

CONTAINERIZATION AND MODERN CARGO STOWAGE

LECTURE 4

Containerization Types & Markings

CONTAINERS

- Standardized reusable box used for the safe, efficient and secure storage and movement of materials and products within a global containerized intermodal freight transport system
 - ISO container
 - shipping container
 - box
 - freight container
 - intermodal container
 - conex box
 - sea can



CONTAINERS

- ISO (international Standards Organization)
- Freight container is an article of transport equipment
 - a) of a permanent character and accordingly strong enough to be suitable for repeated use
 - b) specially designed to facilitate the carriage of goods, by one or more modes of transport, without intermediate reloading
 - c) fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another

CONTAINERS

- ISO (international Standards Organization)
- Freight container is an article of transport equipment
 - d) designed as to be easy to fill and empty
 - e) stackable
 - f) sized such that
 - 1) area enclosed by outer and bottom corners is at least 150ft^3 (14m^2)
 - 2) at least 75ft^3 (7m^2) if top corners fittings

CONTAINERS

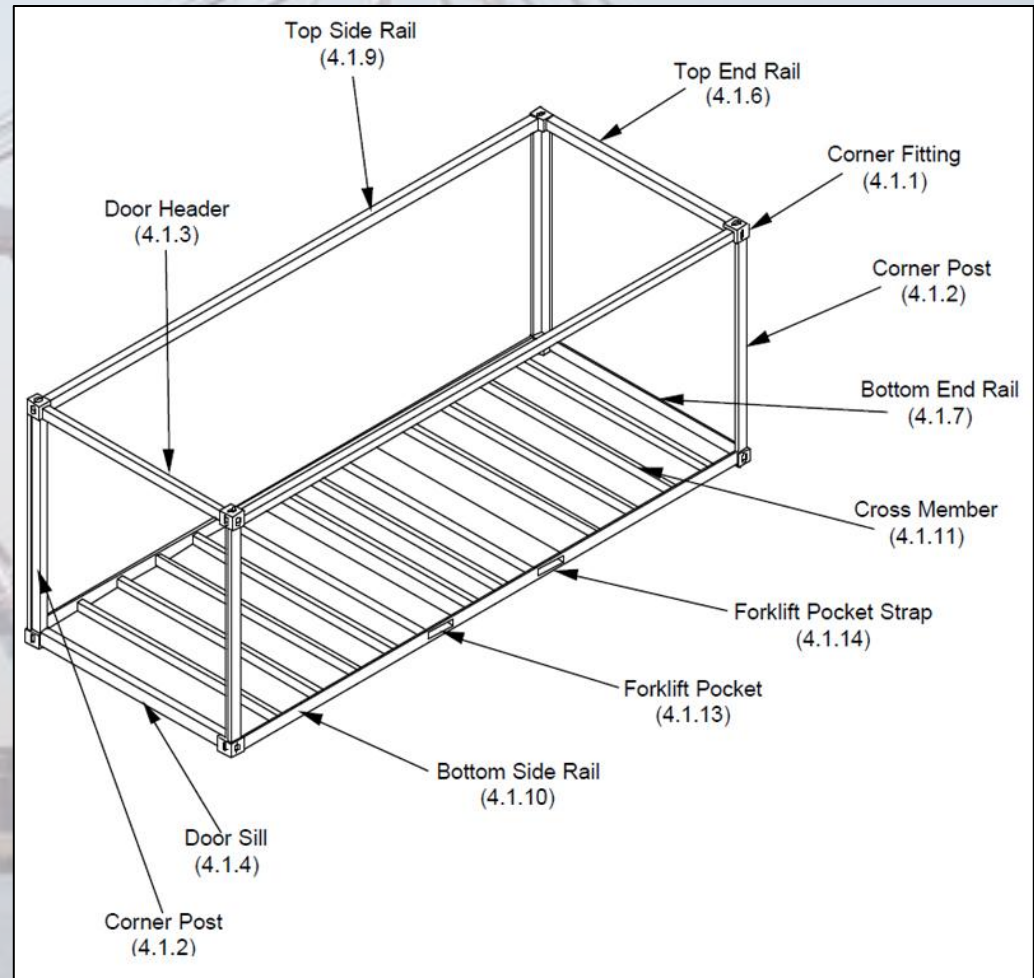
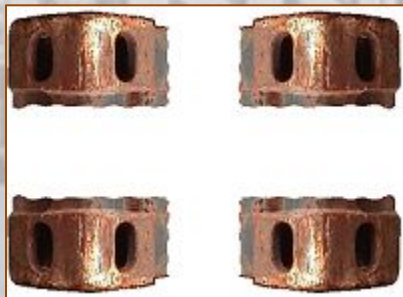
- Construction
 - Usually of corrugated weathering steel
 - Aluminum or fiberglass too
 - Steel frames
 - Support weight
 - Corner fittings, or casting, are used to lift entire weight
 - Wood floor
 - Typical container has doors fitted at one end

CONTAINERS

• Components/Parts

Corner Post: Vertical frame components located at the corners of freight containers and integral with the corner castings and floor structures.

Corner Castings: Fittings located at the corner of the freight container which provide means for lifting, handling, stacking and securing the container.



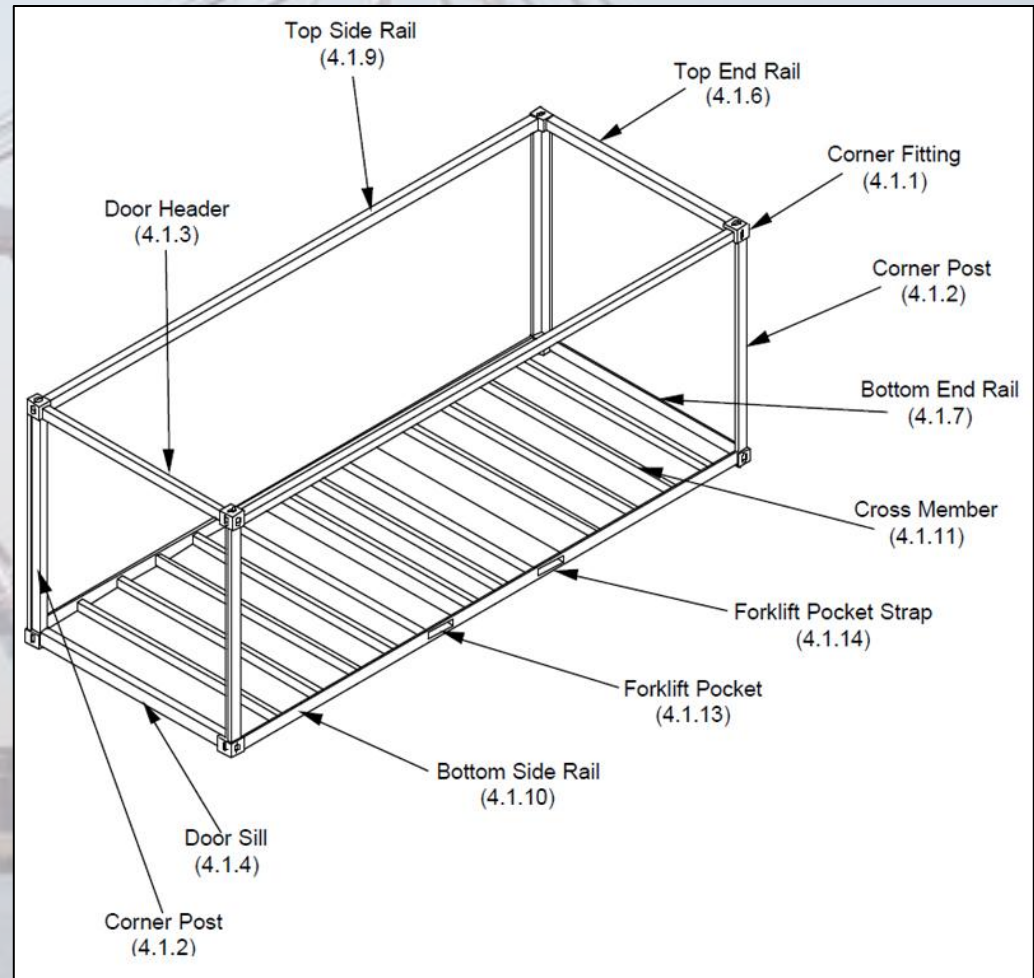
CONTAINERS

• Components/Parts

Front-End Frame: The structure at the front end of the container (opposite the door end) consisting of top and bottom rails attached to the front corner posts and the corner castings.

Top Rail: Longitudinal structural members located at the top edge on either side of the freight container.

Bottom Rail: Longitudinal structural members located at the bottom edge on either side of the freight container.



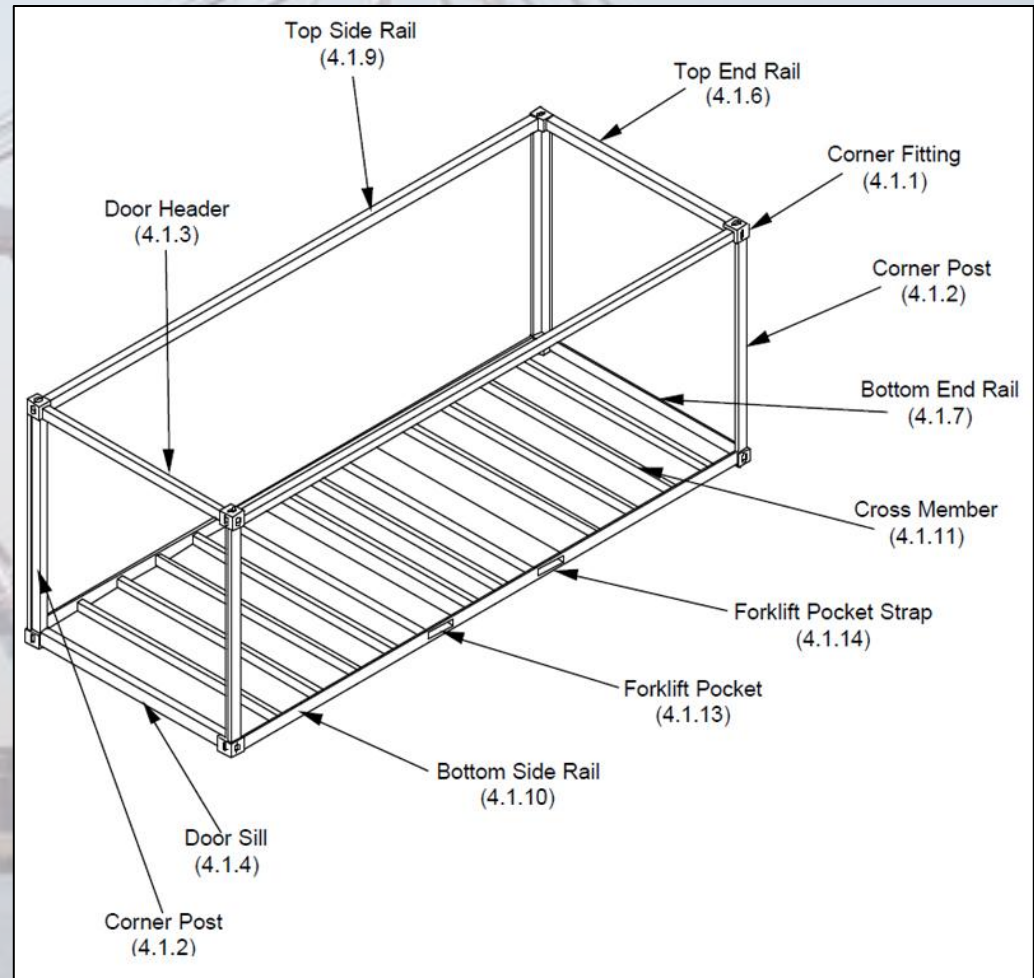
CONTAINERS

- Components/Parts

Header and Sill: In way of door entrance with overhead horizontal header frame and similar floor level threshold sill.

Cross-members: A series of transverse beams at approximately 12 inch centers attached to the bottom side rail and an integral part of the floor frame support

Forklift Pocket: Location for placement of forklift forks for lifting when not loaded.

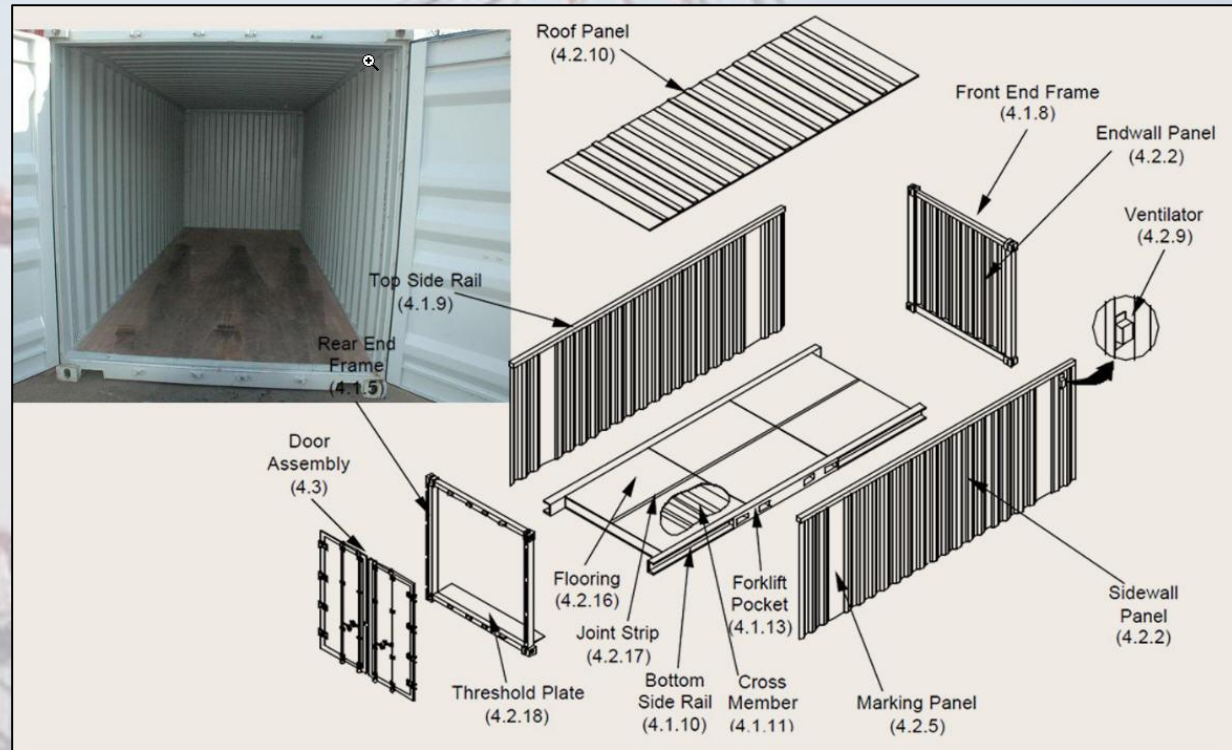


CONTAINERS

- Components / Parts

Floor: The floor may be hard or soft laminated wood, planks or plywood.

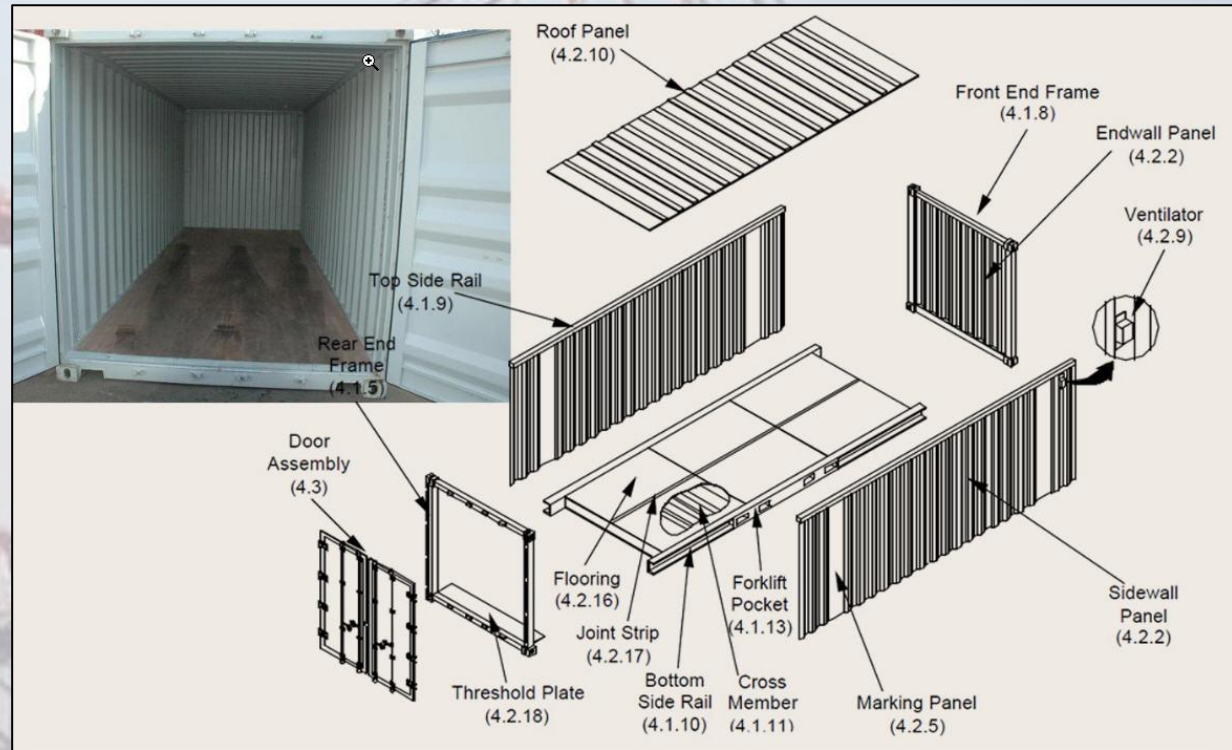
Roof: Roof bows are the undermost structure of the roof and are usually placed at 18 or 24 inch centers. Steel containers (except open top containers) are not fitted with roof bows but will have corrugated or flat steel sheet roofs welded to the frame members. Aluminum containers have aluminum sheathing, bonded with adhesive to the roof bows and riveted to the top rails and headers. Fiberglass containers have fiberglass reinforced plywood panels fastened to the rail and headers. **The roof is the part of the container most vulnerable to damage.**



CONTAINERS

- Components / Parts

Sides & Front: Modern steel containers will have corrugated steel panels. Aluminum containers have aluminum sheathing on the sides and front of the container which are affixed to aluminum stringers which are in turn bolted to the top and bottom rails and also to the front end frame. The stringers may be on the outside or inside of the sheathing. Fiberglass containers do not use stringers for supporting the fiberglass reinforced plywood panels. The side and the front of steel containers are made of corrugated steel sheets eliminating stringers.

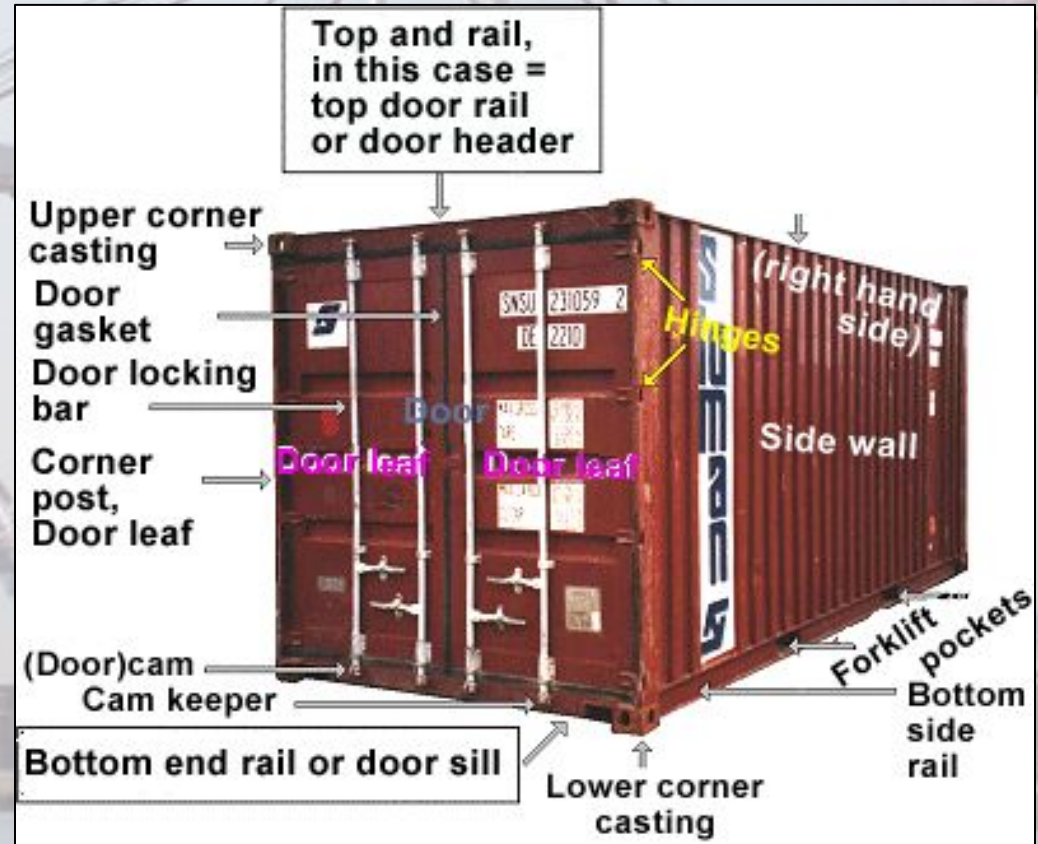


CONTAINERS

• Components/Parts

Doors: Doors may be ply-metal (plywood core with steel or aluminum facings), corrugated, or combinations with fiberglass. The hinged doors have plastic or rubber lined door gaskets as seals against water ingress.

Security seal: Used in conjunction with locking mechanism in order to seal the containers for security purposes. These seals are numbered and often color coded.

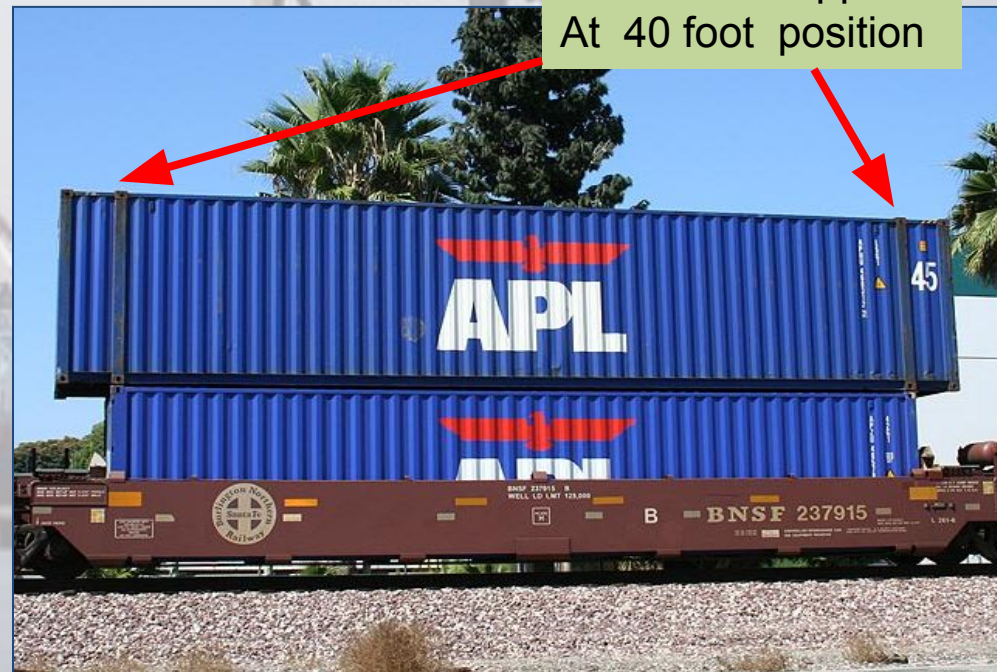


CONTAINERS

- Size
 - ISO (international Standards Organization) standards set in late 1960s
 - Standardized length took some time
 - Pan-Atlantic used 33ft. and then 35 ft.
 - Matson used 24 ft.
- Length
 - Standard length set at 10, 20, 30, and 40 ft.
 - 10 proved to small and few 30 were built
 - 20 and 40 as the most popular and universally common

CONTAINERS

- Length
 - Standard length set at 10, 20, 30, and 40 ft.
 - Longer units of 45ft., 48ft. (14.63 m) and 53ft. (16.15 m) in use
- Additional support points at the 40 ft. position so that they can be stowed over a standard 40ft. container



CONTAINERS

- Length
 - Standard length set at 10, 20, 30, and 40 ft.
 - 20ft. slightly shorter
 - 19ft. 10.5in.
 - So two can fit in space of one 40ft.



CONTAINERS

- Width
 - ISO containers have width of 8 ft. (2.438m)
 - “Pallet wide” containers
 - About 2 inches (5 cm) wider than standard containers
 - Accommodate Euro-pallets common in Europe
 - Internal width of 2440 mm for easy loading of two 1200 mm long pallets side by side

CONTAINERS

The background of the slide is a faded image of a busy port. Several large gantry cranes are visible, with their complex metal structures and cables. In the foreground and middle ground, there are numerous stacks of colorful shipping containers in various colors like red, blue, and white. The port is situated along a body of water, which is visible at the bottom of the frame.

- Height
 - Standard
 - A standard container is 8ft.6in. in height
 - High Cube
 - A high box is 9ft. 6in.
 - Even 10ft. 6in. in some cases.
 - 8ft. height used early on
 - Seen rarely today

CONTAINERS

- Capacity - Boxes

		20' container		40' container		40' high-cube container		45' high-cube container	
		imperial	metric	imperial	metric	imperial	metric	imperial	metric
external dimensions	length	19' 10 1/2"	6.058 m	40' 0"	12.192 m	40' 0"	12.192 m	45' 0"	13.716 m
	width	8' 0"	2.438 m	8' 0"	2.438 m	8' 0"	2.438 m	8' 0"	2.438 m
	height	8' 6"	2.591 m	8' 6"	2.591 m	9' 6"	2.896 m	9' 6"	2.896 m
interior dimensions	length	18' 8 13/16"	5.710 m	39' 5 45/64"	12.032 m	39' 4"	12.000 m	44' 4"	13.556 m
	width	7' 8 19/32"	2.352 m	7' 8 19/32"	2.352 m	7' 7"	2.311 m	7' 8 19/32"	2.352 m
	height	7' 9 57/64"	2.385 m	7' 9 57/64"	2.385 m	8' 9"	2.650 m	8' 9 15/16"	2.698 m
door aperture	width	7' 8 1/8"	2.343 m	7' 8 1/8"	2.343 m	7' 6"	2.280 m	7' 8 1/8"	2.343 m
	height	7' 5 3/4"	2.280 m	7' 5 3/4"	2.280 m	8' 5"	2.560 m	8' 5 49/64"	2.585 m
volume		1,169 ft³	33.1 m³	2,385 ft³	67.5 m³	2,660 ft³	75.3 m³	3,040 ft³	86.1 m³
maximum gross mass		66,139 lb	30,400 kg	66,139 lb	30,400 kg	68,008 lb	30,848 kg	66,139 lb	30,400 kg
empty weight		4,850 lb	2,200 kg	8,380 lb	3,800 kg	8,598 lb	3,900 kg	10,580 lb	4,800 kg
net load		61,289 lb	28,200 kg	57,759 lb	26,600 kg	58,598 lb	26,580 kg	55,559 lb	25,600 kg

CONTAINERS

- Capacity – Some Variations by Owner

Size feet / inches	Door openings* mm feet / inches		Internal dimensions* mm feet / inches			Weight* kg lb			Volume* m3 cubic feet
	Width	Height	Length	Width	Height	Max. gross	Tare	Max. payload	
20 standard 20' x 8' x 8'6"	2,339 7' 8 1/16"	2,274 7' 5 1/2"	5,896 19' 4 1/8"	2,350 7' 8 1/2"	2,393 7' 10 3/16"	30,480 67,200	2,280 5,030	28,200 62,170	33 1,165
40 standard 40' x 8' x 8'6"	2,340 7' 8 1/8"	2,274 7' 5 1/2"	12,032 39' 5 11/16"	2,350 7' 8 1/2"	2,393 7' 10 3/16"	32,500 71,650	3,700 8,157	28,800 63,493	67 2,366
40 high 40' x 8' x 9'6"	2,340 7' 8 1/8"	2,577 8' 5 7/16"	12,032 39' 5 11/16"	2,350 7' 8 1/2"	2,697 8' 10 1/8"	32,500 71,650	3,880 8,554	28,620 63,100	76 2,684
45 high 45' x 8' x 9'6"	2,340 7' 8 1"	2,585 8' 5 12"	13,556 44' 5 11"	2,352 7' 8 9"	2,698 8' 10 3"	32,500 71,650	4,900 10,803	27,600 60,848	85 3,036

Tables include “heavy” 20 ft. containers.

Normal max gross is 24,000 kg for standard 20ft.

CONTAINERS

- Capacity - Boxes
 - Tare Weight
 - Weight of a container **without cargo**
 - Includes all fittings and materials
 - Varies depending on construction
 - Gross Weight (maximum gross weight)
 - Weight of a container and all its contents
 - Payload (maximum permissible payload)
 - Weight of contents of a container
 - Difference between gross and tare
 - Volume
 - **Internal** length x width x height

CONTAINERS

- Capacity – Ships and Terminals
 - Twenty-foot equivalent unit (TEU)
 - Based on the volume of a 20 ft. intermodal container
 - 20 ft (length) × 8 ft (width) container
 - A forty-foot equivalent unit (FEU) is two TEUs
 - Approximate measure
 - Height of the box is not considered
 - 9 ft. 6 in. *High cube* and the 4 ft. 3 in. *half height* 20 ft (6.1 m) are both one TEU
 - A 45 ft. container is still 2 TEUs

CONTAINERS

- Types
 - General purpose containers
 - Open-top and Half height containers
 - Flat rack and Platform containers
 - Ventilated container
 - Thermal Containers (mechanical / insulated)
 - Bulk container
 - Tank container
 - Named cargo containers (Livestock container, Automobile containers ...)

CONTAINERS

- General purpose containers
 - Standard dry van
 - Suitable for commodities in bundles, cartons, boxes, cases, sacks, bales, pallets, drums, loose cargo, bulk, furniture, etc.



CONTAINERS

- General purpose containers
 - Totally enclosed and waterproof
 - Rigid roof and sides
 - Wood floor
 - No ventilation
 - May cause problems with some cargos
 - Carry Solid and liquid bulk cargoes with modification

CONTAINERS

- General purpose containers
 - Full width doors at at least one end
 - Side opening doors option
 - High cube and pallet wide options



CONTAINERS

- Open Tops
 - General purpose container with no rigid roof
 - Load through open top or end doors
 - May have removable tarpaulin soft top
 - Removable roof bows can be used for support
 - Used for over-height goods like machinery and timber requiring top loading



CONTAINERS

- Half Height Containers
 - Similar to open top
 - Only 4ft. high
 - Used for high density (heavy) cargo) such as steel pipes, beam, or rolls; and ores
 - Two can fit in space of one standard container



CONTAINERS

- Open Sides
 - General purpose with rigid roof and ends, but no sides
 - Sides covered with removable tarpaulin
 - Prone to cargo shifting in transit



CONTAINERS

- Flatracks
 - No side walls or roof
 - Used for out of gauge cargo (over height and/or over width) and bulky goods
 - Machinery, vehicles, boats, etc.
 - Fixed or folding ends
 - Folded ends allow stacking into bundles for storage when empty



CONTAINERS

- Platform (flatbed)
 - No side walls, roof or ends
 - Used for equipment, over-length cargoes and special project cargoes



CONTAINERS

- Ventilated
 - General purpose containers allow exchange between inside and outside ambient air
 - Designed to prevent condensation on cargo
 - Used for fruits and vegetables, bagged coffee, tea, spices, tobacco

CONTAINERS

- Ventilated
 - Natural air flow
 - Highly vented
 - Side vents along top and bottom rails
 - Top vented
 - Side vents along top rails



CONTAINERS

- Ventilated
 - Mechanical air flow
 - “Fantainers”
 - Mechanical fan installed inside or outside
 - Ambient air drawn into the floor by the fan via a especially designed perforated lower front sill and replaced air is removed through the fan



CONTAINERS

- Thermal
 - Similar construction as general purpose
 - Inside is isolated from outer walls by a thick layer of insulating material
 - Aluminum t-section floor with ducts for the passage of cold air into the container



CONTAINERS

The background of the slide is a faded image of a busy port. Several large gantry cranes are visible, with their complex metal structures and cables. In the foreground and middle ground, there are numerous stacks of intermodal containers in various colors, including red, blue, and white. The port is situated along a body of water, which is visible at the bottom of the frame.

- Thermal
 - Used to carry cargo requiring precise temperature control
 - Capable of chilled, frozen, or even heated applications
 - Number in use/circulation has skyrocketed
- Detailed discussion of reefers in later lecture

CONTAINERS

- Thermal
 - Integral “Reefer”
 - Refrigeration unit built into container



- Requires external power source on ship and at terminal
- Own data logger to record temperature

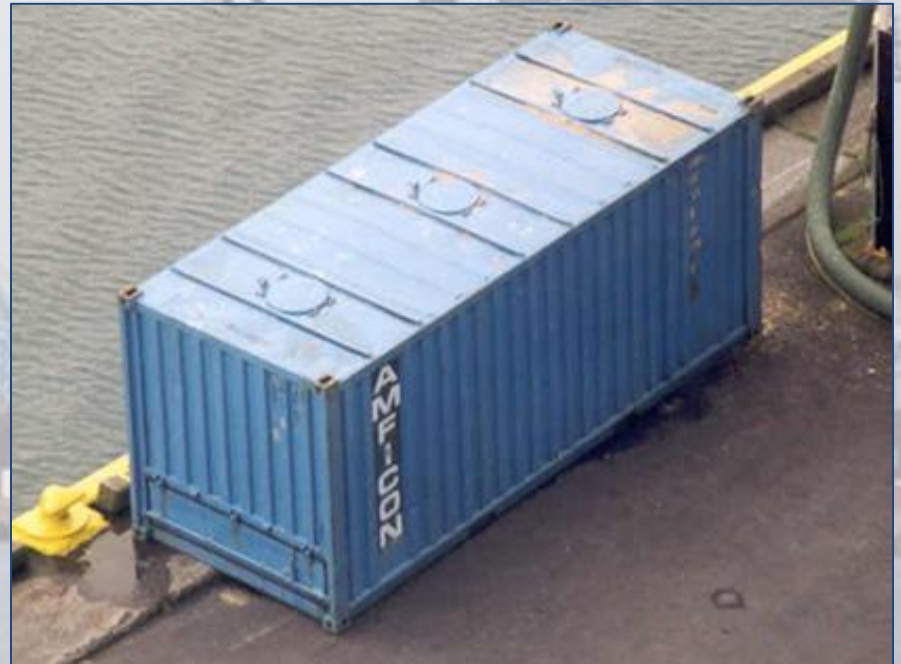
CONTAINERS

- Thermal
 - Porthole “Reefer”
 - Connected to a system of air ducts in the vessel’s hold through which cold air is supplied
 - Clip-on refrigerated units used when off ship



CONTAINERS

- Bulk
 - General purpose container with special top loading ports and lower door discharge shoot
 - Used for dry cargoes in bulk i.e. grains, malt, sugar, fertilizer, coal, etc.



CONTAINERS

- Tanker
 - Tank fit within a container frame
 - Used to carry small shipments of bulk liquid and gas such as food-stuff, chemicals, helium, etc.



- Temperature control is possible

CONTAINERS

- Named Cargo
 - Livestock, autos, etc.



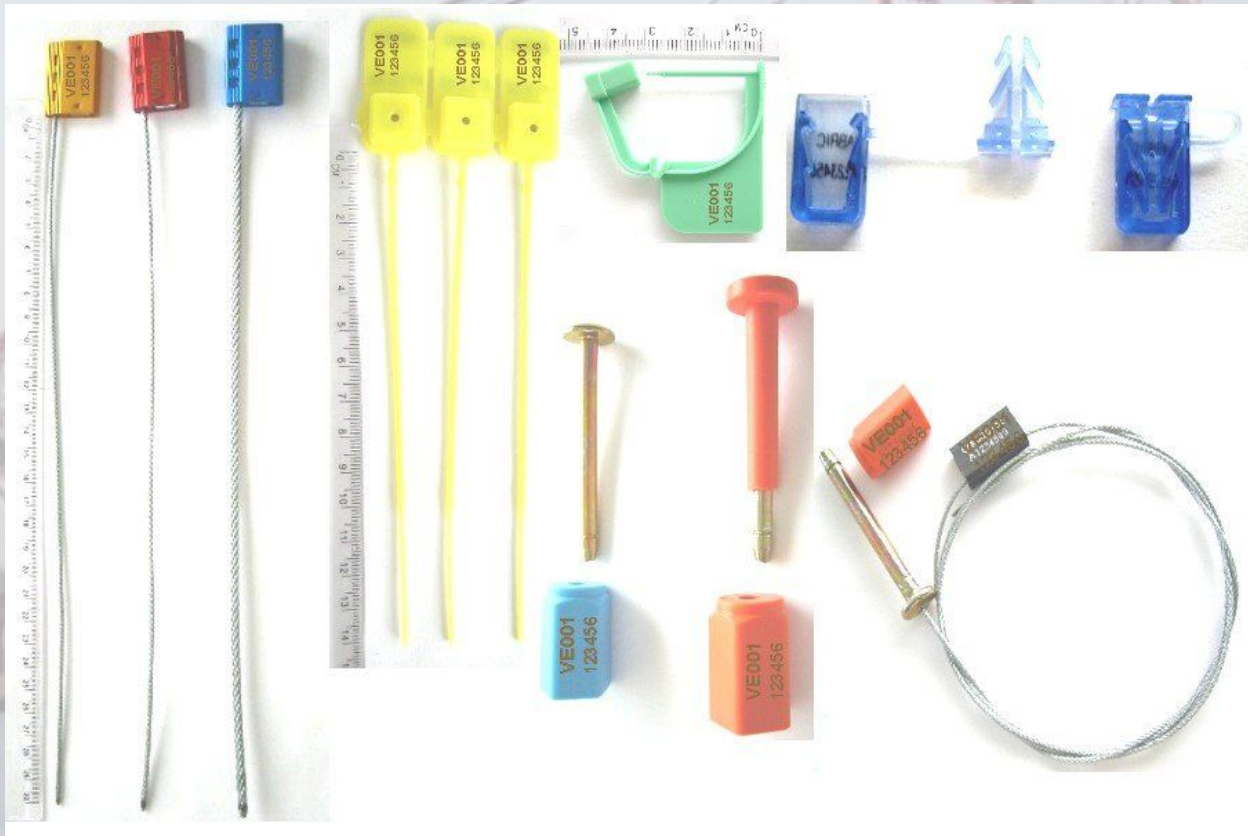
CONTAINERS

- Locking and Sealing
 - Prevent loss or tampering



CONTAINERS

- Locking and Sealing
 - Prevent loss or tampering



CONTAINERS

- Standardized Container Bolt Seal
 - Preferred By Shipping Lines
 - Galvanized High Tensile Steel shank
 - ABS Protective Mold To Counter Corrosion
 - Highly Visible Unique Sequential Numbering
 - Easy To Lock Spring Lock Mechanism



CONTAINERS

- Over 90% of all non-bulk waterborne cargo is shipped in containers
- Over 18 million shipping containers in circulation making over 200 million trips per year
 - Over 28 million TEUs

AVERAGE NEW CONTAINER PRICES (China, ex-factory) in USD

	2Q '09	3Q '09	4Q '09	1Q '01
GP-20ft	2,100	2,000	1,900	2,000
GP-40ft	3,360	3,200	3,040	3,200
GP-40ft HC	3,570	3,400	3,230	3,400
IR-20ft	13,200	13,000	13,200	13,500
IR-40ft HC	16,500	16,000	16,400	16,800

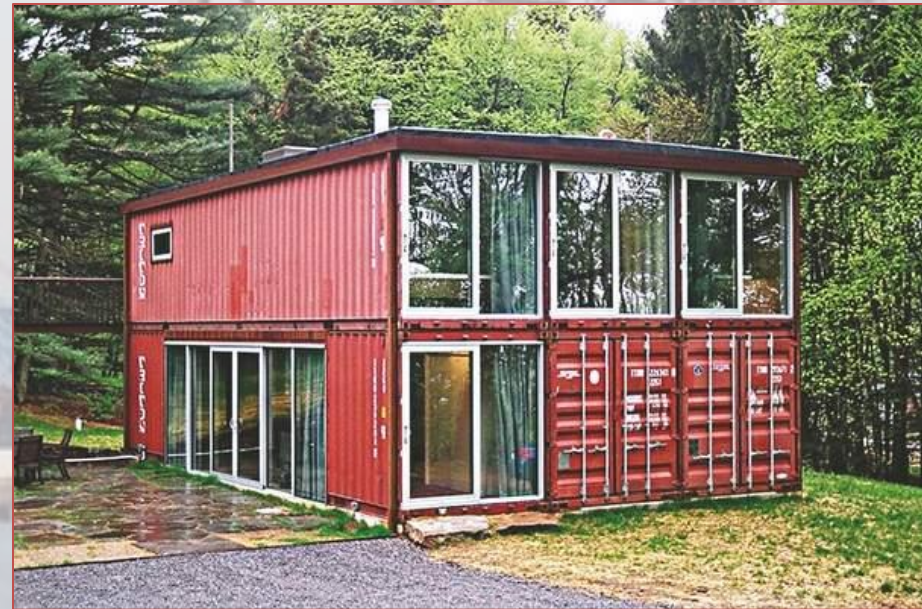
GP=General Purpose, HC=High Cube; IR=Integral Reefer

GP prices refer to full Corten Frames/posts, muffler grade stainless steel outer panel/floorer and high grade stainless steel inner liner), and includes integral machinery, and delivery in central/northern China

Source: Containerisation International

CONTAINERS

- Average life is 10 – 15 years
- Modified containers are used commonly for mobile self-contained homes, as on-site offices and for various uses such as a generator van when mounted on a chassis
- Container architecture is a new industry



CONTAINERS

- Markings
 - **ISO 6346**
 - International standard for coding, identification and marking of intermodal containers
 - Visual identification system for every container
 - a unique serial number with check digit
 - the owner
 - a country code
 - a size
 - type and equipment category
 - any operational marks

CONTAINERS

- Markings



- 1.Owner's name and Logo
- 2.Classification Society Shield
- 3.Custom Seal
- 4.CSC Plate
- 5.Container Number & Country Size Type Code
- 6.Capacity and weight
- 7.Manufacturer's certification
- 8.Dimensions name plate

CONTAINERS

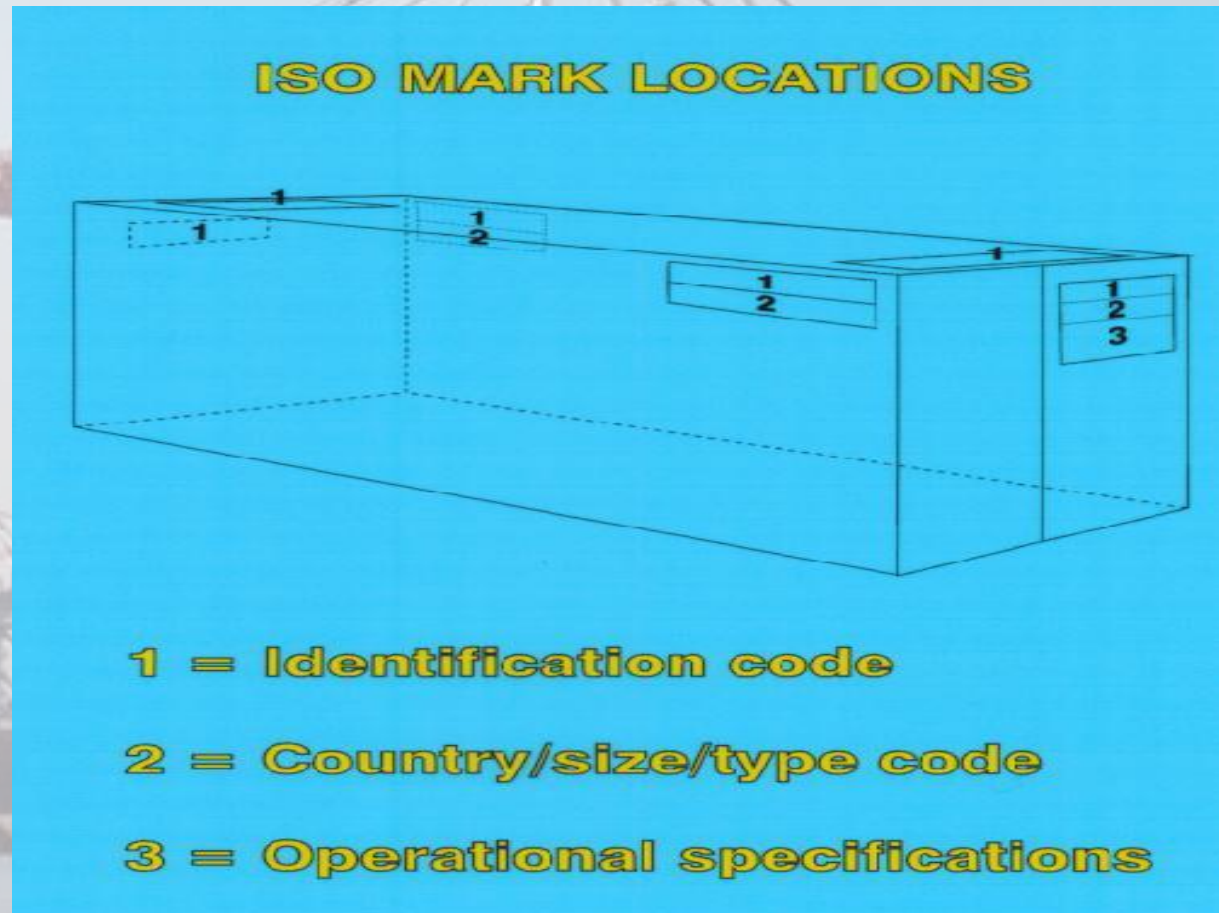
- Markings



- 1.Owner's name and Logo
- 2.Classification Society Shield
- 3.Custom Seal
- 4.CSC Plate
- 5.Container Number & Country Size Type Code
- 6.Capacity and weight
- 7.Manufacturer's certification
- 8.Dimensions name plate

CONTAINERS

- Markings
 - Locations



CONTAINERS

- Markings
 - Letter / Number heights
 - ID code minimum 100 mm high
 - Country/Size/Type code minimum 100 mm
 - Operational marks minimum 50 mm high

CONTAINERS

- Markings
 - On Line Tutorial

<http://www.pier2pier.com/links/files/educational/containermarkings.php>

<http://www.pier2pier.com/links/files/educational/containermarkings.swf>

CONTAINERS

- Markings
 - Container Number
 - Unique to each container
 - Eleven alpha numeric characters
 - owner code, consisting of three capital letters
 - product group code, consisting of one of capital letters U, J or Z
 - six-digit registration number
 - check digit



CONTAINERS

- Markings
 - Owner Code
 - Consists of three capital letters of the Latin alphabet to indicate the owner or principal operator of the container.
 - Code needs to be registered at the Bureau International des Conteneurs in Paris
 - Equipment Category Identifier
 - One of the following three capital letters
 - U for all freight containers
 - J for detachable freight container equipment
 - Z for trailers and chassis

CONTAINERS

- Markings
 - Serial Number
 - Six numeric digits
 - Assigned by the owner or operator
 - Check Digit
 - One numeric digit
 - Validates accuracy of the owner code and serial number
 - Can validate on line

<http://42g1.com/validate.html>

CONTAINERS

- Markings
 - Check Digit Calculation - Step 1

An equivalent numerical value is assigned to each letter of the alphabet, beginning with 10 for the letter A (11 and multiples thereof are omitted)

A	B	C	D	E	F	G	H	I	J	K	L	M
10	12	13	14	15	16	17	18	19	20	21	23	24

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
25	26	27	28	29	30	31	32	34	35	36	37	38

The individual digits of the registration number keep their everyday value, i.e.
1 = 1, 2 = 2 etc.

For Example:

S	U	D	U	3	0	7	0	0	7
30	32	14	32	3	0	7	0	0	7

T	E	X	U	4	5	2	1	4	9
31	15	36	32	4	5	2	1	4	9

CONTAINERS

- Markings
 - Check Digit Calculation - Step 2

Each of the numbers calculated in step 1 is multiplied by 2^{position} , where position is the exponent to basis 2. Position starts at 0, from left to right. Multiplies are the first number by 1, the second by 2, the third by 4 ... and the 10th by 512.

The following table shows the multiplication factors:

1st number/ digit	2nd number/ digit	3rd number/ digit	4th number/ digit	5th number/ digit	6th number/ digit	7th number/ digit	8th number/ digit	9th number/ digit	10th number/ digit
2^0	2^1	2^2	2^3	2^4	2^5	2^6	2^7	2^8	2^9
1	2	4	8	16	32	64	128	256	512

CONTAINERS

- Markings

- Check Digit Calculation - Step 3

- 1) Sum up all results of step 2
- 2) Divide them by 11
- 3) Erase all decimal digits of the division (i. e. make the result an integer value)
- 4) Multiply the integer value by 11
- 5) Subtract result of 4) from result of 1):

This is the check digit! EXAMPLE

C	S	Q	U	3	0	5	4	3	8	Calc.
13	30	28	32	3	0	5	4	3	8	
x	x	x	x	x	x	x	x	x	x	
1	2	4	8	16	32	64	128	256	512	
=	=	=	=	=	=	=	=	=	=	
13	60	112	256	48	0	320	512	768	4096	6185 [a)]
b) Division by 11:										562.272...
c) Erase decimal digits:										562
d) Multiply by 11:										6182
a) minus d) = Check Digit:										3

CONTAINERS

- Markings
 - Check Digit Calculation - Step 3

Two More Examples:

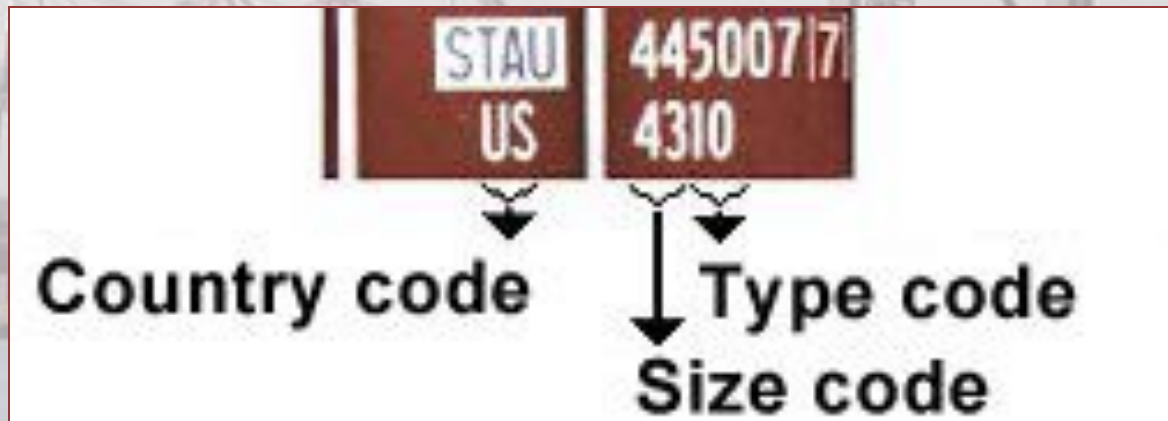
S	U	D	U	3	0	7	0	0	7
30	32	14	32	3	0	7	0	0	7
x	x	x	x	x	x	x	x	x	x
1	2	4	8	16	32	64	128	256	512
=	=	=	=	=	=	=	=	=	=
30	64	56	256	48	0	448	0	0	3,584
The sum of these numbers equals				4,486	and is divided by 11, giving				407.8
The integer multiplied by 11 equals				4,477	The difference between the resultant values is the check digit				
				9					

HLXU 469192 0

H	L	X	U		4	6	9	1	9	2	0
18	23	36	32		4	6	9	1	9	2	
1	2	4	8		16	32	64	128	256	512	
18	46	144	256		64	192	576	128	2,304	1,024	4,752
4,752	11	432.0	432	11	4,752	0					

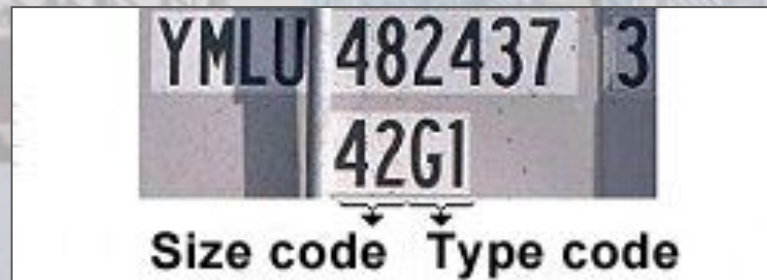
CONTAINERS

- Markings
 - Country, Size, Type Codes
 - Country (optional)
 - Consists of two capital letters abbreviation.
 - US for United States, GB for Great Britain



CONTAINERS

- Markings
 - Country, Size, Type Codes
 - Size & Type
 - Four alpha or numerical coded digits
 - First character, representing the length
 - Second character, representing the width and height
 - Third and fourth character indicating the type of the container



CONTAINERS

- Markings
 - Country, Size, Type Codes
 - Size & Type
 - Under current standard



According to the two characters 45 of the size code, the container is 12,192 mm or 40' long, 2,895 mm or 9'6" high and 2,438 mm or 8' wide. The type code characters G1 state that the container is a general purpose container without ventilation but with vents in the upper part of the cargo space



According to the two characters 45 of the size code, the container is 12,192 mm or 40' long, 2,895 mm or 9'6" high and 2,438 mm or 8' wide. The type code characters R1 state that the container is a thermal container which can be mechanically refrigerated and heated

CONTAINERS

- Markings
 - Capacity and Weight

KKTU 666042 6		
22R1		
MAX G W	27000 KGS	
	59520 LBS	
TARE	3085 KGS	
	6800 LBS	
MAX C W	23915 KGS	
	52720 LBS	
CU CAP	284 CUM	
	1005 CUFT	

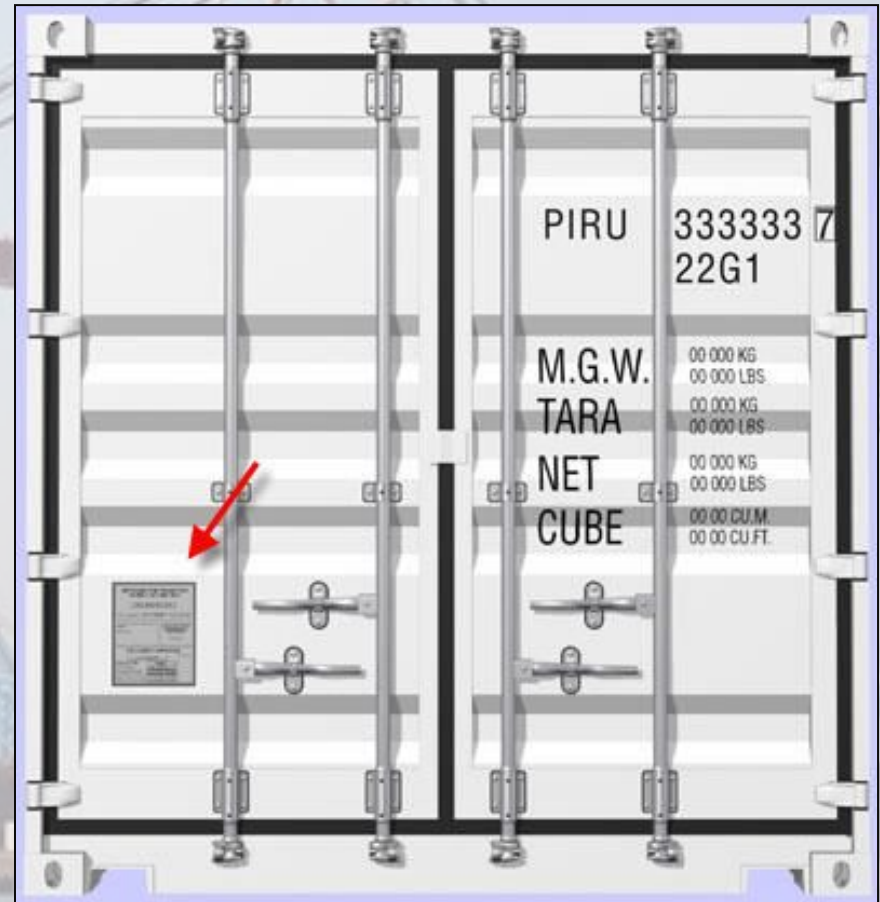
GB 4510		
MAX. WT.	30.480 KGS	
	67.200 LBS	
TARE WT.	3.980 KGS	
	8.770 LBS	
PAYLOAD	26.500 KGS	
	58.430 LBS	
CU. CAP.	76.3 CU.M.	
	2.696 CU.FT.	

CONTAINERS

- Markings
 - Capacity and Weight
 - Maximum Gross Weight (Rating)
 - Maximum permissible weight of a container plus its contents
 - Tare Weight (also Net Weight)
 - Weight of a container without cargo includes all fittings and materials
 - Payload
 - Weight of contents of a container
 - Difference between gross and tare
 - Cubic Capacity or Volume
 - Internal length x width x height

CONTAINERS

- Markings
 - CSC Plate
 - Required for any container used for international transport
 - International Convention for Safe Containers



CONTAINERS

- Markings
 - CSC Plate
 - Permanently affixed
 - Left side door
 - Testing for defects that could put a person in danger
 - 5 years then every 2
 - Max Gross Weight
 - Allowable stack weight
 - Racking test
 - Twisting stresses when in transit

APPROVED FOR TRANSPORT
UNDER CUSTOMS SEAL

GB/C 4568 BV/2002

TYPE HC40/03B MANUFACTURER'S NO. OF THE CONTAINER CIMC 15324889

OWNER:
COMPAGNIE MARITIME D'EQUIPEMENT - C.M.E.
HEAD OFFICE: APARTADO 850
PANAMA 1 - REPUBLIC OF PANAMA

TIMBER COMPONENT TREATMENT
IMMEDIANUM 20002005

MANUFACTURED BY:
CIMC
SHENZHEN SOUTHERN CIMC
CONTAINERS MANUFACTURE CO., LTD.

CSC SAFETY APPROVAL

F/BV/7834/02

DATE MANUFACTURED 8/2005

IDENTIFICATION NO. ECMU 963333

MAXIMUM GROSS WEIGHT 30,480 KGS 67,200 LBS

ALLOW. STACK. WT. FOR 1.8G 192,000 KGS 423,280 LBS

RACKING TEST LOAD VALUE 15,240 KGS 33,600 LBS

ACEP
FR
0018
1985
CMA

CONTAINERS

- Markings
 - Classification Societies



CONTAINERS

- Markings
 - Operational
 - Height
 - Even mirror version
- Hazardous/ Dangerous Cargo
 - Placards
 - Discuss in detail in later lecture



CONTAINERS



- Looked at the Types of Containers and their markings
- Next Lecture:
Terminals and ships
- Assignment:
Chapter 1: *Marine Cargo Operations*, Meurn
Chapter 8: *Cargo Work*, House

CONTAINERS

References:

- *Marine Cargo Operations*, Meurn, 4th ed. 2011
- *Cargo Work*, House, 7th ed., 2005
- <http://www.containerhandbuch.de/>



Purpose:

- *All materials are presented strictly for educational purposes only*

CONTAINERIZATION

The background of the slide is a faded image of a busy port. Several large gantry cranes are visible, with their long jibs extending over the water. In the foreground and middle ground, there are numerous stacks of intermodal containers in various colors like red, blue, and white. The water is calm, and the sky is a pale, hazy blue.

- Looked at the history of containerization by video
- Next Lecture:
Types of Containers and Markings
- Assignment:
Chapter 1: *Marine Cargo Operations*, Meurn
Chapter 8: *Cargo Work*, House