

GreenCube

Approval Report

ISBU & Shipping Container
Construction Approval Data



Building Inspectors
Mortgage Companies
Insurance Underwriters

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GreenCube Approval Report

Version 4.0

All information in the [GreenCube Approval Report](#) is an accurate digest of specifications, requirements, and certifications for all ISBU modules and ISO steel dry cargo Shipping Containers sizes 10', 20', 40', 45' and 53', both GP and HC types.

Prepared in accordance with:

International Organization for Standardization (ISO)
ISO- 1CC type steel dry containers
International Maritime Organization (IMO)
International Convention for Safe Containers (CSC) 1972-2007
and in accordance with CSC Article IV(2)

These specifications and commentary cover design, construction, materials, testing, inspections of ISO standard shipping containers and ISBU modules. All information is in accordance with the requirements of ISO- 1CC type steel dry freight containers by all certified global manufacturers.

These Specifications are for information purposes and for use only by ISBU Association members and their associates for the development and construction of their projects.

Any structural modifications of these containers should be certified by a structural engineer to meet appropriate safety standards and building codes.

All information is certified to be accurate according to ISO/IMO/CSC requirements, articles and revisions current to April 2009.

Quick Reference Guide

Who will benefit from this report?

Construction professionals:

-Architects, structural engineers, civil engineers, home designers, building contractors, sub-contractors, welders, real estate developers and real estate agents.

Government agencies:

-EPA, LEEDS, DOE, State, County, and City engineers, planners, zoning, building departments, inspectors, FEMA and other disaster relief agencies.

Finance and Insurance:

-Mortgage companies, banks, private lenders, appraisers, warranty providers, insurance underwriters and their agents.

Educational Institutions:

-Universities, colleges, technical colleges, extended learning, faculty, and students.

What is an ISBU?

ISBU is universal short term for Inter-modal Steel Building Unit (ISBU)

An ISBU is an ISO- 1CC type Corten steel container manufactured for, or converted for use for either some type building construction purpose or for a storage unit. They come in varying lengths and heights and can be used for either transportation, storage, or building construction.

Why is ISBU construction or ISBU integration a preferred structure?

The reasons for the growing interest and use of an ISBU for single unit or multi-unit construction are too numerous to mention.

In 2007, 2008 and 2009 the ISBU has become a very legitimate, viable construction and storage technology and not just a trend or fad. Their uses are now widely accepted by the professional designers, contractors, environmentalists and governments.

The low cost of construction has now become a secondary issue.

Whether the use of ISBU construction or ISBU integrated construction will remain economical is no longer the main issue to its demand and acceptance.

The greatest reasons ISBU construction has become so popular with consumers, professionals and government is much simpler and basic than the cost factor:

- 100% Recyclable
- Exceptional Strength and Durability
- Exceptional Safety; tornado, hurricane, flood, and earthquake
- Exceptional Longevity and Sustainability

The economics and overall cost factor of ISBU construction and storage are now becoming a side benefit and not the principle feature.

Quick Reference Index

What we must know about ISBU construction?

We must understand how to properly buy an ISBU

We must understand how they are constructed and certified

We must understand how exceptionally durable they are

We must understand why they are safer and stronger than conventional housing

We must understand how they compare to present Building Codes

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Certification Types

Why are certifications important? We will discuss this because Building Inspectors and architects continue to ask for “strength certifications” before approving the use of ISBU for construction use and often for storage use.

Just because you see a shipping container it **does not** mean it still meets the strength or safety standards listed below.

A vast number of our members are reporting they buy ISBU shipping containers only to find the Building Inspector and/or architect will not allow them for use in construction.

Who wants to build a structure using materials that cannot be certified for their project?

Here are some commonly used, referred to, and requested certifications.

***SIR Certification (New. See page 38)**

SIR is the new certification specifically created for ISBU container projects.

CSC Certified

CSC is short for ICSC (International Convention for Safe Containers)

CSC Certification is generally meant as the initial Certification from the factory engineer. When the container is certified at the factory it receives a CSC Plate (see below).

Re-certification can also be done by the ACEP or IICL 5 method. (see below). When these methods are used it is sometimes called CSC re-certification, meaning it again meets CSC standards.

“Cargo Worthy” Certification

Please note there is a difference between:

- Cargo Worthy
- Cargo Worthy Certification

All new containers are “Cargo Worthy”, however many used containers are not and this needs to be clearly understood.

If a container is old or has been damaged, it may be not considered “Cargo Worthy”. That means it can only be used for storage and cannot be used for shipping or transit because it is too weak and not stackable.

In the past 12 months we have many ISBA members who have purchased containers only to find they could only be delivered by a private trucker, but not shipped commercially or sent to another location by ship. The reason for this is that they do not have the “cargo worthy” certification and therefore may also they may have a problem getting them approved by the Building Inspector in your local area.

We must state that the term “Cargo Worthy” does not necessarily mean it meets the original strength standards or can be used for all types shipping, stacking and transport operations. Many assume that is what it means but even within the shipping trade and among container dealers there is some confusion.

Things are quite loose in this area. It can be deemed “Cargo Worthy” by a dealer, depot or shipper, yet **not** meet the original strength specifications.

Therefore it's important to be “Cargo Worthy” if it needs to be shipped to its destination; however this may not be completely acceptable certification for a Building Inspector.

If you are buying ISBU for construction, stacking, etc., and they need the original strength and standards for permits, you must get it certified in some way. A “Cargo Worthy Certification” may be one solution an Inspector may accept.

Usually when an ISBU cannot be certified it will only be used for storage or for parts. (Also see topic: Depots vs., Dealers. Buyer Beware)

NOTE: When a damaged container is repaired it must always be re-inspected before it can be used for transportation. However, the re-inspection **is not** necessarily the same as having it re-certified. This is quite different. Quite often these well-used or frequently damaged units are sold to eliminate the needed repairs and cost of a true re-certification.

IICL 5 Inspection

This is a standard created by the federation of the container leasing companies (IICL) who's members represent about 90% of all container leasing companies which own approximately 50% of all shipping containers globally.

Their inspection program is known industry wide however is seldom used by container dealers, Building Inspectors and architects due to the fact the IICL is more of a tracking of repairs rather than the direct testing of it's present strength and condition. Additionally, the inspection costs and unnecessary data seem to make it prohibitive.

ACEP

ACEP (Approved Continuous Examination Programs)

This is generally a thorough examination of all container parts. The only reason this inspection and certification sticker is often rejected by a Building Inspector is because the ACEP examination can be certified by the owner or one of his employees and is not necessarily performed by an independent third party inspector.

Although the ACEP is usually quite accurate some Building Inspectors and architects will not accept this inspection due to above mentioned reasons.

ASIS

The ASIS or “as is” simply means it is sold “as is” with no warranty. This does not mean it is a bad container; it also does not mean it's an old container. It simply means it is no longer in use in the transport system and will be used as an ISBU, therefore does not need the CSC plate attached.

This makes sense to container shipping companies and container dealers, how ever most Building Inspectors and architects see this as an admission of possible damage or lower quality containers. It may not be easy to change this mind set unless the container has an additional “third party” strength inspection and certification.

New!

CIN Code

CIN (Container Identification Number)

There is a code stamped by the factory on the inside corner of every shipping container. Few architects, inspectors, and building contractors are aware of this permanent code.

- The number is unique with every container. Meaning it is a different number on every shipping container built.
- It cannot be removed and is permanently stamped into the steel corner inside.
- Like the CSC Plate, the CIN code is an accurate reference to the original manufacturer, engineers, place and date of manufacture.

This code is ideal for the use as an industry standard for recording, registering and certifying ISBU. We were surprised to learn there is presently no formal name for this code. Since it is similar to a VIN code on an automobile the ISBU Association has suggested to name and reference to it as: CIN (Container Identification Number)

We are hopeful to see this CIN used in certification and Building Permits since the CSC Plates are generally removed by either the dealer or the building contractor.

ISBU Association is presently working with an organization to create a strong government backed certification using the CIN and CSC guidelines which could be a relevant, easy to interpret ISBU inspection and certification.

(See the SIR section on page 38 for more information on CIN)

Certification Ratings

The below ratings are feedback from our ISBA members, trade interviews and readers in general.

*CIN based Certification	▲ ▲ ▲ ▲ ▲ (where available)
CSC Certification	▲ ▲ ▲ ▲ ▲
Cargo Worthy Certification	▲ ▲ ▲ ▲ ▲
ACET Certification	▲ ▲ ▲ ▲ ▲
IILC 5 Certification	▲ ▲ ▲ ▲ ▲

The above rating analysis is based upon relevance for containers (ISBU) used specifically in building construction and storage and not for containers used in the transportation industry. The transportation industry has inspection requirements which are often not relevant to storage or construction ISBU.

***Important-** See Updates: [SIR Certification, page 38](#)

How important is the CSC ID Plate? (Also see SIR page 38)

Presently, the principle reason a CSC ID Plate is so important is mainly due to the lack of any other organized ID system.

Secondly, Building Inspectors and architects are looking for some source of ID and certification and are somewhat mis-guided in their search believing the only ID reference to a container after manufacturing is the CSC Plate. (see CID)

We have only stressed this as an ID form since there is little knowledge of any other organized form of ID and strength certification. In 1993 the CSC revised the laws making the ID Plate a necessary part of ISO container certification for transport purposes. This is not entirely relevant for use on ISBU modules.

Check with your local Inspectors before buying ISBU to see what they require.

What to look for:



CSC ID Plate: Not combined with Transport seal.

CSC ID Plate: Revised standards in 1993 by CSC. Transport seal combined with CSC Certification.

The CSC ID Plate is the certification from the factory engineer. The CSC ID Plate is also the evidence of the containers age and manufacturer. (see CID)

It is generally accepted that you should not purchase ISO shipping containers without the CSC ID Plate and without a strength and safety certification. We hope this concept can soon be changed to include a more relevant inspection and ID certification based on the CID code.

Depots vs., Dealers. Buyer Beware

There is some controversy in the ISBU and shipping container industry regarding the quality of containers purchased from “container depots”. Many container dealers promote the fact they have better quality containers than a Depot can offer. This is not necessarily correct.

To better address this we must define what a “container depot” is.

A shipping container “depot” is a repair yard, shop and storage facility for the shipping and leasing companies. A Depot is usually where containers are maintained and repaired and Depots are generally very efficient at what they do.

A Depot does not manufacture containers, they are not fleet operators; ...they are only a storage facility for all types containers and a repair Depot for damaged or aging shipping containers.

Do they sell containers and ISBU? Yes... but a depot’s reputation is typically of one who sells the “vintage” models that are older, used and abused models that the shipping companies and lease operators will no longer use due to damage or physical appearance. However, they can, and do sell newer containers also which they buy from the shipping and leasing companies just like any other container dealer. So although they do repairs, obtain older or damaged containers, they can obtain and sell newer containers of any quality and grade just like a normal dealer.

Are Depot containers “cargo worthy” containers? They offer many qualities.

Because of their lower cost of acquiring older or well used units they are also able to sell these units wholesale to other dealers who can resell them in other regions of the country.

Understanding all this, good and bad containers can come from anywhere and since you don’t know where your containers history or where they are actually coming from we again strongly suggest “Buyer Beware”. Here is a check list that can be used no matter who your dealer is:

- 1) Physically check the condition of the container before buying, just as you would an automobile.
Check inside, outside, top, and especially the bottom.
- 2) Always obtain Cargo Worthy or other credible certifications.
- 3) Always be certain the CSC ID Plate is intact if your Building inspector requires it.
- 4) Always buy from a reputable dealer, distributor or agent for shipping companies, leasing companies, and fleet operators.
- 5) If you buy ASIS be certain to have a valid certification of strength and CID for the Building Inspector or architect.

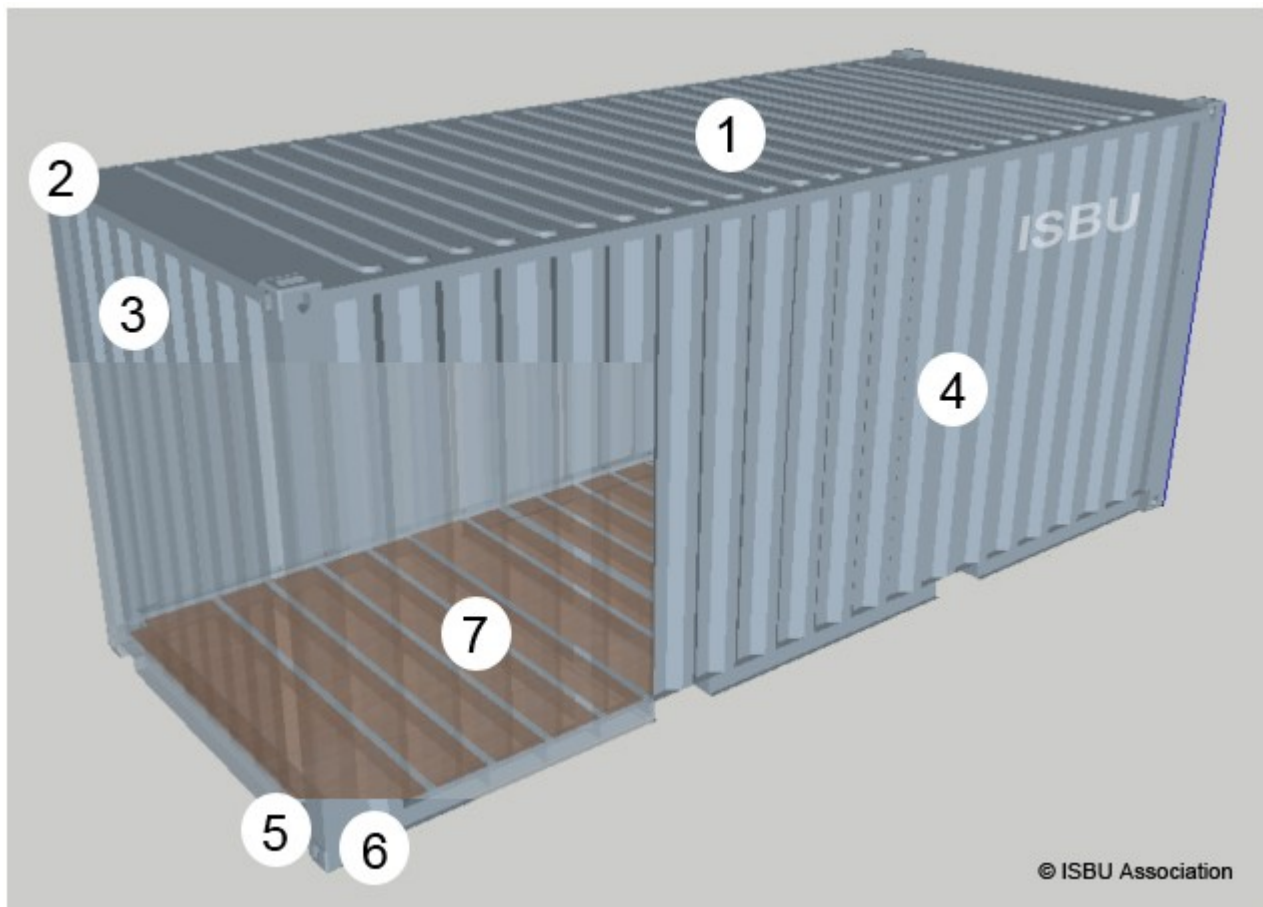
● Building Code Comparisons

Does a standard ISBU meet or exceed IBC or UBC construction standards?

The standard ISO, IMO, and CSC specifications exceed IBC and UBC strength codes in every requirement as a base structural unit:

- Strength loads: top, bottom, side, and end.
- Seismic: earthquake and tremors
- Wind: top and side forces, including tornado and hurricane forces.
- Fire: side, top and bottom.

TYPE	ISBU (container) CERTIFICATION	UBC (Building Code) REQUIREMENTS	ISBU (times stronger) PERFORMANCE
1) Roof, uniform load, center	300 psf	20 psf	15.0 x
2) Roof, stacking, axial	53,000/per post	500/per post	106.0 x
3) End walls, lateral	366 psf	20 psf	18.3 x
4) Side walls, lateral	234 psf	20 psf	11.7 x
5) Racking/shear load "A"	16,800 lb.	680 lb.	24.7 x
6) Racking/shear load "B"	33,600 lb.	1,600 lb.	21.0 x
7) Flooring, uniform load	101 psf	40 psf	2.5 x



(See expanded certifications and specifications for details)

* IBC (International Building Code)
* UBC (Universal Building Code)

Corten Steel vs., Mild Steel

ISO shipping containers are made using a special steel named “Corten steel”. This product is quite different than the common “mild steel” used in most building construction.

U.S. Steel is the original inventor and manufacturer of Corten steel.

Corten steel has at least three very unique properties compared to mild steel

- 1) 40% stronger than mild steel
- 2) Superior bonding properties with paints and coatings
- 3) Anti-corrosive blend of metals



The rusting or corrosion on the surface of un-painted Corten steel is very slow, losing only 1.0 mm of surface per 100 years. 1.5 mm in highly corrosive environments.

For this reason, Corten steel is used on bridges, freeways, cargo ships and the favorite of artists for use on outdoor steel art and architecture. It oxidizes, but does not corrode, that is a very significant difference.

The longevity rating for Corten steel on these structures is 100 - 120 years un-painted. When coated with epoxy paints and maintained, these surfaces are near eternal.



TEST: Corten steel used on shipping containers is virtually undamaged (Cronos)

Many independent studies have been done on shipping containers and the Corten steel used in the container construction. One such study was made by the Cronos Leasing company. The results of a study performed by a UK university concluded that Corten A steel was 75% stronger than mild steel. Their strength test was conducted using a hydraulic ram equivalent of over 20 tons per square inch.

An ISBU or shipping container meet and exceeds all U.S. and International building codes for use as a construction unit base. It is the epitome of sustainability and recyclable and its reputation is well known for durability and longevity.

● **Modification Issues**

Minor Modifications

How much strength does an ISBU lose if modified? Virtually none.

This depends on how much modification it incurs. If modified properly it does not lose any significant strength with minor modifications.

Since an ISBU is simply a base module for a structure, then all modification should comply with standard building codes. For example the cutting and adding of doors and windows then become building code standard with the standard and proper framing.

Unless the basic unit (s) becomes highly modified such as the removal of entire walls, roof, etc., the basic ISBU module will retain its entire structural integrity.

Adding window, doors and even a stairway through the roof will not jeopardize its ability to meet or exceed normal building code standards.

Combining multiple ISBU modules to create larger homes, office or storage will generally increase the total unit strength and stability since the modules become a fully welded multi-unit structure attached to each other.

- The combining of multiple ISBU does not diminish its individual or total unit strength.
- Modifications such as windows, doors and stairways will be done according to code.

Major Modifications

As with any structure, major modifications to an ISBU or a multi-ISBU complex will require certain supports then be re-certification by a structural engineer. This is a common procedure with any building structure.

Such things as removing entire walls are easily re-supported by vertical steel supports every 13.3' or horizontal steel beams "I beams" supporting the opened side wall roof.

A qualified architect or structural engineer can easily create construction plans with these structural modifications which will be approved by the Building Inspector.

It needs to be noted: The ISBU is simply the ultra-strong cube which can be modified and added upon with standard building materials.

Except for Emergency housing or Mobile storage units, ISBU modules are not meant to replace normal housing codes, insulations or inner construction. An ISBU is simply a very strong, recyclable, and long life infrastructure to easily combine with multiple ISBU, add inner walls, insulation, plumbing, ceilings, and sit on standard foundations according to standard building codes.

● Usage Types

Permanent Construction

These are homes, offices, apartments, garages, work shops, classrooms, student housing, medical facilities and agricultural structures which are meant to be permanent and not meant to be moved.

They will be placed on foundations and comply fully with local building codes.

Due to their ISBU infrastructures these buildings will be the safest and most durable buildings in the community and can have an exterior which will be of standard design using stucco, siding, brick, or any combination of recyclable materials.

Temporary Construction

These are emergency shelters, disaster relief, homes, offices, apartments, garages, work shops, classrooms, student housing, medical facilities, guard shacks, and agricultural structures which are meant to only be temporary until the permanent structures are completed.

Due to their ISBU infrastructures these buildings will be the safest and most durable buildings in the community and can have an exterior which will be of standard design using stucco, siding, brick, or any combination of recyclable materials.

Permanent Storage

These will consist of permanent structures at a residences, offices, schools, agricultural areas, or shopping centers which are meant to be permanent, attractive and not meant to be moved.

Due to their ISBU infrastructures these buildings will be the safest and most durable buildings in the community and can have an exterior which will be of standard design using stucco, siding, brick, or any combination of recyclable materials.

Mobile Storage

Mobile storage units serve an important need on the property of businesses, residences, schools, government, and in agricultural areas. Consisting either of the smaller 4', 5', 8' and 10' ISBU or the more common 20' and 40' ISBU.

In some areas it is often easier to get a Permit to place cheap, unsafe mobile units on these properties rather than the stronger, safer ISBU storage units.

If aesthetics are an issue these units can be painted or façades added to better adapt to the surroundings or zoning covenants. These are not fire hazards as many mobile units and much safer and less likely to decompose in the neighborhoods of work yards.

Due to their ISBU infrastructures these buildings will be the safest and most durable buildings in the community and can have an exterior which will be of standard design using stucco, siding, brick, or any combination of recyclable materials.

● Home Owner

Is This Right For Me?

Until you've actually been in a properly built ISBU home, classroom or other ISBU building structure you cannot comprehend the absolute warmth and silence.

An ISBU structure has so many benefits and strengths over conventional construction it is difficult to comprehend their intrigue and value.

You should not go into your project because it's possibly a cheaper alternative. The true features of ISBU construction are in the safety, strength, longevity, sustainability, speed, and flexibility of construction.

Plan your project properly as you would any home and comply with every filing and request of your City-County building inspector. You want it right; they want it right.

Design Options

It's obvious to say there are some limitations to your design, but not many.

We fully recommend you choose most any standard home design and adjust your "cubes" to fit the floor plan, ...a few feet here, a couple there and you will see it's not that difficult to have a normal home with strength and sustainability.

The exterior is not complicated either. The steel infrastructure is an excellent frame for either siding, rich stucco, brick, wood, or any combination.

If you are happy with your present home and simply want a durable and safe add-on then ISBU integration is quite simple and affordable.

NOTE: Do not begin any construction without a Building Permit. This is always the wrong approach. Be patient with you local Building Department and Bank. They have no reason to decline your project but the need to understand this new technology and be confident it meets code.

When a person has professional architectural plans and a Building Permit, we see little resistance to obtaining the construction loans and home insurance. Most lenders and insurance underwriters are only concerned the home is built according to local building codes.

● Construction Professionals

Designer

In creating your designs the main caution is to understand where the main supports and frame are then design the home or other building project as normal.

Review the section, “Building Code Comparisons” and note where the main structural points are. Removing an entire ISBU roof/ceiling is acceptable if needed to design a vaulted 16’ ceiling. Also remember an ISBU design can include both horizontal and vertical ISBU’s connected for unique designs.

Architect

If you are also the designer architect please read the above “Designer” comments. To understand your limitations you may want to consult with a structural engineer to assist you in know more about the structural design limitations as you connect other ISBU or attempt any radical modifications.

Structural Engineer

The need for a structural engineer seems to be one of the weakest points in the rapid development of ISBU construction and technology.

Our organization sees many projects on hold due to the lack of qualified local structural engineers. Due to the infancy of this construction concept Building Inspectors are often going a bit overboard are requesting very basic things certified.

Although much of that information is now in our “Approval Report”, this ISBU technology is creating quite a demand for qualified structural engineers in each State and Province.

Building Contractor

If you know building construction then you know how to build ISBU homes, offices and other ISBU structures. There is little difference in anything else you already know or do. The only thing that is different is that your super structure is a combination of steel boxes, which, in fact, may actually make the entire project easier for you.

The biggest concern we hear is in regard to cutting and modifying the ISBU. In fact, the use of a Plasma cutter is even easier than attempting to cut holes and modify walls in plywood, sheet rock or concrete. Once the basic holes are made it becomes a standard construction project.

● Government Zoning/Planning Commissions

The Myths & The Facts

There are many myths regarding “shipping container homes” and their construction.

To say these myths and type casting are common would not be correct. In fact very few government agencies promote these un-educated beliefs and concepts.

Here are the top four myths:

MYTH: Shipping containers are hot ovens and not fit for human habitation.

FACT: Any non-insulated structure can become hot and unsuitable for human habitation in the summer months. A shipping container is as responsive to insulation as any other structure or material. When constructed according to Building codes all homes become safe and habitable.

MYTH: Shipping container housing only attracts “ghetto type” lifestyles.

FACT: Any housing or building material can become a ghetto unless properly managed. Here in the United States we have “ghetto” in every major American city, yet none of the homes are built from shipping containers.

A ghetto is not the material, it’s the people and the governmental management.

MYTH: Shipping containers should not be used for housing because they quickly become old and rusty housing.

FACT: Inasmuch as shipping containers are constructed with Corten steel, then coated with epoxy paint, it is near impossible for them to corrode as some believe. Any scratched, dented and untreated metal will oxidize and in time corrode.

A shipping container home constructed according to building codes will be the most maintenance free structure you could put in a community.

MYTH: Shipping containers cannot meet conventional housing standards or building codes and therefore should not be considered for use in construction.

FACT: As proven by the actual tests and certifications a shipping container, when used as housing infrastructures or storage units greatly exceed all government standards.

Due to the actual facts, ISBU construction is being endorsed by governments, universities and largest corporations globally.

● Building Inspectors

Approvals, Permits, Inspections

The ISBU Association is fortunate to be making much progress with ISBU related Building Permits and approvals.

In virtually every situation we've encountered the city-county Inspectors and agencies have been very cooperative and interested to see this technology go forward.

The most negative situations were created by home owners who did not follow procedures and government regulation in applying for their Building Permits properly.

The main comments we continue to hear from Building Inspectors are:

- Some people are not really interested in building according to code.
- We're very intrigued with this type construction we just don't have access to the proper information.
- You are presenting this to us much differently than the applicant has.
- The architectural drawings were not done properly.
- You need more engineers in our State who know this stuff.

NOTE: If you are a Building Inspector or valid employee of a government agency with questions or comments regarding ISBU construction please contact us at:

approvals@isbu-info.org

Please contact us using your government email address for our verification.

● Lending Institutions

Banks, Mortgage Companies and other lending institutions

In speaking with officers six major bank and mortgage companies in the United States we have been met with very positive interest and very little negative.

Generally they only need verification that the local government agency is in approval of the construction and that it is being built according to code.

NOTE: If you are a legitimate Lender or valid employee of a Lending agency with questions or comments regarding ISBU construction please contact us at:

approvals@isbu-info.org

Please contact us using your corporate email address for our verification.

● Insurance Underwriters

Warranty Companies, Insurance Agents

Insurance underwriters have been the least problem to date since they generally accept the knowledge and expertise of the Building Inspector and/or Lender.

If the Bank will finance the project then it is obvious they have already done their research on the project and the Insurance company has little concern.

NOTE: If you are a legitimate Lender or valid employee of a Lending agency with questions or comments regarding ISBU construction please contact us at:

approvals@isbu-info.org

Please contact us using your corporate email address for our verification.

Dear Reader,

We have been very involved in working directly with municipalities, lending institutions, and insurance underwriters in behalf of our Members since May 2007.

This is very time consuming, however every project and geographic location can have a different need or concern regarding ISBU construction projects.

We are very committed in learning what the agencies need in order to be comfortable with approving these ISBU building construction projects including ISBU storage units.

Please contact us with your experiences so we can update our reports and know how to better assist these agencies.

Additionally, since our first publication we have been contacted by an agency that can possibly provide the most widely accepted "certifications" which would be very acceptable to inspectors, banks and architects. We are very interested since they also agree with the CIN code concept in their certifications. They have a target date of February 20 to submit the full details of the certification program to us. We expect this will become the most widely accepted program for ISBU construction and storage units.

(UPDATE) New CIN based SIR Certification was approved and implemented March 2009.

Regards,

Barry Naef
Managing Director
ISBU Association

Reference and Documentation:

ISO Shipping Container Technical Specifications

ISO General Sizes: Dry Cargo Steel Container

(10', 20' 40', 45' GP/HC models)

ISBU Association (ISBA)

Specification: ISBA-01.25.09-ISOGEN

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All information is certified to be accurate according to IMO/CSC articles and revisions current to April 2009.

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1. General

1.1 Operational Environment (IMO/ISO Requirements)

The container will be designed and constructed for the transportation of general cargo on sea (above or under deck) and on land (road or rail) throughout the world, and will be suitable for the environmental conditions imposed by those modes of transport. All materials used in the construction will be able to withstand extreme temperature ranging from -40°C (-40°F) to 70°C (158°F) without effect on the container's strength and watertight properties.

1.2 Standards , Regulations and Rules

1.2.1 Standards and Regulations

Containers shall comply with following in their latest editions:

1) I.S.O./TC-104

668- Series 1 freight containers - Classification, external dimensions and ratings

6346- Coding, identification and marking for freight containers

1161- Specification of corner fittings for series 1 freight containers

1496-1- Specification and testing of series 1 freight containers.

Part 1: General cargo containers for general purposes

830- Freight containers – Terminology.

3874- Freight containers – Handling and securing

2) The International Union of Railway (UIC) code 592 OR.

3) The Customs Convention on the International Transport of Goods (T.I.R.).

4) The International Convention for Safe Containers (CSC).

5) Transportation Cargo Containers and Unit Loads Quarantine Aspects and Procedures by Commonwealth of Australia Department of Health. (T.C.T.)

1.2.2 To satisfy the requirements of Rules of classification society.

2. Approval and Certificates

2.1 Classification Certificate

All the containers shall be certified for design type and individually inspected by Classification Society.

2.2 Production Certificate

The Production Certificate of series containers to be issued by the Classification Society. The Society's seal shall be provided.

2.3 T.C.T Certificate

Certificate of timber treatment to the requirement of Australia Department of Health which is currently the International standard.

2.4 Customs Certificate (T.I.R.)

Customs' Approval and Certificate to be issued by the Customs.

2.5 U.I.C. Registration

All the containers will be registered & comply with the International Union of Railways.

2.6 C.S.C. Certificate

All the containers will be certified and comply with the requirements of the International Convention for Safe Containers.

3. Handling

The container will be constructed to be capable of being handled without any permanent deformation which will render it unsuitable for use or any other abnormality during the following conditions:

- 1) Lifting, full or empty, at the top corner fittings vertically by means of spreaders fitted with hooks, shackles or twistlocks.
- 2) Lifting, full or empty, at the bottom corner fittings using slings with appropriate terminal fittings at slings angle of forty-five (45°) degree to horizontal.
- 3) Lifting, full or empty, at two fork pocket by fork lift truck.

4. Transportation

The container shall be constructed to be suitable for transportation for following modes without any permanent deformation which will render the container unsuitable to use or any abnormality.

4.1 Marine:

- In the ship cell guides:

Seven (7) high stacked based on Max. gross weight of 30,480 kg.

- On the deck:

Four (4) high stacked and secured by suitable vertical and diagonal wire lashings.

4.2 Road - On flat bed or skeletal chassis:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

4.3 Rail - On the flat cars or special container car:

Secured by twistlocks or the equivalent at the four bottom corner fittings.

5 . Dimensions and Ratings

5.1 Dimension

Note: See specific ISO shipping container specifications & dimensions.

No part of the container will protrude out beyond the external dimensions mentioned above.

Maximum allowable differences between two diagonals on any one of the following surfaces are as follows:

5.2 Door Opening

Note: See specific ISO shipping container specifications & dimensions.

5.3 Fork Pocket

Note: See specific ISO shipping container specifications & dimensions.

5.4 Inside Cubic Capacity

Note: See specific ISO shipping container specifications & dimensions.

5.5 Rating

Note: See specific ISO shipping container specifications & dimensions.

5.6 Corner Protrusions

1) The upper faces of the top corner fittings will protrude above the highest level of the roof construction except corner plate by 6 mm.

2) For the containers under empty condition the lower faces of the cross members in their bases including their end transverse members shall be on a plane located at least 17 mm above the lower faces of the bottom corner fittings.

3) The outer side faces of the corner fittings will protrude from the outside faces of the corner post by minimum 3 mm. The outer side faces of the corner fittings will protrude from the outside faces of the side walls by nominal 7 mm and from the outside faces of the front end wall by 7.4 mm.

4) For the containers under the condition such as the load equal to 1.8R - T is uniformly distributed over the floor, no part of the container base will deflect by more than 6 mm below the lower faces of the bottom corner fittings.

6. Construction

6.1 General

The container will be constructed with steel frames, fully vertically corrugated steel side and end walls, die-stamped corrugated steel roof, wooden flooring, corrugated double hinged doors and ISO corner fittings at eight corners. All steelworks will be built up by means of automatic and semi-automatic CO2 gas arc welding. All exterior welding including that on base structure will be continuous to give perfect watertight properties, Interior welds will be intermittent with a minimum bead length of 25 mm for every 200 mm. All the welds, even spots, will have penetration without undercutting or porosity.

6.2 Corner Fittings

Corner fittings will be designed in accordance with ISO/1161 standard, and manufactured at the workshops approved by the classification society.

6.3 Base Frame

The base frame will be composed of two (2) bottom side rails, a number of cross members and a pair of fork pockets, which are welded together as a sub-assembly.

6.3.1 Bottom Side Rail

Each bottom side rail is built of a steel pressing made in one piece. The bottom flange face outwards so as to be easily repaired and hard to corrode.

Note: See specific ISO shipping container specifications & dimensions.

6.3.2 Crossmember

The crossmembers are composed of a number of small pressed channel section and some large one with three 4.0 mm thick webs located beneath each board joint of the plywood, which are placed at certain center distance.

Shape: " C " section

Small: 122 x 45 x 45 x 4.0 mm, Quantity: - -

Large: 122 x 75 x 45 x 4.0 mm, Quantity: - -

6.3.3 Fork Pocket

One pair of fork pockets will be provided in accordance with ISO requirements for loaded handling. Each fork pocket is constructed with two adjacent crossmembers, a top plate and two bottom end plates. A angle stiffener plate will be welded to each opening of fork pocket.

Top plate: 3.0 mm Thick

Bottom plate: 6.0 mm Thick

6.3.4 Reinforcement

Reinforcement plates will be welded at two ends of bottom side rail.

Dimension: 200 x 153 x 4.0 mm

6.4 Front End

The front end will be composed of corrugated end wall and front end frame, which are welded together as a sub-assembly.

6.4.1 Front End Wall

The front end wall is composed of steel sheet fully vertically corrugated into trapezium section, butt joint together to form one panel by means of automatic welding.

Thickness: 2.0 mm

Corrugation dimension-	Outer face: 110 mm	Depth: 45.6 mm
	Interface: 104 mm	Slope: 18 mm

6.4.2 Front End Frame

The front end frame will be composed of one front sill, two corner posts, one front header and four corner castings.

6.4.2.1 Front Sill

The front sill is made of a special "C" section steel pressed with vertical webs as the stiffener.

Front sill: 4.0 mm thick

Web: 4.0 mm thick

Quantity: - -

6.4.2.2 Corner Post

Each corner post is made of a 6 mm thick section steel pressing to ensure the suitable strength, light-weight and easy maintenance.

6.4.2.3 Front Header

The front header is constructed with steel square tube lower part and steel plate upper part. The upper part is extended inwards of the container certain distance with full width from front part of top corner fittings.

Lower rail: 60 x 60 x 3.0 mm RHS

Upper part: 3.0 mm thick

6.5 Rear End

Rear end is composed of Rear End Frame which consists of one door sill, two corner posts, one rear header with header plate and four corner fittings, which are welded together as a sub-assembly, and Door Systems with locking devices.

6.5.1 Door Sill

The door sill is built of special channel section steel pressing with internal ribs as stiffeners at the back of each cam keeper. The upper face has a slope for better drainage and the highest part is on the same level to the upper face of the wooden floor.

Door sill: 4.5 mm thick Slope

Stiffener ribs: 4.0 mm thick 1:10 approx. Quantity: - -

6.5.2 Corner Post

Each corner post is constructed from an inner part of channel shaped hot-rolled section steel and an outer part of steel pressing, welded together to form a hollow section to ensure the door opening and suitable strength against the stacking and racking force. Four (4) sets of hinge pin lugs are welded to each outer part of the corner post.

Inner part: 113 x 40 x 12 mm
Outer part: 4.5 mm thick

6.5.3 Door Header

The door header is constructed from a lower part of a " U " shaped steel pressing with internal stiffener ribs at the location of the back of cam keeper and an upper part of steel pressing rear header plate, they are welded together to form a box section to provide a high rigidity.

Rear header: 4.0 mm thick
Header plate: 3.0 mm thick
Rib: 4.0 mm thick
Quantity: - -

6.5.4 Door Systems

Doors will consist of two door leaves, each leaf with two locking devices, four hinges and pins, seal gaskets and the door holders. The doors will be installed by hinge pins to the rear end frame and capable of swinging about 270 degrees.

6.5.4.1 Door Leaves

Each leaf consists of door panel, steel door frame which consists of horizontal (upper & lower) and vertical (inner & outer) members. They are welded together to form the rectangular door leaves. The door are so arranged that the left leaf can not be opened without displacement of the right leaf.

Door panel: With 3 corrugations

Depth: 40.0 mm
Interface: 106.0 mm
Slope: 22.0 mm
Panel thickness: 2.0 mm

Note: See specific ISO shipping container specifications & dimensions.

6.5.4.2 Hinges and Pins

Four forged hinges, providing with bushed hole, are welded to each door leaf. Each door is installed by hinge pins, washers and bushing.

Washer- Material: Stainless steel, Location: Under the bottom of hinge
Bushings- Self-lubricating synthetic
Pin- Material: Stainless steel

6.5.4.3 Locking Devices

Two locking bars are of steel tube with handles, anti-racking rings and cam ends, and fixed to each door leaf with bolts / nuts and six huck bolts at TIR locations, by top and bottom bearing brackets and bar guide brackets. The bars are suspended in bearing brackets with bush of self-lubricating synthetic material.

Cam-keepers are welded to the door header and sill.

a) Locking device type: 2566MN Type, made in China.

b) Locking bars treatment : Hot-Dipped galvanized (75 Microns)

c) Cam keeper treatment : Electro zinc plated (13 Microns)

6.5.4.4 Door Holder and Receptacle

A door holder per door, made of mixed nylon rope, is tied to the center side locking rod & the receptacle (door hook) is welded to each bottom side rail to remain the door at the open position.

6.5.4.5 Seal Gaskets

The black door seal gaskets are of "J-C" type EPDM rubber. They are attached to the door frame with stainless steel rivets and retainer strips. The gasket is set with adhesive sealant on the back.

6.5.4.6 Shim

The E.P.D.M shim will be placed over the holes on the door for fastener (except under large bearing brackets).

6.6 Side Wall Assembly

6.6.1 Top Side Rails

Each top side rail is used a square steel pipe.

Rail: 60 x 60 x 3.0 mm RHS

6.6.2 Side Walls

Each side wall will be composed of a number of sheets for the intermediate (inner) parts and outer panels at each end of side wall, fully vertically corrugated into trapezium section, butt welded together to form one panel by automatic welding.

Inner panel: 1.6 mm thick, Quantity: - -

Outer panel: 2.0 mm thick, Quantity: - -

Trapezium:

Outer face: 72 mm

Slope: 68 mm

Inner face: 72 mm

Depth: 36 mm

Pitch: 278 mm

6.7 Roof

The roof will be constructed by several die-stamp corrugated steel sheets with a certain upwards camber at the center of each trough and corrugation, these sheets are butt jointed together to form one panel by automatic welding.

Corrugation Shape:	Depth:	20.0 mm
	Pitch:	209.0 mm
	Inner face:	91.0 mm
	Slope:	13.5 mm
	Camber upwards:	5.0 mm
Panel thickness:		20 mm
Sheet Quantity:		(depending on container length)

6.7.1 Roof reinforcement plate

Four 3.0 mm thick. reinforcement plates shall be mounted around the four corner fittings.

6.8 Floor

6.8.1 The Floor Boards

The floor consists of plywood. The plywood is treated with wood preservative containing "Phoxim" or equivalent according to the Commonwealth Department of Health, Australia (International standard).

Plywood thickness:	28 mm
Plywood moisture content:	Less than 14%
Plywood ply number:	19 plies
Plywood material:	Apitong/Hardwood

6.8.2 Arrangement and Fixing

The plywood boards are longitudinally laid on the Crossmember with a pre-blasted painted and free floating flat steel at the center, and two angle steel along both side rails. The plywood boards are tightly secured to each crossmember with countersunk self-tapping electro-zinc plated steel screws. These heads of the floor screws are countersunk below the level of the upper surface of the floor by 1.5 mm to 2.5 mm.

Screws:

M8 x 45 x Φ 16 (head), Electro zinc plated
Screws, quantity:

6 Pcs/end row, 4 Pcs/other
Flat bar: 50 x 4.0 mm, primed and painted
"L" section: 3.0 mm Thick.

6.9 Special Features

6.9.1 Customs Seal Provision

Customs seal provisions are made on each locking handle and retainer in accordance with TIR requirements.

6.9.2 Lashing rings

- 1) Lashing rings are welded to each bottom and top side rail at corresponding recessed area of side wall.
Lashing ring Qty./ Each bottom or top side rail: (depending on container length)
- 2) Lashing rods are welded on each rear & front corner post slot.
Lashing rods Qty. / Each front corner post : (depending on container length)
Lashing rods Qty. / Each rear corner post : (depending on container length)
- 3) Capabilities of pull load of every lashing point are as following:
Lashing rings on the side rails: 1,500 kg/each
Lashing rods on the corner posts: 1,500 kg/each
- 4) Treatment of lashing ring / bar: Electro zinc plated

6.9.3 Sill Cut-Outs

200 x 75 x 9 mm channel section steel recesses are provided in each ends of rear and front sills adjacent to the bottom fitting to prevent damage due to any twistlock misalignment.

6.9.4 Ventilators

One ventilator with E.P.D.M seal gasket is supplied on each side wall at the right-hand end when facing the outside of container, fixed by aluminum huck bolts, the seal is to be applied on the edges except the bottom side of the ventilator, after the completion of the painting process.

Quantity: 1 / each side panel
Material: ABS Labyrinth Type.

7. Preservation

7.1 Surface Preparation of the Steelwork

- 1) All the steel surface prior to forming or after will be de-greased and shot blasted to Swedish Standard SA 2.5 to obtain the surface roughness at 25 to 35 microns which can result in the removal of all the rust, dirt, mill scale and all other foreign materials.
- 2) Locking rod assemblies, which are welded with gear cams, bars holder and handle hinges, are hot dipping galvanized (Thickness: 75 microns).
- 3) All fasteners such as bolts/nuts, washers, self-tapping screws, which are not mentioned in this Spec. will be electro zinc plated to 13 Microns, unless specified otherwise.
- 4) Hinges and cam keepers will be electro zinc plated to 13 Microns.
- 5) Sealant
Apply to each perimeter of the floor, all the overlapped joints of inside, all the holes for bolts and nuts and all the places where water may leak and be sealed to prevent against water entry.

Sealant Materials:

Chloroprene (Cargo contact areas)

Butyl (Hidden parts and other areas)

7.2 Coating

7.2.1 Prior to Assembly

All the steel surfaces will be coated with primer paint immediately after shot-blasting .

7.2.2 After Assembly

All the weld joints will be shot-blasted to remove all the welding fluxes, spatters, burnt primer coatings caused by welding heat, and other foreign materials, and followed with the secondary paint operation immediately.

7.2.3 All the surface of the assembled container will have coating system as follows:

Process	Paint Name	DFT (μ)
Exterior Surface	Epoxy zinc rich primer	30
Epoxy primer	Chlorinated rubber or Acrylic topcoat	40
Color: BS 445		40
Total:		110
Interior Surface	Epoxy zinc rich primer	40
Pure epoxy		30
Total:		70
Underside Epoxy zinc rich primer		30
Bitumen		200
Total:		230

NOTE: Flooring is not generally coated with epoxy zinc primer or any epoxy topcoat.

8. Markings

8.1 Lettering

The markings will be designed decal and arranged according to buyer's requirement.
The markings consist of the following contents:

- 1) Owner's emblems according to owner's design.
- 2) Owner's code , serial number and check digit (outside & inside)
- 3) Size and type code (outside)
- 4) Weight details (on door)
- 5) Other marking: According to owner's requirements.

8.2 Consolidate Plate

8.2.1 The containers will bear marking plate in accordance with the requirements of the Classification Authorities and owner such as mentioned in section 2 in this specification.
The plate will be permanently riveted to the specified position by rivets and sealant.

Plate material:	Stainless steel
Plate treatment:	Chemically etched & enameled
Rivets material:	Stainless steel
Plate thickness:	0.8 mm

8.2.2 Contents of the plate: (rev. 2007)

- 1) Owner's plate (name and address) .
- 2) Maker's plate (name and address) .
- 3) CSC approval No.
- 4) Customs approval No.
- 5) Wood treatment .

The engraved letters on this plate are as following :

IM: Immunization

XXXX : The name of preservative.

XXXX : The time of immunization.

- 6) Date of manufacture (year-engraved, month-stamped)
- 7) Owner's serial number (stamped)
- 8) Owner's model number.

9. Testing and Inspection

9.1 Prototype-type Container

Prototype-type container to be manufactured in accordance with this specification and shall be tested according to procedures described in the ISO 1496/1 and the Classification Society's requirements. The containers will be fabricated & tested in advance of the mass production.

9.2 Container in Mass Production (Testing procedure)

9.2.1 Every container in mass production shall be manufactured under effective Quality Control procedures to meet the specified standards.

One in every 100 of containers shall be tested for following items:

- a) Stacking test
- b) Lifting from top corner fitting test
- c) Lifting from bottom corner fitting test
- d) Floor test.

After completion, ALL the containers shall be subject to dimension check, door operation check, light leakage test & production type weather-proofing test. The containers shall be inspected by the surveyor of Classification Society and identified by the appropriate society seal.

9.2.2 Each assembled corner post structure will have a tension test with 15,240 kgs. after the welding in the construction line.

(See testing table below)

9.3 General Testing Criteria:

Test Number	Test Load	Method
a. Stacking	Internal Load: 1.8R-T Testing load:86,400kg/post	Hydraulic cylinder load to corner post through top corner fittings. Time duration : 5 mins .
b. Lifting from Top Corner Fittings	Internal Load: 2R-T	Lifting vertically from top corner fittings. Time duration : 5 mins .
c. Lifting from Bottom Corner Fittings	Internal Load: 2R-T	Lifting from bottom corner fitting 45° Deg. To horizontal. Time duration : 5 mins .
d. Lifting from Fork Pocket	Internal Load: 6R-T	Lifted by horizontal bars. Bar length : 1828 mm, Bar width : 200 mm, Time duration : 5 mins .
e. Restraint (Longitudinal)	Testing Load: 2R(R/side) Internal Load: R-T	Hydraulic cylinder load applied to bottom side rails in compression & then tension . Time duration : 5 mins .
f. Floor Strength	Truck Load: 7,260 kg	Special truck is used. Total contact area: 284 sq cm, Wheel width: 180 mm, Wheel center distance: 760 mm
g. Wall Strength (Front & Door)	Test Load: 0.4 P	Compressed air bag is used. Time duration : 5 mins.
h. Side Wall Strength	Test Load: 0.6 P	Compressed air bag is used. Time duration : 5 mins.
i. Roof Strength	Test Load: 300 kg	Applied area will be the weakest place of 600 x 300 mm longitudinal & transverse. Time duration : 5 mins .
j. Rigidity (Transverse)	Test Force: 15,240 kg (150 kn)	Hydraulic cylinder will be applied to front top end rail & door header through top corner fittings, each time pulling & pushing. Time duration : 5 mins .
k. Rigidity (Longitudinal)	Test Force: 7,620 kg (75 kn)	Hydraulic cylinder load will applied to side top rail through top corner fittings. Time duration : 5 mins .
l. Weather proofing	Nozzle: Pressure:	12.5 mm (inside dia.) Distance: 1.5 m 100 kpa (1 kg/sq.cm) Speed: 100 mm/Sec.

Note: R - Maximum gross weight T - Tare weight P - Maximum payload

9.4 Inspection

9.4.1 Materials and Component Parts Inspection

All the materials and components will be inspected by Quality Control Dept. to make sure that the most suitable and qualified components being used for the containers and to meet this specification.

9.4.2 Production Line Inspection

Every container will be manufactured under effective Quality Control procedures, and every production line of the factory will be inspected and controlled by the Quality Control Dept. to meet this specification.

10. Documents Submission

10.1 When Contracting

The manufacturer shall submit the specification with following drawing (3 sets):

General arrangement	Side wall assembly
Base assembly	Front end assembly
Rear end assembly	Roof assembly
Marking arrangement	

10.2 When delivery

The appointed manufacturer shall prepare all the documents needed two weeks before the date of delivery and submit them to the owner.

11. Guarantee

The guarantee period will commence at the day of delivery and the delivery is not later than three (3) months after the containers are accepted by the owner.

11.1 Paint Guarantee

The paint system applied to the container surface shall be guaranteed against corrosion and/or paint failure for a period of five (5) years. The guarantee shall be applied to all kinds of faults / failures affecting more than 10 % of any given part of the container, and partial or total repainting shall be assured for the container(s) at the manufacturer's expense. Normal wear/tear, or corrosion caused by acid, alkaline solution or result from damages by abrasion impact or accident are excluded. Corrosion is defined as the rusting exceeding RE3 (European scale of degree of rusting).

11.2 Other Guarantees

All containers shall be guaranteed against any defects or omissions in construction, poor workmanship, or defective materials for a period of one (1) years. Any damages caused by mis-handling, mis-securing, mis-loading, impact and other natures of accident are excluded. The self-adhesive film decal shall have a guaranteed life of seven (7) years minimum.

12. Materials

The main materials used in construction are as follows or approved equivalent:

Location	Materials
Front End Assembly:	
Front corner post	Corten A
Front sill	Corten A
Front panel	Corten A
Front header cap	Corten A
Front rail	Corten A
Base Assembly:	
Bottom side rail	Corten A
Crossmember	Corten A
Fork pocket assembly	Corten A
Floor center rail	Corten A
Floor support angle	Corten A
Cover plate	Corten A
Rear End Assembly:	
Rear corner post (outer)	Corten A
Rear corner post (inner)	SM50YA (or SS50)
Rear header cap	Corten A
Door header lower	Corten A
Door sill	Corten A
Door panel frame	Corten A
Door panel	Corten A
Door hinge	S25C, Electro zinc plated
Door hinge pin	Stainless steel
Locking device	BE 2566MN Type, made in China
Locking cam keeper	S20C, Electro zinc plated
Locking cam	S20C, HDG
Locking rod	STKR41, HDG
Door gasket	E.P.D.M
Gasket retainer	Stainless steel
Washer	Stainless steel
Rivet	Stainless steel
Shim	EPDM
Corner fitting	SCW49

Side Wall Assembly:

Side panel	Corten A
Top side rail	Corten A
Lashing bar, lashing ring	SS41, Electro zinc plated
Ventilator	A.B.S

Roof:

Roof corner gusset	Corten A
Roof panel	Corten A

Floor:

Floor board	Apitong / Hardwood plywood
Floor screws	Electro zinc plated

Material Strengths:

Material	Yield point (Kg/sq.mm)	Tensile strength (Kg/sq.mm)
SS41	25	41
JIS SCW49	28	49
SS50	29	50
S20C	25	42
S25C	28	46
SM50YA	37	50
Corten A	35	49
SM50A	33	50

References and documentations include:

International Maritime Organization (IMO)
International Convention for Safe Containers (CSC) 1972-2007 and in accordance with CSC Article IV(2)
U.S. Steel technical data sheet, 2002
Universal Building Code
Cronos Leasing Company
China International Maritime Containers (Group) CIMC
Bank of America, Wells Fargo, Countrywide Financial, CitiMortgage
State Farm Insurance, St. Paul's Travelers Companies
SIR Certification: International Inspections, Inc.

13. Summary: ISBU Usage

An ISO Shipping Container is understood to have two (2) principle uses:

- 1) Transportation purposes
- 2) Storage and building construction (ISBU)

Please consider the following notes:

- Do not purchase an ISBU without the CSC Identification Plate attached or one with CIN included in the certification.

The CSC should be left intact and/or documented for city/county building inspectors. Without the CSC plate or CIN certification you could have serious problems.

Architects should require the CSC ID Plate to be intact for their Building Code certifications, or use Certifications based on CIN codes.

- The container should have a current strength certification from the dealer.
- The strengths listed above in the International specifications code are pertaining to “non-modified” ISBU. The cutting and modifying can alter the strength in certain areas and will need to be re-certified by a structural engineer if much cutting and modifications are done.
- Please note that there are two roof strength tests. Although every area of the roof far exceeds the strength required by any Building Code, the corners have the greatest strength to support weight. The inner and main roof areas support less weight than the corner posts.
- The information listed above is the “basic” International Code for ISO shipping containers and all brands should meet these minimum requirements even with door or top modifications.

The metals and parts are accurately listed, however for further strength or properties of these parts you should consult a metal or part engineering database.

- Flooring is always a concern when purchasing a used ISBU.

Since the usage of the shipping container was unknown it is recommended the wood portion of the flooring be replaced prior to construction. Not only is the cost nominal, this is often a valid concern of the local Building Inspector.

The exception can be for use as a mobile storage unit. The resurfacing and sealing of the wood flooring is safe and acceptable.

14. UPDATES:

SIR Certification: Structural Integrity Report

Soon after we published our first edition of the "Getting Approved Report" we began getting feedback and interest from many agencies, corporations, and organizations. The main topic for the ISBU Association was "how can we standardize container inspections and certifications to better address the gaps between the shipping container trade, container dealers, and the inspectors including government, architects and structural engineers".

After negotiating the needs and possible solutions, numerous conversations and meetings were held between certain organizations, trade professionals and governmental agencies to formulate a simple, solid inspection, report and certificate that building inspectors, architects, engineers, lenders, and insurance underwriters can have ultimate confidence in.

After several weeks of discussions and final approvals we are pleased to announce the creation of the Structural Integrity Report (SIR) and it's immediate implementation by International Equipment Inspections, Inc., with a credible, well known, well trained and respected national inspection network.

Key Points:

- Structural Integrity
- Safety
- CIN Code based
- Environmental Security (toxic residues)

Our sincere thanks to Mr. John Stangel who's strong international shipping trade experience and professional background was able to organize and mediate the rapid formation of the new certification program. He and others pushed our concept through with organizations, governmental agencies and legal entities to bring this to fruition in record time, ...weeks, not months or years.

Please work with IEI directly if you have further questions and comments. The ISBU Association were only involved in the conception and have no involvement in the administration and implementation of the SIR Certification.

Please read the following summary. We will have more detail in weeks and months to come. This much needed standardization is a very solid and effective beginning which can immediately assist all consumers and professionals who use ISBU for storage and construction purposes.

SIR Certification-

International Equipment Inspections, Inc (IEI) is pleased to announce that it can offer to individuals, builders and corporations a **S.I.R.** Structural Integrity Report on any containers that might be purchased for purposes of building shelters.

The report encompasses a visual inspection by a qualified inspector with knowledge of the CSC (Container Safety Convention) criteria, the Institute of International Container Lessors guide to equipment inspections (IICL-5), the Department of Defense Guide to Container Inspection for Commercial and Military Intermodal Containers and its guide to Convention for Safe Container (CSC) Re-inspection of modular causeway systems, ISOPAK Components.

The report provides city inspectors, developers, banks, architects and any interested parties with a guide line of what constitutes a structurally sound and safe ISO container in regards to the CSC requirement under a re-inspection of its structural integrity.

The report is a record of the containers condition at the time of the inspection and that the units purchased are free from any structural deficiencies in any primary structural components as per CSC and IICL guidelines. While containers might have structural deficiencies not affecting their use in static domestic storage; units to be used in a shelter configuration may rely on the structural integrity of primary components. The value to the local inspectors and builders is knowing for certain that the containers they received have been inspected to the structural integrity of its intended marine capacity.

While the stresses, racking, and pressures on containers in their marine capacity would normally be much greater then the loads associated in shelter configuration, knowing that the components have not been compromised is important to the professions using the components in their projects.

The inspection goes further to highlight any visible and transferable toxins, hazards or residues in the containers; allowing for rejections of units prior to purchases. There is no known method available to inspectors to ensure that toxins, at some point in time during the containers maritime use, had come in contact with any hazardous materials. Under all circumstances it would be I.E.I.'s position that container floors should be taken out of any units considered for a shelter project. What can be verified is that there are no transferable residues or odors in containers at the time of the inspections/purchases of containers for shelter use.

Local inspectors may not be familiar with ISO containers. ISO containers are built for enormous stress and pressures and their viability as a component with-in the construction industry is slowly being recognized. The ISBA is working hard to promote information in regards to containers and there usefulness outside of the shipping world. There is still a need for a qualified inspector to check unit conditions for the benefits of: architects, engineers, designers, builders and local inspectors.

It is important to know that when containers are used, the primary components at the time of the inspection meet the marine industries most stringent conditions; the Container Safety Convention Regulations, better known as (CSC).

Summary written by John C. Stangel, a co-author of the SIR

John C. Stangel is a graduate of the University of Wisconsin. He resided and worked in Europe since 1979, returning to the States in 1997. While in Europe, he worked for various companies within the international shipping industry including Maersk and AP Moller group. His last position was Vice President for Unicon International, responsible for Europe the Middle East and Africa. In 1996 he developed the first web based auction site for trading of shipping containers, which was later sold to Transamerica's container leasing division.

In November 2000 he left Transamerica and together with Maersk Inc. he organized Container-it, Inc., a wholesale container equipment trading company based in Georgia and serving North America and the Caribbean.

SIR / CIN Summary-

The Structural Integrity Report (SIR) is a standardized combination of established reports and inspections and offers a specific three part inspection to specifically address issues related to ISBU containers that will be used for storage, shelter or other construction:

- 1) Structural integrity (strength)
- 2) Environmental safety (toxins and containments)
- 3) Verifiable identification system (container ID)

Due to the fact that recycled shipping containers generally have the CSC plates removed by the shipping companies and container equipment leasing companies, the SIR utilizes the CIN code stamped inside the container to create a more positive and verifiable ID if required for ownership and modular construction.

CIN- Container Identification Number
SIR- Structural Integrity Report

CIN-

The CIN is an alphanumeric code stamped into the right, inside corner post of every ISO container that is manufactured. The code is stamped into the steel corner after the container passes inspection at the factory. The code identifies the date, factory, engineering information, and unique code for each container.

The same CIN code is then painted in larger numbers on the inside and outside of the container for easy identification during its global transit and repairs over the next few years of its transit life.



Even after the container is sold, retired, recycled, re-painted or re-conditioned, the CIN code will always remain stamped on the inside of the container and can become visible even when covered by multiple coats of paint.

SIR-

The SIR inspector is quite experienced with various container industry inspections including CSC, Cargo Worthy, ACET, IILC 5, etc. The experienced SIR inspector uses the criteria listed on page 39 to determine the status of the ISBU container then issues a certified SIR which includes the CIN code listed inside the container.

The SIR provides the buyers, contractors, building inspectors, architects and engineers with “one” standardized inspection that is very specific for the non-transit use as ISBU's as construction and storage modules.

NOTE: The SIR certification means it complies with the original strength standards when originally manufactured. This strength will remain with stacking and even with simple cutting and modifications for doors and windows. However, ...the removal of entire sides or roofing would need to be properly reinforced, then re-certified by a structural engineer. These calculations and recertification is not a complicated procedure.

The SIR certification is ultimately a U.S. government backed certification administered by International Equipment Inspections, Inc.

For inspections, inspector opportunities, or information regarding the international use of the SIR in your country you may contact Mr. Marvin Johnson at I.E.I., Inc. Mr. Johnson is also the CEO of Intermodal Support Services, Inc.

Email: mjohnson@sircertifications.org

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