Lecture 4
The Container
THE CONTAINER

Section 1  Emergence of the ISO Container
Section 2  The ISO Container
EMERGENCE OF ISO CONTAINERS
1925 – AUSTRALIAN RAILWAYS
EMERGENCE OF ISO CONTAINERS
WORLD CONGRESS 1928

- World Congress 1928 held in Rome
  - Container Commission established
- 1933 replaced by International Container Bureau
  joint body of:
  - International Chamber of Commerce
  - Union of Railways (UIC)
  - Meet 4 times a year (except war years)
- Largely concerned with European railways
1929 began hauling rail cars by ship from the port of New York to Havana, Cuba

2 ships Seatrain New York and Seatrain Havana
- Length 130 m, DWT 10,500
- Capacity of 100 railcars on 4 decks
- Load and unload in 10 hours

Service continued until early 1960s (ended due to USA - Cuba politics)

Sought to redeploy ships to New York to Puerto Rico but poor rail in Puerto Rico
EMERGENCE OF ISO CONTAINERS
+1930s UK RAILWAYS
EMERGENCE OF ISO CONTAINERS
1950s USA STRICK-TAINER

- 1950s first ship cargo container used in international trade
- 1960s evolved into Flexi-Van container system
  - Used by New York Central Railroad
  - Road-Rail-Unit with bottom container castings
Problem

- Port of Pusan
- Korean stevedores dropping and broke about 90% of crates
- Theft and pilferage common
- Army lost about 10% of all cargo

CONEX Box 1952

- Reduce port pilferage and breakage
- Reduced transport time from 55 days to 27 days
EMERGENCE OF ISO CONTAINERS
1968 – LIVERPOOL TO NEW YORK
EMERGENCE OF ISO CONTAINERS
1955 - WHITE PASS AND YUKON

- Clifford J. Rodgers
  - Purpose built container ship (Montreal 1955)
  - 600 steel containers
    - 8ft by 8ft
    - 5 tons capacity

- November 26, 1955 - Intermodal container system
  - North Vancouver, British Columbia to Skagway, Alaska
  - Transported on purpose built rail wagons and trucks
  - Transport north inland to the Yukon
  - Transported to consignee without opening
Malcolm McLean (Scottish American) – a trucker
- Bought a second hand truck. In 1937
- Business grew to 1800 trucks
- Long distance trucking

USA is a federal country each state collects its own taxes
- Truck trailers paid a tax each time enters another state
- A long haul could cross 12 states
- 2 x tax payments at the border crossing

Known for innovation and he was frustrated that
- 1 day to unload a truck carrying breakbulk cargo
- Dock pallets loaded one at a time and manually stowed

1954 designed system for loading and unloading
- Body of truck removed from chassis and loaded on ship
- Body of truck unloaded from ship and put on a new chassis

Sending by ship would save
- Taxes
- Handling time
- Damage and thefts
EMERGENCE OF ISO CONTAINERS
SEALAND 1955 - MALCOM MCLEAN

- Sold trucking business for $6 million
- Bought a shipping company
  - Pan-Atlantic Steamship Line (would become Sea-Land)
- Converted a 1944 T-2 tanker ship (Ideal X)
  - Deck added with slots to secure 58 units (35ft)
  - Also able to carry 15,000 tons of petroleum
26 April Ideal X’s first sailing
Port Newark (New Jersey) to Houston
Deck had slots for 58 units (35ft long)
Arrived in Houston 6 days later
- Units unloaded onto chassis on quay
- Existing port cranes were used
- No handling of cargo by longshoremen (US port workers)
Cost of stowage
- Breakbulk ship = US$ 5.80 per ton
- Ideal X = US$ 0.16 per ton
- 36 times less
Established X soon proved the success of the concept

- Bought World War 2 C2 type general cargo ship
  - Converted into container ship
  - Ideal X was sold (scraped in 1964)

- Gateway City first cellular container ship
  - Length 137m
  - Beam 22m
  - Draft 7.6m
  - Speed of 15 knots
  - Capacity of 226 units (35 ft) = 395 TEU

- 5 Sister ships also converted in 1957
  - Azalea City
  - Bienville
  - Fairland
  - Raphael Semmes
  - Beauregard

- Geared cellular ships with stacked containers
- Had to use stackable containers!
Crew (25)
- 1 Captain
- 1 Chief Engineer & 1 radioman
- 1 Pursar
- 6 Able-bodied & 3 ordinary seamen
- 1 Bosun & 1 maintenance man
- 3 Firemen & 1 wiper (engine room)
- 1 Cook & 2 stewards
- 3 Mates (1st, 2nd and 3rd)

First sailing Port Newark to Miami
- 165 units Newark to Houston
- 61 units Newark to Miami
- 3 units Miami to Houston

At Houston
- 08:18 first unit unloaded
- 08:20 first unit left port
- 08:30 first unit delivered to shipper in Miami

Regular service
- Newark – Miami – Houston – Tampa
- Loading & unloading = 264 tons of cargo an hour

Source: [http://ravenofferings.blogspot.kr/2010/05/notes-from-ss-fairland.html](http://ravenofferings.blogspot.kr/2010/05/notes-from-ss-fairland.html)
EMERGENCE OF ISO CONTAINERS
SEALAND 1958 – SERVICE EXPANDED

- Sea-Land introduces container service to Puerto Rico
  - Service Newark - San Juan (Puerto Rico)
  - SS Fairland
EMERGENCE OF ISO CONTAINERS
MATSON NAVIGATION - 1956

- Matson Navigation
  - 1882 first service San Francisco to Hilo (Hawaii)
  - Operated cargo ships, passengers ships and terminals
- 1956 researched introduction of containers
- 1958 Hawaiian Merchant
  - Converted a C3 type 1945 built general cargo ship
  - Carry 20 containers on deck (24ft containers)
  - Breakbulk under deck
31st August 1958 Hawaiian Merchant leaves (Alameda) San Francisco Bay
Alameda – Honolulu, Hawaii
Cargo of 20 x 24 ft containers on deck

- Sea-land = 35ft long containers
- Matson = 24 ft long containers
EMERGENCE OF ISO CONTAINERS
DEVELOPMENT OF DIFFERENT SOLUTIONS

- North America
  - Domestic trade to islands and Alaska
  - SeaTrains
    - Rail wagon load units
    - Purpose built ship
  - Conex
    - Military containers (Korean war)
- White Pass – Yukon
  - 8ft x 8ft containers
  - Purpose built ship
- Sea-Land
  - 35ft stackable units based on bodies
  - Based on truck length
  - Converted ships
- Matson Navigation
  - Adapted ships
  - 24 ft units suited to Hawaiian trade route

- Elsewhere
  - Range of swap body solutions
  - Based on rail wagons
EMERGENCE OF ISO CONTAINERS
DEVELOPMENT OF DIFFERENT SOLUTIONS

- Concept had been proven
- Issues
  - Each solution was independent
    - Different dimensions
    - Similar but different lifting methods and fittings
  - No International trade had begun
  - Port infrastructure represented a challenge
EMERGENCE OF ISO CONTAINERS
ASA – 1958 STANDARDS

1958 American Standards Association (ASA)
   - 2 committees held separate meetings to agree container dimension standards
   - Held in November 1958 over 2 days
   - Materials Handling 5 (MH-5)

Membership dominated by
   - Trucking companies
   - Railroads
   - Trailer manufacturers

Sea-Land and Matson only shipping lines using “containers”
   - Were not part of the discussions
   - Resisted MH-5 standard

Agreed family of acceptable standards for US domestic containers
   - 8ft width based on road regulation
     - At the time this was too wide for many European railways
   - Height maximum of 8½ ft agreed
     - Maritime members favoured 8ft
     - Trucking members favoured 8½ ft

Agreed 3 pairs of container lengths
   - 20/40 ft (40 ft based on railway maximum)
   - 12/24 ft - based on west coast USA shipping line Matson)
   - 17/35 ft – based on trailer length allowed in all states
National Defence Transportation Association
- A USA association of companies handling military cargo
- Decided to study container dimensions
- No shipping companies were members
- 1959 it had agreed standard containers
  - 20 ft and 40 ft long
  - 8 ft wide
  - 8 ft high
  - Would not accept for military cargo
    - ASA standards of 8½ high or different lengths

US military cargo
- Very valuable source of revenue for transport companies
- Domestic movements
- Overseas USA military bases
EMERGENCE OF ISO CONTAINERS
1961 - VIETNAM WAR
April 1963 compromise agreed

There were issues over transport modes
- Railway infrastructure – tunnels, wagons etc
- Road networks – national regulations on truck sizes
- Ports – ability to handle container dimensions and fittings
- Ships – container ships were already built for different sizes

There were issues of the container design
- There was a growing number of containers
  - Railways
  - Shipping companies
  - Trucking companies
- They had
  - Different sizes
  - Different strengths
  - Different methods of lifting
  - Different stacking limits

Many countries involved
- European, British, North American, Japan
EMERGENCE OF ISO CONTAINERS
1966 EXPERIMENT TILBURY LONDON
EMERGENCE OF ISO CONTAINERS
1967 - SEATRAIN LINES

- Converted 2 x T2 tanker ships
- Newark-Puerto Rico service
- Converted T2 tankers and C2 ships to carry containers
- Length 165m
- Under deck carried rail and lorries
- 2 x 50 ton cranes to unload under deck cargo
- Used 40ft container units

Seatrain Puerto Rico
EMERGENCE OF ISO CONTAINERS

ISO CONTAINERS – THE ISO

- Non-governmental organisation (NGO)
  - Based in Switzerland
  - Produces voluntary industry standards (not just transport)
  - Established in 1947
  - “To promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity.”

- During the 1960s ISO sought to develop global standards for containers
EMERGENCE OF ISO CONTAINERS
ISO STANDARDS – TC 104

- 1968 standards issued
- Today 3 standards + 1 underdevelopment
  - TC 104/SC 1 - General purpose containers
  - TC 104/SC 2 - Specific purpose containers
  - TC 104/SC 4 - Identification and communication#
  - Under development: Freight containers -- Mechanical seals
- 28 participating countries and 24 observing countries
- Liaises with
  - United Nations bodies eg
    - International Labour Organization (ILO)
    - International Maritime Organization (IMO)
  - Non-governmental organizations (NGOs) eg
    - ICHCA International
    - International Container Bureau (ICB)
    - International Chamber of Shipping (ICS)
  - International governmental organizations (IGOs) eg
    - World Customs Organization
    - European Commission
  - Trade associations eg
    - Asian Packing Federation (APF)
EMERGENCE OF ISO CONTAINERS
OPEN TECHNOLOGY

Unlocked, container may be lowered onto or removed from truck

Locked
EMERGENCE OF ISO CONTAINERS
OPEN TECHNOLOGY
EMERGENCE OF ISO CONTAINERS
STRENGTH OF CONTAINERS
<table>
<thead>
<tr>
<th>Section 1</th>
<th>Emergence of the ISO Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2</td>
<td>The ISO Container</td>
</tr>
</tbody>
</table>
ISO 668:1995 Classification, dimensions and ratings
- Amd 1:2005 – updates including structures and goosenecks
- Amd 2:2005 - 45 containers

- Dimensions
  - External ± tolerances
  - Minimum internal
  - Minimum door opening

- Locations of corner fittings

- Load bearing structures
  - Locations
  - Strengths

**Table 2 — External dimensions, permissible tolerances and ratings for series 1 freight containers**

<table>
<thead>
<tr>
<th>Freight container designation</th>
<th>Length, L (mm)</th>
<th>Width, W (mm)</th>
<th>Height, H (mm)</th>
<th>Rating, R (kg gross mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1AA</td>
<td>12 192</td>
<td>2 438</td>
<td>2 438</td>
<td>30 480</td>
</tr>
<tr>
<td>1A</td>
<td>2 438</td>
<td></td>
<td></td>
<td>67 200</td>
</tr>
<tr>
<td>1AX</td>
<td>2 438</td>
<td></td>
<td></td>
<td>67 200</td>
</tr>
<tr>
<td>1BBB</td>
<td>9 105</td>
<td>2 438</td>
<td></td>
<td>30 480</td>
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<tr>
<td>1BB</td>
<td>2 438</td>
<td></td>
<td></td>
<td>67 200</td>
</tr>
<tr>
<td>1B</td>
<td>2 438</td>
<td></td>
<td></td>
<td>67 200</td>
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<td></td>
<td>67 200</td>
</tr>
<tr>
<td>1CC</td>
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<td>2 438</td>
<td></td>
<td>30 480</td>
</tr>
<tr>
<td>1C</td>
<td>2 438</td>
<td></td>
<td></td>
<td>67 200</td>
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<tr>
<td>1D</td>
<td>2 991</td>
<td></td>
<td></td>
<td>10 160</td>
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<tr>
<td>1DX</td>
<td>2 438</td>
<td></td>
<td></td>
<td>22 400</td>
</tr>
</tbody>
</table>

*See 5.1.2

*In certain countries there are legal limitations to the overall height of vehicle and load (for example for railroad service).
ISO 830:1999 Vocabulary
  Cor 1:2001

Definitions
  - Container types
  - Related to dimensions and capacities
  - Related to ratings and masses
  - Components and structures
  - Handing and securing
  - Visual identification
THE ISO CONTAINER
ISO 1161: 1984 – CORNER FITTING

- ISO 1161:1984 Corner fittings – Specification
  - Cor 1:1990
  - Amd 1:2007 - 45 ft containers
- Dimensions
- Strength
- Design
- Minimum load bearing area
- Corner fitting marking
ISO 1496 Specification and testing

-1:1990 General cargo containers for general purposes
  ▶ Amd 1:1993
  ▶ Amd 2:1998
  ▶ Amd 3:2005
  ▶ Amd 4:2006
  ▶ Amd 5:2006 - Door end security

-2:2008 Thermal containers

-3:1995 Tank containers for liquids, gases and pressurized dry bulk
  ▶ Amd 1:2006 - Testing of the external restraint (longitudinal) dynamic

-4:1991 Non pressurized containers for dry bulk
  ▶ Amd 1:1994 - 1AAA and 1BBB containers
  ▶ Cor 1:2006

-5:1991 Platform and platform-based containers
  ▶ Amd 1:1993 - 1AAA and 1BBB containers
  ▶ Amd 2:1994

Contents

- Dimensions, ratings and design
- Testing
- Diagrammatic representation of capabilities
- Dimensions of fork-lift pockets
- Cargo securing systems
THE ISO CONTAINER
ISO 1496:1990 - TESTING

- General container type tests
  - Test 1: Stacking
  - Test 2: Lifting from the four top corner fittings
  - Test 3: Lifting from the four bottom corner fittings
  - Test 4: Restraint (longitudinal)
  - Test 5: Strength of end walls
  - Test 6: Strength of side walls
  - Test 7: Strength of the roof
  - Test 8: Floor strength
  - Test 9: Rigidity (transverse)
  - Test 10: Rigidity (longitudinal)
  - Test 11: Lifting by fork-lift pockets
  - Test 13: Weatherproofness

- Thermal container tests

- Tank container tests
  - Pressurized
  - Non-pressurized

- Platform container tests

- Internal cargo securing components
ISO 2308:1972 Hooks for lifting freight containers of up to 30 tons capacity
THE ISO CONTAINER
ISO 3874: 1997 - HANDLING

- ISO 3874:1997  Handling and securing
  - Amd 1:2000 - Twistlocks, latchlocks, stacking fittings and lashing rod systems
  - Amd 2:2002 - Vertical tandem lifting
  - Amd 3:2005 - Double stack rail car operations
  - Amd 4:2007 - 45 ft containers

- Contents
  - Packing, loading and emptying
  - Stowage and securing cargo
  - Lifting methods
  - Top lift spreaders
  - Top lift sling
  - Bottom lift sling
  - Side lift (methods 1, 2 and 3)
  - End lift (methods 1 and 2)
  - Fork lifts
  - Landing and supporting
  - Stacking on the ground (including wind speed)
  - Securing during transport (ship, road, rail)
  - Twistlocks (dimensions, strength and testing)
  - Latchlocks (dimensions, strength and testing)
  - Stacking fittings (dimensions, strength and testing)
  - Lashing rods (dimensions, strength and testing)
THE ISO CONTAINER
ISO 3874: 1997 - HANDLING
ISO 6346:1995 - Coding, identification and marking

Visual identification system for every container

Unique container code
- Owner – 3 letter alpha code (1700+ owners globally)
- Equipment category – 1 letter alpha code
  - U = container
  - J = detachable equipment for containers
  - Z = trailer or chassis for containers
- Serial number - 7 digits (includes check digit)

Country code (optional)

Size & type (since 1996)

Operational marks
- Air surface container
- Overhead electrical danger
- Height max

Managed by the International Container Bureau (BIC) - www.bic-code.org
THE ISO CONTAINER
ISO 6346: 1995 – CONTAINER NUMBER

BSIU2253788

Owner

Serial Number

Check Digit

U = container
J = detachable equipment for containers
Z = trailer or chassis for containers
### ISO Container:

- **ISO 6346: 1995** - Container Owner

The image displays a container with the code "BSIU2253788" on its side. Below is a table containing information about various container prefixes and their owners:

<table>
<thead>
<tr>
<th>prefix</th>
<th>slt</th>
<th>name</th>
<th>origin</th>
<th>owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRUU</td>
<td>t</td>
<td>btc</td>
<td>BN</td>
<td>Brunei Transporting Company</td>
</tr>
<tr>
<td>BSBU</td>
<td>l</td>
<td>bigsteelbox</td>
<td>CA</td>
<td>Big Steel Box ltd.</td>
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<tr>
<td>BSCU</td>
<td>s</td>
<td>bsc</td>
<td>RU</td>
<td>Baltic Shipping Company</td>
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<td>bsc</td>
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<tr>
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<td>s</td>
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<td>IN</td>
<td>Best Express Shipping Transport pvt. ltd.</td>
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<tr>
<td>BSIU</td>
<td>l</td>
<td>blue sky</td>
<td>GB</td>
<td>Blue Sky Intermodal (UK) ltd.</td>
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<td>s</td>
<td>GB</td>
<td>A.P. MollerMaersk Group</td>
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<tr>
<td>BSLU</td>
<td>o</td>
<td>GB</td>
<td>HK</td>
<td>BSL Containers</td>
</tr>
<tr>
<td>BSMU</td>
<td>t</td>
<td>brian smith</td>
<td>GB</td>
<td>E.E. &amp; Brian Smith</td>
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<td>l</td>
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<td>Bruhn Spedition</td>
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<tr>
<td>BTIU</td>
<td></td>
<td></td>
<td>FR</td>
<td>Interarmes commissariat</td>
</tr>
</tbody>
</table>

[www.prefixlist.com](http://www.prefixlist.com)
THE ISO CONTAINER
ISO 6346: 1995 – CONTAINER LENGTH

First character = length
Second character = width and height
Third and fourth character = type

First Character
1 = 10 feet
2 = 20 feet
3 = 30 feet
4 = 40 feet
B = 24 feet
C = 24 feet 6 inch
G = 41 feet
H = 43 feet
L = 45 feet
M = 48 feet
N = 49 feet
THE ISO CONTAINER
ISO 6346: 1995 – WIDTH & HEIGHT

First character = length
Second character = width and height
Third and fourth character = type

<table>
<thead>
<tr>
<th>Container height</th>
<th>2nd Character code</th>
<th>Container width</th>
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</thead>
<tbody>
<tr>
<td>mm</td>
<td>ft</td>
<td>2438 mm (8ft)</td>
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<tr>
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<td>8</td>
<td>0</td>
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<tr>
<td>≤1219</td>
<td>≤4</td>
<td>9</td>
</tr>
</tbody>
</table>
First character = length
Second character = width and height
Third and fourth character = type

General purpose container
G0  Opening(s) at one end or both ends
G1  Passive vents at upper part of cargo space
G2  Opening(s) one or both ends plus full opening(s) on one or both sides
G3  Opening(s) one or both ends plus partial opening(s) on one or both sides
General container with ventilation

V0  Non-mechanical system, vents at lower and upper part
V2  Mechanical ventilation system, located internally
V4  Mechanical ventilation system, located externally
The ISO Container
ISO 6346: 1995 – Type (Bx)

First character = length
Second character = width and height
Third and fourth character = type

Dry bulk container
B0  Nonpresurized, box type, closed
B1  Nonpresurized, box type, airtight
B3  Pressurized, horizontal discharge, test pressure 150 kPa
B4  Pressurized, horizontal discharge, test pressure 265 kPa
B5  Pressurized, tipping discharge, test pressure 150 kPa
B6  Pressurized, tipping discharge, test pressure 265 kPa
THE ISO CONTAINER
ISO 6346: 1995 – TYPE (Sx)

First character = length
Second character = width and height
Third and fourth character = type

Named cargo container
S0  Livestock carrier
S1  Automobile carrier
S2  Live fish carrier
Thermal container
RO  Refrigerated, mechanically refrigerated
RT  Refrigerated and heated, mechanically refrigerated and heated
R2  Self-powered refrigerated/heated, mechanically refrigerated
R3  Mechanically refrigerated and heated

Thermal container
HO  Refrigerated and/or heated, with removable equipment located externally; heat transfer coefficient K=0,4 W/(m²*K)
H1  Refrigerated and/or heated with removable equipment located internally
H2  Refrigerated and/or heated with removable equipment located externally; heat transfer coefficient K =0,7 W/(m²*K)
H5  Insulated; heat transfer coefficient K= 0,4 W/(m²*K)
H6  Insulated; heat transfer coefficient K= 0,7 W/(m²*K)
THE ISO CONTAINER
ISO 6346: 1995 – TYPE (Ux)

First character = length
Second character = width and height
Third and fourth character = type

Open-top container
U0 Opening(s) at one or both ends
U1 Opening(s) at one or both ends, removable top member(s) in end frame(s)
U2 Opening(s) at one or both ends, plus opening(s) on one or both sides
U3 Opening(s) at one or both ends, plus opening(s) on one or both sides plus removable top member(s) in end frame(s)
U4 Opening(s) at one or both ends, plus partial opening on one side and full opening on the other side
U5 Complete, fixed side and end walls (no doors)
22P0

First character = length
Second character = width and height
Third and fourth character = type

Platform (container)
P0  Platform (container)
P1  Fixed, two complete and fixed ends
P2  Fixed, fixed posts, either free-standing or with removable top member
P3  Folding (collapsible), folding complete end structure
P4  Folding (collapsible), Folding posts, either free-standing or with removable top member
THE ISO CONTAINER
ISO 6346: 1995 – TYPE (Tx)

22T0

First character = length
Second character = width and height
Third and fourth character = type

Tank container
T0  For non dangerous liquids, minimum pressure 45kPa
T1  For non dangerous liquids, minimum pressure 150kPa
T2  For non dangerous liquids, minimum pressure 265kPa
T3  For dangerous liquids, minimum pressure 150kPa
T4  For dangerous liquids, minimum pressure 265kPa
T5  For dangerous liquids, minimum pressure 40kPa
T6  For dangerous liquids, minimum pressure 60kPa
T7  For gases, minimum pressure 910kPa
T8  For gases, minimum pressure 220 kPa
T9  For gases, minimum pressure (to be decided)
THE ISO CONTAINER
OTHER ISO AGREEMENTS

- ISO 8323:1985 - Air/surface (intermodal) general purpose containers - Specification and tests
- ISO 9669:1990 - Interface connections for tank containers
  - Amd 1:1992 - Sections 3 and 4
- ISO 9711 - Information related to containers on board vessels
  - Part 1 Bay Plan System
  - Part 2 Telex data transmission
- ISO 9897:1997 - Container equipment data exchange (CEDEX)
  - Cor 1:2001
- ISO 10368:2006 - Remote condition monitoring
- ISO 10374:1991 - Freight automatic identification
  - Amd 1:1995
- ISO 17363:2007 - Supply chain applications of RFID
- ISO 18185-1:2007 - Electronic seals
  - Part 1: Communication protocol
  - Part 2: Application requirements
  - Part 3: Environmental characteristics
  - Part 4: Data Protection
  - Part 5: Physical layer
1972 Convention for Safe Containers (into force 1977) has two goals.
- Safety in container transport & handling - test procedures & strength requirements.
- Facilitate international container transport - uniform international safety regulations.

Annex I
- Regulations for container testing, inspection, approval and maintenance.
- Approval authorized body (safety approval plate)

Annex II
- Structural safety requirements and tests – for inland and maritime transport
- Subsequent maintenance of a safety-approved container responsibility of owner

1983 amendments (into force in 1984)
- Extended interval between re-examination to 30 months (allow periodic examination)

1991 amendments (into force in 1993)
- Included addition new Chapter concerning approval of modified containers.

1993 amendments (requires ratification)
- Concern information on approval plate and amends some test loads and procedures
THE ISO CONTAINER
STACKING & MAINTENANCE

- Standard container
  - Max gross weight of about 30 metric tonnes
  - Corner posts designed for 190 metric tonnes load under G force of 1.8
  - Bottom container can support 6 containers
  - Stack height of 7 fully loaded containers

- Container structural inspections
  - Once container is 5 years old
  - Every 3 years after

- IMO report on inspections performed between 1996 and 2002
  - 19,704 containers inspected
  - 1,737 (approximately 9%) had structural deficiencies.