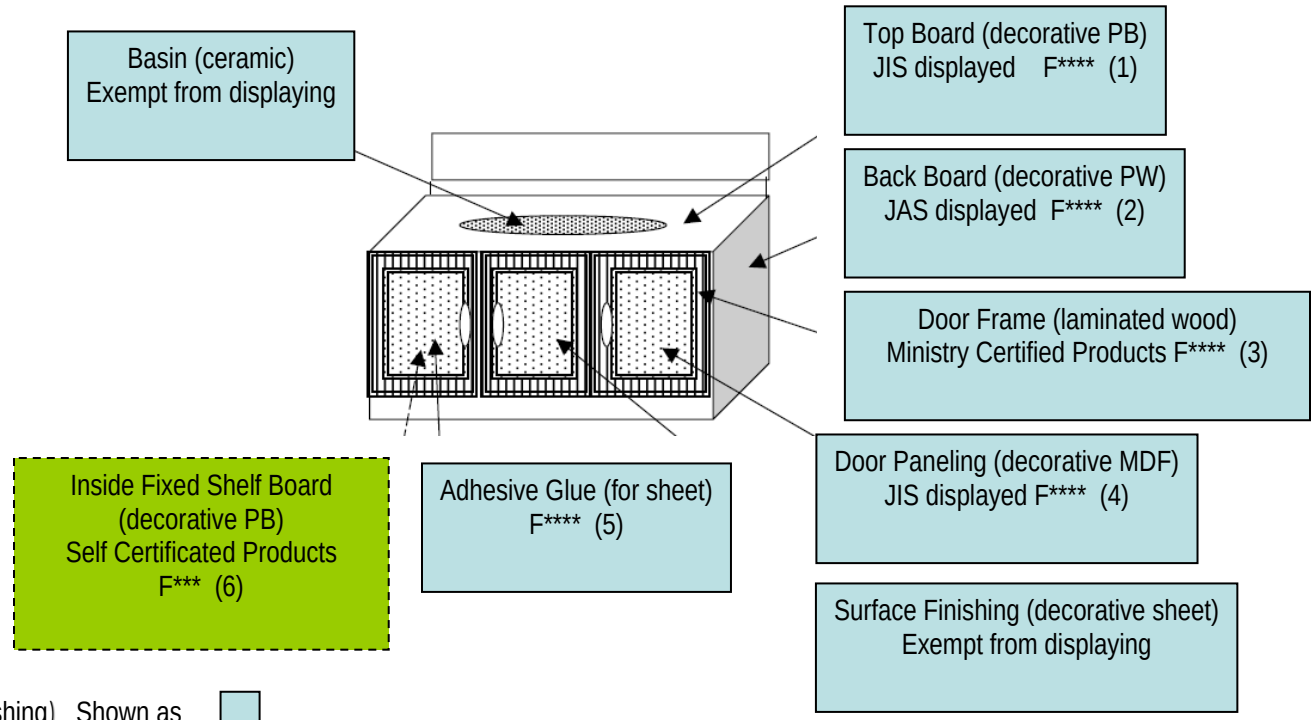


Figure 8a. Product diagram for wooden cabinet showing formaldehyde emission rating of individual components.

(Reference) Example of how to confirm the formaldehyde emission designation of product

1) Check the formaldehyde emission designation of each component



(Interior Finishing) Shown as

- JIS Performance Certification Form (decorative PB)
- JAS Performance Certification Form (decorative Plywood)
- Ministry Certification Form (Laminated wood)
- JIS Performance Certification Form (decorative MDF)
- Adhesive Glue Certification Form? (Japan Adhesive Industry Association (JAIA) displayed, MSDS (Material Safety Data Sheet by Japan Petrochemical Industry Association), etc)

(Substrate (Attic)) Shown as

(6) Registry Number of Japan Construction Material & Housing Equipment Industries Federation (J-CHIF)

Figure 8b. Translated product diagram for wooden cabinet showing formaldehyde emission rating of individual components.

There are two disadvantages with using the Third Party Voluntary Inspection option. First, since many industry associations have limited English language translation capabilities, the North American manufacturer must assume the additional expense of providing this service. Second, the members of some industry associations in Japan are reluctant to allow their associations to certify foreign competitor's products. Thus, while this strategy may be available for some manufacturers, it is likely not available for most North American manufacturers and exporters, particularly when their product is a direct competitor with a Japanese product whose manufacturer is a member of the association being asked to perform the inspection.

7.3 Ministerial Approval

The third, and probably the most appropriate method for gaining regulatory approval for North American imported value-added wood products, is to obtain Ministerial Approval. To apply for a Ministerial Approval the product must be tested and deemed to meet the formaldehyde emission requirements under the BSL. This method is the most appropriate because it allows for the testing of products that contain a number of component parts made from differing materials.

When first introduced in 2003, it was only possible to obtain a Ministerial Approval through one of nine Designated Evaluation Bodies (DEB), all of which were located in Japan. However, on June 18th, 2004, the Ministry of Land, Infrastructure and Transportation (MLIT) designated Professional Service Industries, Inc (PSI) of Eugene, Oregon as an Overseas Recognized Performance Evaluation Organization (ORPEO). This is particularly helpful for North American manufacturers and exporters since the documentation and basic fees are the same for PSI and the Japanese Designated Evaluation Bodies (DEBs). A list of testing organizations is provided in Appendix A.

While it is possible for a North American manufacturer or exporter to obtain a Ministerial Approval for their product through a DEB in Japan, this option is complicated by language, currency transfer (for payment for testing) and shipping of samples.

While the basic testing and application fees are similar for all of the testing agencies (both those in Japan and those overseas), total costs can be substantially higher with Japanese DEBs because of the high cost of shipping test samples to Japan and overseas communication costs (both phone and fax). In addition, most of the DEBs in Japan do not have English language capabilities and their documentation is generally in Japanese. As a result, there will be additional charges for translation services. In addition, there is a high probability of errors since most DEBs do not have English language capabilities and most North American manufacturers and exporters are unlikely to have Japanese language (both written and spoken) proficiency. For these reasons, it is recommended that North American manufacturers and exporters consider working through PSI to gain Ministerial Approval for their products.

7.4 Testing Procedure

The following testing procedure information is based on extensive interviews with the PSI ORPEO program manager, Mr. Randy Webb, as well as the PSI representative in Japan, Mr. Jiro Makino. The approval process, which is similar to that employed by Japanese Designated Evaluation Bodies, is outlined in Appendix B. For more detailed information and up-to-date pricing information, please contact Mr. Randy Webb at PSI or visit their website at: http://www.psiusa.com/wood/calendar.asp.

First of all it is important to understand that the Ministerial Approval process is designed for value-added products that are comprised of a mix of raw materials, such as cabinets or doors. A Ministerial Approval will generally not be granted for commodity materials such as plywood panels or OSB panels.

Prior to submitting a test specimen for formal Ministerial Approval, it is recommended that a sample specimen be submitted for unofficial testing. This is done for several reasons. First, the cost is substantially lower for an unofficial test that it is for an official test. Second, the unofficial test can provide a good indication of what the F star rating of the product will likely be and this information is required for the official application.

7.5 Fee Structure and costs

The testing documentation and application fees are approximately $US4,500 (as of 2008), although these fees can vary depending upon the amount of translation required and they assume that the product is approved following the first evaluation. Given the current exchange rate between the US dollar and the Japanese yen, the fees can be broken down in the following way:

Testing: approximately $US4,000

Application: approximately $US250

Translations and administrative: approximately $US250

8.0 Responses to Objectives

The information provided below is a brief summary of the answers to the study objectives. Full details are available in the body of the report.

Objective 1: What are the actual in-market test parameters for gaining regulatory approval for imported value-added wood products?

There are 3 ways to get your products into Japan:

- *Your product is on the exempt list (See page 7)*
- *Use only JAS or JIS approved raw materials in your product (see page 10)*
- *Obtain Ministerial Approval for your product (see page 21) if they do not fall into the other two categories listed above*

Objective 2: How are the testing programs applied?

- *The testing programs are applied to all value-added products requiring Ministerial Approval regardless of the country of origin unless they manufactured exclusively from raw material approved by JAS or JIS or are on the exempt list.*

Objective 3: What value-add products require testing?

- *All products included on the list on page 6 if they are not F**** rated due to using JAS or JIS raw material*

Objective 4: Can industry associations provide input to the testing agency to enable exporters to meet the testing requirements without actually testing of products? (In other words, can they merely indicate the product standards and avoid testing?)

- *Yes they can but the association incurs the financial liabilities for any products found to be non-compliant and this can be expensive. This is not a recommended course of action to pursue.*

Objective 5: What changes to product design or standards would provoke the need to gain new regulatory approval?

- *If the value added manufacturer stopped using JAS or JIS approved raw material*
- *If the design or product required the use of different raw materials than those approved for the original product*

Objective 6: What independent testing agencies in Japan are available for product testing?

- *A listing is provide in Appendix A but use of a Japanese testing agency is not recommended due to cost and language issues*

Objective 7: Do they provide documentation in English as well as Japanese?

- *Most Japanese agencies do not have English capabilities and if they do they may not be willing to provide it or the cost may be prohibitive*

Objective 8: Can these agencies communicate with North American value-added wood manufacturers in English?

- *Most cannot communicate in English and meaning or intents can be lost without excellent communication skills*

Objective 9: What do the independent testing agencies charge?

- *A schedule of their charges is included in Section 7.5.*

Objective 10: How do these services compare to PSI in Oregon in terms of costs and documentation?

- *Testing costs for PSI are almost identical and you avoid additional costs related to translation, shipping samples and communications. Testing methods and the certification by a US company are equally accepted in Japan as certification by a Japanese agency.*

9.0 Summary

Value-added manufacturers can achieve product certification by several means as described on Page 16. According to the regulations it is possible to included some F*** and F** raw material in the products and still obtain certification. However, in almost all cases the marketplace will not accept anything less than F**** material.

Value-added manufacturers planning to export to Japan are well advised to use only F**** rated or JAS/JIS raw material in their products. While this restricts the availability of raw material, it makes access to the marketplace much easier and product acceptance much higher.

Appendix A. Designated Evaluation Bodies for Ministerial Approval for wooden building materials.

Organization	Telephone	Address
Designated Performance Evaluation Bodies engaged in the evaluation of formaldehyde-emitting building materials in Japan		
Japan Testing Center for Construction Materials	03-3664-9216	Yusenkayabacho Building 10F, 2-9-8 Nihonbashi Kayabacho, Chuo-ku, Tokyo 103-0025
Japan Spinners Inspecting Foundation	03-3661-7179	Shiga Buildinug, 12-9 Nihonbashi Kodenmacho, Chuo-ku, Tokyo 103-0001
The Building Center of Japan	03-3434-7169	30 Mori Building, 3-2-2, Toranomon, Minato-ku, Tokyo 105-8438
Japan Plywood Inspection	03-3591-7438	Meisan Building, 1-18-17 Nishi-Shimbashi, Minato-ku, Tokyo 105-0003
Japan Housing and Wood Technology Center	03-3589-1796	Adoresu Building 4F, 2-2-19 Akasaka, Minato-Ku, Tokyo 107-0052
Japan Paint Inspection and Testing Association	03-3443-3011	Tokyo Toryo Kaikan 205, 2-2-19 Ebisu, Shibuya-ku, Tokyo 150-0013
Center for Better Living	03-5211-0599	Sogo Nibanncho Building 6F, 4-5 Nibancho, Chiyoda-ku, Tokyo 102-0084
Chemicals Evaluation and Research Institute, Japan	06-6771-5157	1-6-5 Dogashiba, Tennoji-ku, Osaka 543-0033
General Building Research Corporation of Japan	06-6966-7600	TS Building 4F, 1-2-10 Minani-shinmachi, Chuo-ku, Osaka 540-0024
Hokkaido Northern Regional Building Research Institute	01-6666-4217	1-20 Hihashi 1-jo 3-chome, Midorigaoka, Asahikawa, Hokkaido 078-8801
Tokai Technology Center	05-2771-5161	710 Inokoshi, 2-chome, Meito-ku, Nagoya 465-0021
Recognized Performance Evaluation Bodies engaged in the evaluation of formaldehyde-emitting building materials overseas		
Professional Service Industries, Inc.	541-484-9212	2710 W. 5th Avenue, Eugene, Oregon 97402
Fraunhofer-Gesellschaft zur Forderung der abgewandten Forschung e.V.	53-1215-5375	

Appendix B. Formaldehyde Test Method

In order to determine the level of formaldehyde emission for a specific product, a sample of the product must be evaluated according to JIS A 1901 Test Method (small chamber method). The following description of the test methods for evaluating formaldehyde emissions is based on the test methods published by the Building Center of Japan at their website:
http://www.bcj.or.jp/en/03/src/SickhouseManual_0404.pdf

"Methods for Checking the Emission Rate of Formaldehyde"

Test Specimens

1. Equivalency of test specimens
   The materials in test specimens and their composition must, in principle, fully conform to the specifications stated in the application.

2. Sampling, preparation and storage of test specimens
   The test specimens must, in principle, be sampled from the material (generally produced in a factory) stipulated in the application and prepared with the required dimensions. If it is not possible to cut out a test specimen from the material, the test specimen should be prepared according to the same specifications, including the composition of materials, as stated in the application, so that the performance of the product based on the specifications in the application can be evaluated.

   The test specimens should be taken from the product within seven days of manufacture….Care should be taken to ensure that test specimens prepared in accordance with the above procedures are not exposed to high ambient temperatures (35C or higher) during transportation.

   Until they are submitted for testing, test specimens should be wrapped tightly in aluminum foil and sealed in polyethylene bags or similar containers. They should be stored away from sunlight in an indoor location with minimal temperature fluctuation, whenever possible.

3. Number of test specimens
   In principle, two test specimens should be prepared. However, as ingle test specimen is acceptable if it is clear that product quality has been maintained ad controlled appropriately and I accordance with the detailed requirements, as stipulated elsewhere.

4. Selection of test specimens
   In the case of materials that are deemed to be of the same type, the test specimen based on the specifications that have the highest level of formaldehyde emission shall be selected. The methods of determining the range of products in the same category of materials and of selecting test specimens shall vary, depending on the materials used. However, additional tests and other reasonable methods shall be used.

5. Surface of test specimen used for measurement
   The surface of the test specimen on which measurements are taken shall differ according to the material and its use. In principle, the surface from which formaldehyde shall be emitted into the interior of a room shall be used. Other surfaces shall be sealed appropriately to prevent formaldehyde emissions with JIS A 1901 method.

Performance Evaluation Report

The performance evaluation report shall include the following items. The required format is stipulated elsewhere.

1. Evaluation organization, evaluation number, evaluation completion date
2. Performance evaluation category
3. Evaluation report (outline of test results, discussion, summary of evaluation)
4. Name of applicant (name of company and representative, address)
5. Subject name (name of structural method or building material)
6. Structural drawings (appendix)
7. Specification of component materials (appendix)
8. Execution method (appendix)
9. Test Results (appendix)

In general, the process for gaining approval for a product is part official and part unofficial. The application process provided to the applicant (manufacturer/exporter) and processed. However, before the application is officially submitted, an unofficial test is run for a in the worst case scenario (current product, just recently manufactured). This is useful since it will let the applicant know if their product will be acceptable in Japan and what the formaldehyde emission rating will be prior to submitting an official application. This provides an opportunity for the manufacturer to alter their product in the case that the product does not meet the formaldehyde emission specifications required to be successful in Japan.

When submitting the test specimen for the official application, the evaluation agency will specify the specimen dimensions and number of specimen to be submitted. They will also specify how the specimen should be prepared for transportation. In addition to the product specimen, the evaluation agency will also require additional information, including (but not always limited to) the following: schematic drawings of the product, specifying dimensions and the exact materials used, types of glues used (including the resin formulation as provided by the resin manufacturer), and the types of coatings and finishes used (including the ingredient lists as provided by the coating manufacturer). All of this information is required by MLIT as part of the Ministerial Approval process.

The official sample (3 tests) is then run. The product is broken down into the individual components and each component is tested. Each material used in the product is placed in a glass or acrylic dessicator and the formaldehyde emissions are measured. The final product F star rating is based on the lowest F star rating obtained for each of the components, regardless of the total volume represented by the specific component.

It is useful to consider including all materials that might be used in a product on the foreseeable future. This is because it is not necessary to re-test a product if the design changes as long as the materials used in the redesigned product are the same as those used in the original product for which the Ministerial Approval was granted. Thus, if the manufacturer is considering using another material for a cabinet door in the future, they might want to include a sample of this material in the test so that it will have already gained approval.

However, if a new material is used, then the product must receive a new Ministerial Approval based on all the materials used in the product and not just the new material being used. In addition, if a material being used in the product is sourced from a new manufacturer, then the entire product must receive a new Ministerial Approval. For example, suppose that a cabinet has a solid wood door made from edge-glued lumber and that the current cabinet has received a Ministerial Approval. If the cabinet manufacturer

wanted to use a lower priced edge-glued panel for their cabinet, this would require that they resubmit their cabinet (including all of the materials used) for a new Ministerial Approval since the new edge-glued panel may generate a higher level of formaldehyde emissions than the original panel.

It is possible for one company (or a trade association) to allow other companies to use their Ministerial Approval as long as the product is the same and it uses the same materials in its production. For example, if a stair parts manufacturer receives a Ministerial Approval for a stair tread made from edge-glued lumber, it is permissible for them to allow another stair tread manufacturer (or a cabinet door manufacturer, for that matter) to export stair treads (or cabinet doors) made from edge-glued panels as long as the second manufacturer sources their edge-glued panels from the same edge-glued panel manufacturer. However, keep in mind that the company (trade association) to whom the Ministerial Approval was granted will be held responsible in the event that the second manufacturer begins to source their edge-glued panels from a lower cost manufacturer whose product has a higher level of formaldehyde emissions.

Appendix C. Contacts

Jim Ivanoff
Program Manager, BC Wood, Japan
Tomoecho Annex-II, 9F
3-8-27 Toranomon, Minato-ku, Tokyo
T: 81-3-5401-0534
ivanoff@canadawood.jp

Kensei Harada, Deputy Director
Housing Production Division
Housing Bureau
Ministry of Land, Infrastructure and Transport
2-1-3 Kasumigaseki, Chiyoda-ku, Tokyo
T: 81-3-5253-8510
harada-k2qx@mlit.go.jp

Hideaki Mutou
Housing Production Division
Housing Bureau
Ministry of Land, Infrastructure and Transport
2-1-3 Kasumigaseki, Chiyoda-ku, Tokyo
T: 81-3-5253-8510
mutou-h2y5@mlit.go.jp

Randy Webb
PSI, Inc.
Eugene, OR USA
T: 541-

Jiro Makino
Asian Marketing Director
PSI, Inc.
3-4-1 Mita, Suite 202, Minato-ku, Tokyo
T: 81-3-5730-7744
jiro@psi-j.co.jp

Colin Ishihara, Manager
Building Equipment & Fire Safety Section
Technical Appraisal Department
The Building Center of Japan
No.30 Mori Bldg
3-2-2 Toranomon, Minato-ku, Tokyo
T: 81-3-3434-7169
ishihara_m@bcj.or.jp

Ryuji Tanaka
Assistant Project Manager
Building Equipment & Fire Safety Section
Technical Appraisal Department
The Building Center of Japan
No.30 Mori Bldg, 3-2-2, Toranomon
Minato-ku, Tokyo
T: 81-3-3434-7169
tanaka_r@bcj.or.jp

Ryo Sasaki, Head Researcher
Japan Lumber Inspection & Research Assoc.
6th Floor, Nagatacho Bldg
2-4-3 Nagatacho, Chiyoda-ku, Tokyo
T: 81-3-3580-3215
sasaki@zenmoku.jp

Tomoki Sera
Center for Better Living
Tokyo
T: 81-3-5211-0574
t-sera@cbl.or.jp

Okasaki Atsuo, Director
International Codes & Standards
Housing Bureau
MLIT
2-1-3 Kasumigaseki, Chiyoda-ku, Tokyo
T: 81-3-5253-8513
okazaki-a263@mlit.go.jp

Noriko Ban
Japan Director
WA State Japan Office
Homat Villa 301, Toranomon, Tokyo
T: 81-3-3459-0896
wsjoban@gol.com

Ladd McDaniel
Japan Director
American Forest & Paper Association
Toranomon 40 MT Building, 4F
5-13-1 Toranomon, Minato-ku, Tokyo
T: 81-3-5404-5266
ladd@americanwood.jp

Ken Aoki
Housing Evaluation Center
Center for Better Living
Sumitomo Fudosan Kojimachi Building
4-5 Nibancho, Chiyoda-ku, Tokyo
T:81-3-5211-0738
cbilibretto@cbl.or.jp

Tadashi Naka
President, Center for Better Living
Sumitomo Fudosan Kojimachi Building
4-5 Nibancho, Chiyoda-ku, Tokyo
T:81-3-5211-0555
t-naka@cbl.or.jp

Nobufusa Yoshizawa
Building Research Department
Institute for Building Environment and Energy Conservation
Sumitomo Fudosan Kojimachi Building
4-5 Nibancho, Chiyoda-ku, Tokyo
T: 81-3-3222-6728
yoshizawa@ibec.or.jp

Masatoshi Tomoi
Tomoi Timber Engineering
TTE Architect/Building Engineer's Office
Asahi Toranomon Building, #104
3-18-6, Toranomon, Minato-ku, Tokyo
T: 81-3-3438-1035
ttetomoi@polka.plala.or.jp

Yuichi Hayashi
Agricultural Specialist
Office of Agricultural Affairs
US Embassy
10-5, Akasaka, 1-chome, Minato-ku, Tokyo
T: 81-3-3224-5107
yuichi.hayashi@fas.usda.gov