

INSTRUCTIONS · 20' DC · IBC × 18

18 IBC totes in a 20 ft container

Stowage and securing instruction



DIMENSIONS

1200 × 1000 × 1163 mm

CAPACITY

1000 l

TARE WEIGHT

55–62 kg

UN PACKAGING CODE

31HA1 — rigid plastic inner receptacle in a steel cage

OPENING / OUTLET

DN150 / DN50 valve

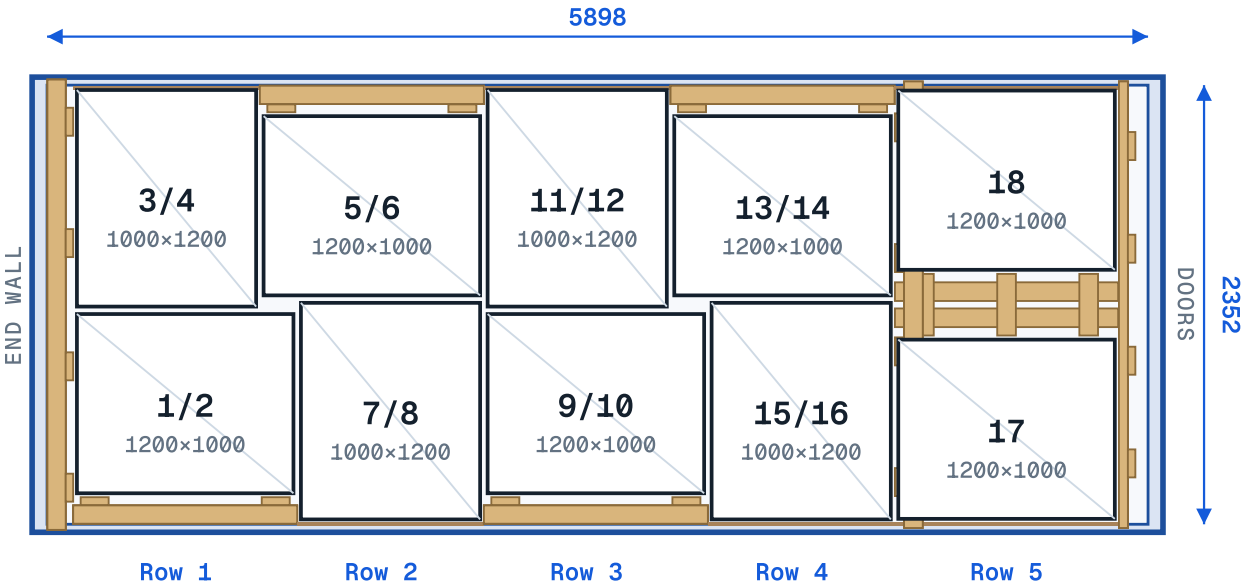
IN A 20' DC

18 units: 4 rows × 2 × 2 tiers + 2 at the doors

Compiled from the regulations listed at the end of this instruction and the VMTP (FESCO) practical instruction for stowing 18 IBC totes in a 20 ft container. For reference only: follow the current editions of the regulations and the carrier's requirements.

Stowage plan

Top view, doors on the right. Rows 1–4 hold two totes stacked two high, row 5 — one tote at each wall; numbers show the loading order (bottom / top tier).



Rows alternate in a bond pattern: after every two rows both columns are 2.2 m long, so a row cannot shift along the container.

IBC tote: what this packaging is

IBC — Intermediate Bulk Container, also called a tote: a 1000-litre plastic container in a steel cage on a pallet. This plan puts 18 totes into a 20-foot container: 4 rows of 2 stacked 2 high, and a fifth row at the doors — 2 totes in a single tier.

WHAT IS SHIPPED

- chemicals: resins, solvents, acids, alkalis, hydrogen peroxide — dangerous goods of classes 3, 5.1, 6.1, 8, 9, packing groups II and III (letter Y in the marking);
- food liquids: oils, syrups, concentrates — only in food-certified totes;
- technical liquids: lubricants, AdBlue, paints, liquid fertilisers.

TOTE REQUIREMENTS

- the design type is certified and the marking on the plate matches the certificate;
- for dangerous goods a plastic tote may be used for no longer than 5 years from manufacture; leakproofness test at least every 2.5 years;
- any manufacturer (Schütz, Mauser, Greif, Werit, etc.) with a valid certificate; a reconditioned tote carries the reconditioner's marking;
- no cracks or leaks, cage and pallet undeformed, cap tightened, valve closed and capped;
- every tote with dangerous goods shows the UN number and a hazard label of at least 100×100 mm on two opposite sides.



STAGE PHOTO 01 1000 l IBC tote at the shipper's yard

Shipper's yard and the container

Loading takes place at the shipper's yard: the 20' DC stands on level ground with a ramp at the sill; next to it are the stacked totes, timber and cardboard for the shields.

- A container for dangerous goods must be **technically sound, clean and free of sharp parts** that could damage the packaging.
- The **container number** must match the CSC plate and show no signs of re-stencilling; the plate shows a valid examination date or an ACEP mark.
- Cargo gross mass is about 18.2 t ($18 \times \sim 1010$ kg) — within the 28.2 t payload of a 20' DC.
- The floor is dry, without holes or protruding nails; the doors close and the gaskets are intact.

MATERIALS PER CONTAINER

- 100×100 mm bars — horizontal bars of the end and side shields (fitted first, against the wall), 2 bars of the top shield, stop bars (1250 mm long) and middle bars (350 mm long) of the stop structure;
- 25–50×150 mm boards — vertical shield boards, nailed on top of the bars;
- 50×150 mm boards — horizontal boards of the door shield;
- posts 25–150 mm thick, 100–150 mm wide, 1160 mm long — 4 pcs for the top shield;
- nails Ø3–4 mm, 70–100 mm long — shields; Ø4–6 mm, 120–200 mm long — top shield; two per connection;
- construction staples Ø6–8 mm, 170–250 mm long — stop structure;
- dense cardboard or plywood — side wall lining.



STAGE PHOTO 02 Container before loading: floor, walls, roof, doors

03 PACKAGING MARKING

The marking must be legible and match the certificate

The packaging marking must be clearly legible and match the marking in the packaging certificate. It is either embossed on the plate or applied as a label.

UN	31HA1
UN symbol	IBC for liquids: plastic receptacle + steel cage
Y	04 26
packing groups II and III	month and year of manufacture
RUS	IBC-RU 017
state authorising the marking	manufacturer
1960	1210
stacking test load, kg	maximum gross mass, kg

HOW TO PHOTOGRAPH

- shoot the plate close up, straight on, without glare — every character must be legible;
- the frame shows the packaging marking and the hazard label;
- a distant overall shot of the tote **is not acceptable** for checking the marking.

STACKING TWO HIGH

Totes may be stacked only if the design type allows it: the marking shows the stacking test load and the stacking symbol on the tote is not crossed out. The load must be no less than the gross mass of the upper tote.



STAGE PHOTO 03 Packaging marking close-up — every character legible

End wall shield

The end wall is fitted with a shield. First, 3 horizontal 100×100 mm bars are placed against the wall; then 4 vertical boards 25–50 mm thick and 150 mm wide are nailed on top of them, on the cargo side.

BARS (AGAINST THE WALL)	BOARDS (ON THE BARS, TOWARDS THE CARGO)
3 horizontal bars 100×100 mm: bottom, tier joint, top	4 vertical boards 25–50 × 150 mm, full loading height
NAILS	JOINTS
Ø3–4 mm, 70–100 mm long, 2 per joint	only where the boards cross the bars

ASSEMBLY ORDER

- **Bars first.** 3 horizontal bars 100×100 mm, tight against the end wall, at three levels: at the floor, at the tier joint and at the top of the load. Length — from one side-wall corrugation to the other: trim the ends so the bar fits tightly into the corrugations and cannot shift.
- **Then boards.** 4 vertical boards 25–50 mm thick and 150 mm wide on top of the bars, on the cargo side, over the full loading height, evenly across the container width. The boards take the cargo pressure and transfer it through the bars to the wall.
- **Nails** Ø3–4 mm, 70–100 mm long — two at every board-to-bar crossing. Drive them from the cargo side towards the wall so the point ends in the bar.
- Joints only where the boards cross the bars. No joints anywhere else.

⚠ Nails must never protrude with their sharp end towards the cargo.

⚠ Cardboard must not be used to protect the end wall.



STAGE PHOTO 04 End wall shield: 3 bars 100×100 against the wall, ends in the corrugations, 4 vertical boards on top

First full row from the end wall

Place the totes as shown: a side shield on the wide side, cardboard on the narrow side. The first tier goes tight against the end shield, the second exactly on top of the first.

BARS (AGAINST THE WALL)	BOARDS (ON THE BARS, TOWARDS THE CARGO)
3 horizontal bars 100×100* mm: bottom, tier joint, top	2 vertical boards 25–50* × 150 mm at the row ends
NARROW SIDE	* SIZE
dense cardboard or plywood on the side wall	according to the container's inner dimensions and the gap between cargo and wall

PLACEMENT

- One tote of the row stands with its long side (1200 mm) along the wall — this is the **wide side**, the side shield goes here.
- The other tote faces the wall with its narrow side (1000 mm) — here the side wall is lined with **dense cardboard or plywood**.

SIDE SHIELD – LIKE THE END SHIELD

- **Bars first.** 3 horizontal bars 100×100 mm tight against the side wall, at the bottom, the tier joint and the top; length — the full depth of the row.
- **Then boards.** 2 vertical boards 150 mm wide on top of the bars, on the cargo side, at the row ends, over the full loading height.
- Choose the bar section and board thickness by the gap between the tote and the wall: the shield must take up the gap without play (here 100 + 44 mm for a 146 mm gap).
- Joints — 70–100 mm nails, 2 per crossing, only at the marked points.

⚠ Nails must never protrude with their sharp end towards the cargo.

⚠ Do not join (nail) the side frame where it touches the tote's steel cage.



STAGE PHOTO 05 First full row from the end wall

06 STEP 3 · ROW 2

Second row — mirrored

The side shield goes on the wide side, the cardboard on the narrow side. Mind the placement: in the second row the totes swap places and the shield moves to the other side.

Rows alternate in a bond pattern: after every two rows both columns are 2.2 m long, so a row cannot shift along the container.



STAGE PHOTO 06 Second full row

Third row

The third row repeats the first: side shield on the wide side, cardboard on the narrow side. Shield, cardboard and connection points as in the photo.

⚠ Do not join (nail) the side frame where it touches the tote's steel cage.



STAGE PHOTO 07 Third row

Fourth row

The fourth row repeats the second. After it both columns end in one plane, 4.4 m from the end shield. The second tier of this row stays open towards the doors: the fifth row is a single tier, so the upper totes will be held by the top shield.

⚠ Nails must never protrude with their sharp end towards the cargo.

⚠ Do not join (nail) the side frame where it touches the tote's steel cage.



STAGE PHOTO 08 Fourth row

09 STEP 6 • ROW 5

Fifth row — 2 totes, single tier, against the walls

The fifth row takes only 2 totes — a single tier, long side (1200 mm) along the container, tight against the fourth row and the side walls. Cardboard goes at the sides. A gap remains in the middle between the totes — the stop structure goes there. Photograph the door opening without the shield.

TOTES	SIDE WALLS
2 pcs, single tier, 1200 mm along the container	dense cardboard or plywood on both sides
GAP BETWEEN TOTES	SECOND TIER
≈ 330–350 mm — for the stop structure	not loaded; the top of row 4 gets the top shield

- The totes go tight against the fourth-row cargo — no gap along the container.
- Each tote is pressed to its side wall through a sheet of cardboard or plywood.
- The valves of both totes face the doors — they stay accessible when the container is opened.

⚠ Mind the way the cargo is placed!



STAGE PHOTO 09 Fifth row: 2 totes against the side walls, cardboard at the sides — door opening without the shield

10 STEP 7

Stop structure between the totes

A stop structure of 100×100 mm bars is fitted between the fifth-row totes: 1250 mm stop bars along the container and 350 mm middle bars across it.

STOP BARS

100×100 mm, 1250 mm long — on the floor along the container

MIDDLE BARS

100×100 mm, 350 mm long — across, between the totes

FASTENING

construction staples Ø6–8 mm, 170–250 mm long

STAPLES

4 per middle bar — 2 per connection

ASSEMBLY ORDER

- **Stop bars** are laid on the floor in the gap between the totes, along the container — from the fourth-row cargo towards the doors.
- **Middle bars** go across, on top of the stop bars. Cut them to length on site so that each bar bears with its ends on the pallets of both totes without play (the model shows 3 middle bars: at the fourth row, in the middle and at the doors).
- Each middle bar is fastened to the stop bars with **four construction staples** — two per connection.
- The structure braces the totes against the side walls and keeps them from shifting to the middle of the container.

⚠ **Mind the way the cargo is placed!**



STAGE PHOTO 10 Stop structure between the fifth-row totes: 100×100 stop and middle bars

11 STEP 8

Top shield

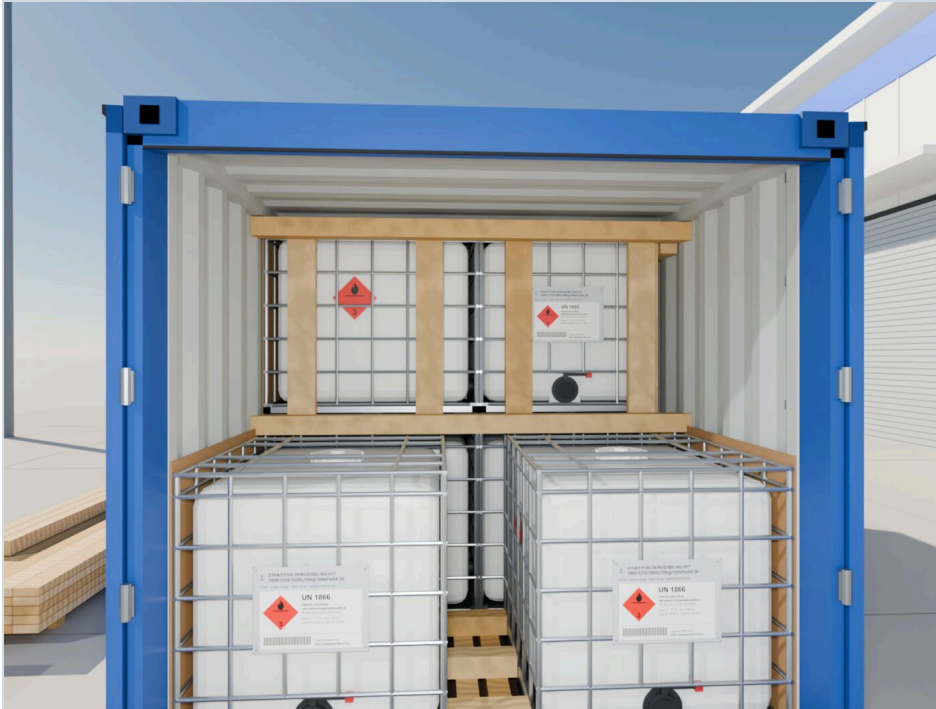
The second tier of the fourth row is secured with a top shield: 2 horizontal 100×100 mm bars across the container width and 4 vertical posts set under the bars. There must be no gap between the cargo and the posts.

BARS 2 pcs, 100×100 mm, across the width, ends in the corrugations	POSTS 4 pcs, 25–150 mm thick, 100–150 mm wide, 1160 mm long
POST THICKNESS by the corrugation position: the posts take up the whole gap to the cargo	NAILS Ø4–6 mm, 120–200 mm long, 2 per joint

ASSEMBLY ORDER

- **Posts** stand vertically tight against the second-tier totes of the fourth row, the height of a tote — 1160 mm, two per tote.
- **Bars** 100×100 mm go on top of the posts, on the door side: one at the bottom of the tier, one at the top. Length — the container width: trim the ends so the bar fits tightly into the side-wall corrugations.
- Choose the post thickness by the corrugation position: the bar sits in the corrugation and the post fills the whole distance from the bar to the cargo.
- Nail the posts to the bars with Ø4–6 mm nails, 120–200 mm long, two per connection.

⚠ **Nails must never protrude with their sharp end towards the cargo. Nail the top shield posts and bars from the door side.**



STAGE PHOTO 11 Top shield on the second tier of the fourth row: 4 posts under 2 bars 100×100

12 STEP 9

Door opening shield

The door opening is fitted with a shield the height of the fifth row: 3 horizontal 50×150 mm boards tight against the cargo and, on top of them on the door side, 4 vertical boards 25–50 mm thick and 150 mm wide.

- **Horizontal boards first.** 3 boards 50×150 mm tight against the fifth-row totes — at the bottom, in the middle and at the top. Length — from one side-wall corrugation to the other: trim the ends to fit tightly into the corrugations.
- **Then vertical boards.** 4 boards 25–50×150 mm on top of the horizontals, on the door side, over the full height of the cargo at the doors.
- Join the boards with Ø3–4 mm nails, 70–100 mm long, two per connection.

⚠ **Nails must never protrude with their sharp end towards the cargo.**



STAGE PHOTO 12 Door opening with the shield

13 STEP 10

Doors, number and hazard placards

Photograph the container with one door closed so that the number is visible. After loading, hazard placards are applied to the container according to the Rules.

- Every package carries the hazard label of the cargo class (division); with a subsidiary hazard — a second label next to the primary one. The label is a square set at 45° (diamond), at least **100×100 mm**.
- On the container the placard is a diamond of at least **250×250 mm** on both side walls and both ends.
- A single dangerous substance (one UN number) over 4000 kg gross — the UN number is displayed on the container as well: black digits at least 65 mm high on an orange panel next to the placard (IMDG Code 5.3.2.1). Here: 18 totes of UN 1866, about 18 t.
- The container number on the door must match the CSC plate.



STAGE PHOTO 13 One door closed — container number visible



STAGE PHOTO 14 Container closed, 250×250 mm hazard placards on all four sides

Photo report: what to photograph

Send the photos of all stages together with the packaging certificate — they are used to check stowage and securing before the container leaves the yard.



01
1000 L IBC tote at the shipper's yard



02
Container before loading: floor, walls, roof, doors



03
Packaging marking close-up — every character legible



04
End wall shield: 3 bars 100×100 against the wall, ends in the corrugations, 4 vertical boards on top



05
First full row from the end wall



06
Second full row



07
Third row



08
Fourth row



09
Fifth row: 2 totes against the side walls, cardboard at the sides — door opening without the shield



10
Stop structure between the fifth-row totes: 100×100 stop and middle bars



11
Top shield on the second tier of the fourth row: 4 posts under 2 bars 100×100



12
Door opening with the shield



13
One door closed — container number visible



14
Container closed, 250×250 mm hazard placards on all four sides

Interactive 3D version: atf.llc · Compiled from the regulations listed at the end of this instruction and the VMTP (FESCO) practical instruction for stowing 18 IBC totes in a 20 ft container. For reference only: follow the current editions of the regulations and the carrier's requirements.

Regulations and references

International regulations

1. UN Recommendations on the Transport of Dangerous Goods. Model Regulations
2. International Maritime Dangerous Goods Code (IMDG Code): ch. 4.1 — packagings and IBCs; 5.2 — marking and labelling of packages; 5.3 — placarding and UN number on cargo transport units; 5.4.2 — container packing certificate; 7.3 — packing of CTUs
3. European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR): 4.1.1.15 — period of use of plastics IBCs; ch. 6.5 — construction, testing and marking of IBCs
4. Agreement on International Railway Freight Communications (SMGS): Annex 2 “Rules for the Carriage of Dangerous Goods”; Annex 3 “Technical Specifications for Loading and Securing of Cargo”
5. IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code), 2014
6. International Convention for Safe Containers (CSC), 1972

Russian / CIS rules and specifications: railways, sea transport

7. Rules for the Carriage of Dangerous Goods by Rail (approved by the CIS Council for Railway Transport, minutes No. 15 of 05.04.1996)
8. Technical Specifications for Loading and Securing of Cargo in Wagons and Containers (approved by the Russian Ministry of Railways, 27.05.2003 No. TsM-943), chapter on universal containers
9. RD 31.11.21.18-96 “Rules for the Carriage of Cargo in Containers by Sea” (Rosmorflot order No. 39 of 22.10.1996)
10. Labour Safety Rules for Loading and Unloading Operations and Cargo Placement (Order of the Russian Ministry of Labour No. 753n of 28.10.2020)

Standards

11. GOST 19433-88 “Dangerous goods. Classification and marking”
12. GOST 26319-84 “Dangerous goods. Packaging”
13. GOST 14192-96 “Marking of cargo”
14. GOST R 53350-2009 (ISO 668:1995) “Series 1 freight containers. Classification, dimensions and ratings”
15. GOST R 51876-2008 (ISO 1496-1:1990) “Series 1 freight containers. Specification and testing. Part 1: General cargo containers”

Practice

16. VMTP (FESCO) instruction for stowing 18 IBC totes in a 20 ft container

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