Norwegian Boeing 787-8/9 Dreamliner
The Boeing 787 makes greater use of composite materials in its airframe and primary structure than any previous Boeing commercial airplane. Undertaking the design process without preconceived ideas enabled Boeing engineers to specify the optimum material for specific applications throughout the airframe.

The result is an airframe comprising nearly half carbon fiber reinforced plastic and other composites. This approach offers weight savings on average of 20 percent compared to more conventional aluminum designs.

Selecting the optimum material for a specific application meant analyzing every area of the airframe to determine the best material, given the operating environment and loads that a component experiences over the life of the airframe. For example, aluminum is sensitive to tension loads but handles compression very well. On the other hand, composites are not as efficient in dealing with compression loads but are excellent at handling tension. The expanded use of composites, especially in the highly tension-loaded environment of the fuselage, greatly reduces maintenance due to fatigue when compared with an aluminum structure. Titanium can withstand comparable loads better than aluminum, has minimal fatigue concerns, and is highly resistant to corrosion. Titanium use has been expanded on the 787 to roughly 14 percent of the total airframe.
Reporting of damage or any form of contact with the aircraft is critical as damage may not be visually detected as easily as on an aluminum aircraft. Although there may not be visible damage externally there is a possibility of delaminating occurring internally. Any contact with the aircraft, no matter how small and any marks or paint damage, **MUST** be reported immediately in order to have qualified engineers assess the damage using a special testing device.
787-8/9 Dimensions

Boeing 787-8
- 74 Feet 9 Inches (22.8 Meters)
- 183 Feet 5 Inches (55.9 Meters)
- 186 Feet 1 Inches (56.7 Meters)

Boeing 787-9
- 84 Feet 9 Inches (27.9 Meters)
- 203 Feet 5 Inches (62.0 Meters)
- 206 Feet 1 Inches (62.8 Meters)
787-8/9 Dimensions

Boeing 787-8

Boeing 787-9
# Weight Limitations

<table>
<thead>
<tr>
<th></th>
<th>787-8</th>
<th>787-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Taxi Weight</td>
<td>228,383 kg</td>
<td>251,743 kg</td>
</tr>
<tr>
<td>Max Take off Weight</td>
<td>227,930 kg</td>
<td>250,836 kg</td>
</tr>
<tr>
<td>Max Landing Weight</td>
<td>172,365 kg</td>
<td>192,776 kg</td>
</tr>
<tr>
<td>Max Zero Fuel Weight</td>
<td>161,025 kg</td>
<td>181,436 kg</td>
</tr>
</tbody>
</table>
## Fuel and APU

<table>
<thead>
<tr>
<th></th>
<th>B787-8</th>
<th>B787-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Main</td>
<td>16,929</td>
<td>16,776</td>
</tr>
<tr>
<td>Right Main</td>
<td>16,929</td>
<td>16,776</td>
</tr>
<tr>
<td>Center</td>
<td>67,472</td>
<td>67,899</td>
</tr>
<tr>
<td>Total</td>
<td>101,33</td>
<td>101,451</td>
</tr>
</tbody>
</table>

**Maximum Boeing Equivalent Thrust (BET)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>APU</td>
<td>67.000</td>
<td>73.800</td>
</tr>
</tbody>
</table>
## Turn radius

<table>
<thead>
<tr>
<th></th>
<th>787-8</th>
<th>787-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nose Radius</td>
<td>30,1 m</td>
<td>33,5 m</td>
</tr>
<tr>
<td>Tail Radius</td>
<td>35,1 m</td>
<td>38,4 m</td>
</tr>
<tr>
<td>Wing Tip Radius</td>
<td>42,5 m</td>
<td>43,9 m</td>
</tr>
<tr>
<td>Min pavement width for 180 turn</td>
<td>42,2 m</td>
<td>47,0 m</td>
</tr>
</tbody>
</table>

**Caution:**

Requires light differential braking/thrust for a 180 turn on a 45 m wide runway
Emergency Escape Slides

787-8
DR 1, 2, 4 Dual Lane
DR 3 Single Lane

787-9
All Doors Dual Lane
<table>
<thead>
<tr>
<th></th>
<th>787-8</th>
<th>787-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>259</td>
<td>309</td>
</tr>
<tr>
<td>Premium</td>
<td>32</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>291</td>
<td>344</td>
</tr>
<tr>
<td>Max crew seats cabin</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Max flight crew/observer/OFCR</td>
<td>2/2/1</td>
<td>2/2/1</td>
</tr>
<tr>
<td>Max number of crew and passengers (adults/children)</td>
<td>307</td>
<td>360</td>
</tr>
<tr>
<td>Max infants (not included in the numbers above without reserved seat)</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Max persons on board (30 infants included)</td>
<td>337</td>
<td>390</td>
</tr>
<tr>
<td>Max unaccompanied minors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max persons with reduced mobility without companion</td>
<td>4 per crewmember</td>
<td>4 per crewmember</td>
</tr>
<tr>
<td>Max persons with reduced mobility with individual/able bodied escort</td>
<td>Must not exceed number of able bodies</td>
<td>Must not exceed number of able bodies</td>
</tr>
<tr>
<td>Toilets</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Passenger life vests</td>
<td>295</td>
<td>349</td>
</tr>
<tr>
<td>Water extinguishers</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
The aircraft is very similar in size to B777, 767, Airbus 330 etc. It can be pressurized to a more comfortable environment, has larger windows and is the quietest aircraft in its class.
Standard jet bridge connection shall be on door two, if this is not possible, connecting to door one is allowed. It is imperative that great care is taken when connecting the jet bridge manually. If the jet bridge is not aligned correctly, the A/C door can be dangerously close to the jet bridge operator panel (depending on the jet bridge layout) There must be enough space to let the A/C move in heavy winds. The jet bridge in the below pictures is much too close to the A/C door. This can easily result in a damaged door if the A/C moves slightly in windy conditions.
Connecting jet bridge on door one puts the jet bridge very close to the angle of attack sensor and staff needs to be extremely vigilant if jet bridge have to go on door one.
(Example below show jet bridge on 787-8 door one in AGP, Spain)
Jet bridge

Connecting jet bridge on door two puts the jet bridge very close to the left engine cowling
(Picture showing 787-9 in Oslo Norway)
The cabin is divided in two class areas on Norwegian Boeing-787 Dreamliner. Economy class in configuration 3-3-3 and Premium class in configuration 2-3-2.
Crew Rest Areas

The Boeing 787 Dreamliner have two crew rest areas, one at each end of the aircraft:

- The area at the front of the aircraft can accommodate two persons (Pictured below).
- The area at back of the aircraft can accommodate five persons.
- All crew rest area doors are locked with numeric locks.
# 787-8/9 Aircraft Doors

<table>
<thead>
<tr>
<th>Location</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door</td>
<td>Passenger entry door 1 (left side)</td>
<td>Passenger entry door 2 (left side)</td>
<td>Passenger entry door 3 (left side)</td>
<td>Passenger entry door 4 (left side)</td>
<td>Forward cargo door (right side)</td>
<td>Aft cargo door (right side)</td>
<td>Bulk Cargo door (left side)</td>
</tr>
<tr>
<td>Maximum ground heights 787-8</td>
<td>185.5 in (471.2 cm)</td>
<td>185.2 in (470.4 cm)</td>
<td>188.4 in 478.5 cm</td>
<td>194.2 in (493.3 cm)</td>
<td>108.2 in (274.8 cm)</td>
<td>114.4 in (290.4 cm)</td>
<td>118.9 in (302.0 cm)</td>
</tr>
<tr>
<td>Maximum ground heights 787-9</td>
<td>189 in (480 cm)</td>
<td>189 in (480 cm)</td>
<td>192.2 in 488 cm</td>
<td>200 in (508 cm)</td>
<td>111 in (282 cm)</td>
<td>118.9 in (302 cm)</td>
<td>120.1 in (305 cm)</td>
</tr>
</tbody>
</table>
Before opening the door from the inside, the door must be disarmed.

To open:
• Move the MODE SELECT hand to the DISARMED position (1)
• Turn the large internal handle 180 degrees in the open direction to unlatch and lift the door (2)
• Push the door outward and forward until the hold-open hook engages
• Ensure that the door latches

To close:
• Pull the hold-open handle to disengage the door from the hold-open hook (3)
• Use the hold-open handle to pull the door into the door frame (3)
• Turn the internal handle 180 degrees in the CLOSE direction to lower and latch the door. If necessary, arm the door escape system (4)
Cargo doors have the same dimensions as the cargo doors on the Boeing-777 and the doorsill height are the same as on the Airbus-330.

**IT IS NOT ALLOWED TO OPEN OR CLOSE THE CARGO DOORS FROM A HIGHLOADER OR A BELTLOADER.**

**ONLY STAIRS CAN BE USED FOR OPENING AND CLOSING CARGO DOORS**

Stay clear of the area directly below the cargo doors when they are opened.

**WARNING**

LIFT ROLLOUT STOPS WHEN LOADER/BRIDGE IS NOT IN POSITION AT THE DOOR SILL.

CARGO CAN FALL AND CAUSE BAD INJURIES OR DEATH.
Opening & Closing of Cargo Doors

Open

Press the upper “flap” to grab hold of the door handle

Pull handle outwards until it opens by itself.

Force the handle all the way down by hitting it from above (Gently)
Cargo door are now ready for opening using the power drives

Close

Force the handle all the way up until the handle are flush with the fuselage

Close the cargo door full using the power drive.
There are three LED lights that indicate if the cargo door is locked, ready to open or opened:

1. **Middle LED light is on** = Cargo door is unlocked and ready to be opened (or locked)
2. **The top LED light is on** = Cargo door is fully opened
3. **Bottom LED light is on** = Cargo door is fully closed and locked
Opening & Closing of Cargo Doors

Access to compartment 5 is located in the aft and on the left side of the A/C
To open this cargo door:
1. Pull out the handle as far as it goes and turn the handle anti clock wise in order to un hatch the door (1)
2. Let go of the handle and push the door inwards
3. Turn on CPT 5 light, this is done by activating the switch located just inside the cargo door on the left (2)
Opening & Closing of Cargo Doors

Sometimes the opening mechanism on CPT 5 is frozen shut which prevent any opening of the hatch. Even if the CPT door is frozen, it is still possible to empty CPT 5 and thereby also possible to get crew bags to arrivals. To do this CPT 4 have to be empty and access to CPT 5 can be done through there.

1. Make sure CPT 4 is empty and that the highloader is not operated.
2. Open the netting separating CPT 4 and CPT 5
3. Begin emptying any crew bags/bags/cargo from CPT 5 into CPT 4 and then out onto the aft platform of the highloader.
4. Lower the highloader platform and transfer crew bags/bags/cargo from highloader to baggage carts.
Approaching Cargo Door Opening

Approaching cargo door with highloader shall be done with caution and it is imperative that the front platform is raised to approximate door height before positioning on to the aircraft as serious damage could result if elevation is attempted in the confined space next to the door. Two brake stops is mandatory, highloader speed setting must be the slowest possible and approach shall be in a straight line.

All contact between highloader and A/C must be reported to flight-deck at once.

All interior and exterior lights must be on in order to help with visibility around the cargo door.
Entering The Stand Safetyzone

Two persons are allowed to enter the safety zone to supply ground power and chocks on the nose gear, but only once the aircraft has come to a complete stop at its assigned parking spot.
Brake Chocks & Warning Cones Procedure

A total of 6 chocks and 5 cones shall be used to chock/cone the aircraft. Chocks and cone shall be placed as follows:

- 1 set of chocks on nose gear, left or right hand side (Right hand side showed)
- 1 set of chocks on each main gear. Chocks on main gear can be placed either inwards or outwards, but never inwards on one wheel and outwards on the other (Outwards on both wheels shown)
- 1 cone at each wingtip
- 1 cone, one meter in front and to the side of each engine
- 1 cone at the tail of the aircraft

Chocks must not touch the aircraft wheels. The reason for this is that the wheels will flex when fuel and bags/cargo will be loaded on the plane.

If the aircraft is parked on a slope, the chocks placed on the downhill side of the main landing gears must touch the aircraft wheels, to stop the aircraft from moving.

Once chocks is in place, flight deck must be notified of this, either by hand signals or by headset.
It is not allowed to open the cargo compartments before all chocks/cones have been placed around the aircraft.
GSE - Optimal Setup
Certain areas on the aircraft can be dangerous if instructions are not followed. ALWAYS follow the guidelines written on the aircraft itself, and follow the guidelines as they are instructed by the various airlines and handlers.

Hot air outlet:
Beside the hazard of hitting ones head on the hatch, the hatch itself will open and close without warning and it WILL cut either fingers or a hand clean off if put into the opening.

**ALWAYS KEEP HANDS AND FINGERS AWAY.**
Main Battery Exhaust outlet are positioned under the aircraft, behind the nose wheel. In case of fire or other problems, the battery storage area will be ventilated using this outlet. Exhaust can be observed as mist, and is not healthy to either inhale or get it on one's skin.

DON'T STAND UNDERNEATH THE EXHAUST. WALK AROUND IT IF ONE HAVE TO PASS BENEATH THE AIRCRAFT.
This picture shows the location of the two previous mentioned hazard areas and how close they are to the headset connection.
Servicing locations on the 787 are similar to the 767 and 777. However, the water service panel on the 787 is located on the forward part of the fuselage instead of the aft.
787-8/9 Service Hatches

- Forward main equipment center external power receptacle
- Water panel
- Conditioned air ground connect
- Refuel control panel
- Aft main equipment center external power receptacle
- Waste panel
Ground Power (Forward)

The Boeing-787 have three ground power connections. Two in the front left side of the fuselage, and one on the left side of the fuselage just behind the left main landing gear. Normally, the aircraft only need two ground power connections and they must be connected like this:

NOTE:
Aft ground power normally used for air-start must never be connected/used unless at least one of the forward ground powers are connected.

Forward ground power:
1: Connect left ground power
2: Connect right ground power.
3: Turn left ground power on.
4: Turn right ground power on.

Never EVER, disconnect ground power without approval from the flight deck.
To get access to the third ground power connection in the aft, a special tool is needed (pictured above).

Once inside, the connection functions exactly like a normal ground power connection.

If the lights are not working (shown with yellow circle in the below-right picture) flight deck have not activated ground power connection to this port, and must do so before it will work.

NOTE: Aft ground power normally used for air-start must never be connected/used unless at least one of the forward ground powers are connected.
The Boeing-787 have 1 precondition air hatch. The hatch is placed just behind and to the left of the anti-collision light.

- Push the metal locks to open, hatch will swing open
- Swing the hatch shut and push the metal locks to lock the hatch

Flight-deck must be notified of preconditioned air in order to direct the airflow from cargo compartment to the cabin
The load is always planned so the A/C have the best balance during flight. To know where everything goes the cargo hold have been divided into holds, compartments and positions. This can be seen on the illustrations below:

**Forward Hold**

**Forward Compartments**
- Compartment 1
- Compartment 2

**Forward Positions**
- Position 11P
- Position 12P
- Position 13P
- Position 21P
- Position 22P
### Boeing 787-8/9 LIR/LIRF ULD Positions (787-8 shown)

**Aft Hold**

**Aft Compartments**
- Compartment 3
- Compartment 4

**Aft Positions**
- Position 31L  Position 31R
- Position 32L  Position 32R
- Position 33L  Position 33R
- Position 41L  Position 41R
- Position 42P

---

<table>
<thead>
<tr>
<th>CPT 3</th>
<th>MAX 10771</th>
</tr>
</thead>
<tbody>
<tr>
<td>31L AKE11130DU</td>
<td>ONLOAD: ARN M/152</td>
</tr>
<tr>
<td>SPECs: NONE</td>
<td>REPORT:</td>
</tr>
<tr>
<td>32L AKE20005DU</td>
<td>ONLOAD: ARN BB/40PCS</td>
</tr>
<tr>
<td>SPECs: NONE</td>
<td>REPORT:</td>
</tr>
<tr>
<td>33L AKE10DY*</td>
<td>ONLOAD: ARN BB/40PCS</td>
</tr>
<tr>
<td>SPECs: NONE</td>
<td>REPORT:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPT 4</th>
<th>MAX 09525</th>
</tr>
</thead>
<tbody>
<tr>
<td>41L AKE11170DU</td>
<td>ONLOAD: ARN BT/33PCS</td>
</tr>
<tr>
<td>SPECs: NONE</td>
<td>REPORT:</td>
</tr>
<tr>
<td>42P PMC11174DU</td>
<td>ONLOAD: ARN C/700</td>
</tr>
<tr>
<td>SPECs: NONE</td>
<td>REPORT:</td>
</tr>
</tbody>
</table>

**LIR:** Loading Instruction Report  
**LIRF:** Loading Instruction Report Form
### Aft Hold

<table>
<thead>
<tr>
<th>CPT 5</th>
<th>MAX 02735</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td></td>
</tr>
<tr>
<td>ONLOAD: ARN D/11PCS BB R/2PCS BT R C/0</td>
<td></td>
</tr>
<tr>
<td>SPECS: NONE</td>
<td></td>
</tr>
<tr>
<td>REPORT:</td>
<td>CPT 5 TOTAL:</td>
</tr>
</tbody>
</table>

No special load/dangerous goods
SI prepared by 48 22 4450177

I certify that:
- This aircraft has been loaded in accordance with the above loading instructions, including deviations recorded.
- Any deviations have been notified to the officer responsible for weight and balance prior to aircraft departure.
- All ULDs and bulk deadload loaded or distributed have been secured by the aircraft locking system and in accordance with applying regulations and limitations in GOM.

Loading supervisor sign: ____________  Print name: ____________

All holds fwd and aft have been visually inspected and were empty prior to loading (Ref. EU and US requirements).

Loading supervisor sign: ____________  Print name: ____________

### Aft Compartments

Compartment 5

### Aft Positions

Position 51
When completing the LIR, it is very important to mark everything correct and mark it the right place.

All deviations from the pre-printed LIR must be noted on the LIR next to the “Report” field as shown to the left in position 22P. The preprinted must be marked as not being valid anymore, but must be marked in such a way that the original text is visible still.

If the weight of the cargo/mail is the same as the pre-printed, the ULD shall be ticked of as shown to the left.

All empty positions or empty ULD shall be ticked of as shown to the left.
When completing the LIR, it is very important to mark everything correct and mark it the right place.

All deviations from the pre-printed LIR must be noted on the LIR next to the “Report” field as shown to the left. The preprinted must be marked as not being valid anymore, but must be marked in such a way that the original text is still visible.

If the bag number is the same as the pre-printed, a circle is made as shown to the left in position 32R.

NOTE: Only circle the bag numbers, not including any text, just numbers.
When completing the LIR, it is very important to mark everything correct and mark it the right place.

All deviations from the pre printed LIR must be noted on the LIR next to the “Report” field as shown to the left. The preprinted must be marked as not being valid anymore, but must be marked in such a way that the original text is still visible.

It is imperative that the LIR is signed CORRECTLY and handed to the dispatcher. The dispatcher must approve that the information noted on the LIR is correct before the loading supervisor leaves the A/C.

Loading supervisor must sign the LIR with staff number, a normal signature as well as with block letters. Once signed by the Loading supervisor the LIR is now a LIRF.

The Loading supervisor must sign the LIR in the second field to confirm that ALL holds were completely empty before loading started. This must be signed in the same way as the above.
Boeing 787-8 ULD Positions

Forward Compartment

5 A-Size or M-Size pallets

11P 12P 13P 21P 22P

11R 12R 13R 14R 15R 21R 22R 23R

11L 12L 13L 14L 15L 21L 22L 23L

16 LD-3s

Aft Compartment

4 A-size pallets or
3 M-size pallets + 2 LD-3s

31P 32P 42R 42L 42P

31R 32R 41R 42R 43R 44R

31L 32L 41L 42L 43L 44L

12 LD-3s

Mixed cargo capacities

4 M-size pallets + 2 LD-3s
3 M-size pallets + 6 LD-3s
2 M-size pallets + 8 LD-3s
1 M-size pallet + 12 LD-3s

Bulk Compartment Capacity = 402 cubic feet

= LD-3

= M-size Pallet
Boeing 787-9 ULD Positions

Forward Compartment

- 6 A-size or M-size pallets
  - 22P 23P 21P 13P 12P 11P
  - 25R 24R 23R 22R 21R 15R
  - 25L 24L 23L 22L 21L 15L

Aft Compartment

- 5 A-size or M-size pallets
  - 31P 32P 33P 41P 42P
  - 31R 32R 33R 34R 41R
  - 32L 33L 34L 41L 42L

Bulk Compartment

- 16 LD-3s
  - 31L 32L 33L 34L 41L
  - 42L 43L 44L

- 20 LD-3s
  - Forward cargo bay
  - Mixed cargo capacities
    - 5 M-size pallets + 4 LD-3s
    - 4 M-size pallets + 6 LD-3s
    - 3 M-size pallets + 10 LD-3s
    - 2 M-size pallets + 12 LD-3s
    - 1 M-size pallet + 16 LD-3s

- 16 LD-3s
  - Aft cargo bay
  - Mixed cargo capacities
    - 4 M-size pallets + 2 LD-3s
    - 3 M-size pallets + 6 LD-3s
    - 2 M-size pallets + 8 LD-3s
    - 1 M-size pallet + 12 LD-3s

Bulk Compartment Capacity = 402 cubic feet
## Air Systems/Smoke detectors

**787-9**
Normally, two smoke detectors in the same cargo compartment must detect a fire or overheat condition at the same time to cause a cargo fire warning. If one detector fails in a compartment, a single smoke detector detecting a fire or overheat condition causes a fire warning.

<table>
<thead>
<tr>
<th>Cargo Compartment</th>
<th>787-8 Forward</th>
<th>787-8 Aft</th>
<th>787-8 Bulk</th>
<th>787-9 Forward</th>
<th>787-9 Aft</th>
<th>787-9 Bulk</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZA576 – ZA652</td>
<td>14</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZB646, ZB647</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

**On the newest 787-8 and all 787-9**, HF radios remain available in the event of smoke detection in the aft cargo compartment.
The head control panel and the secondary panel (Placed on the wall just inside the cargo door) has a "System Stop" button (Emergency Stop) when activated, all power drive systems stops and a small LED light next to the activated button starts to flash. The system can only be reset by pressing the "System Stop" button again. The same button that activated the stop (Blinking), must be activated to cancel the emergency stop. If the button on the other panel (Constant light) are activated to cancel the emergency stop, the system can be “confused” and a mechanic must be called to reset the whole system.

**Power Drive Unit (PDU)**
All locks in the cargo area are now divided into container locks (Yellow) and pallet locks (Red). Great care shall be taken in order to secure ULD’s with the correct locks.

Stacking is NOT allowed on any Boeing-787 Dreamliner. If ULD’s are loaded, all locks MUST be raised and securely locked. This is both between ALL ULD’s as well as all empty positions.

Press to release

Lift to release
**Unit Loading Device Locks (ULD Locks)**

**NOTE:** In forward hold between container position 23 & 22, and aft hold between container position 33 & 34 yellow and red locks are overlapping positions. Red locks are mounted in these positions. If containers are loaded here, two lines of red locks must be raised to lock, if a pallet is loaded, only one line of locks shall be raised.
As mentioned in slide 14 the cargo door can be closed without raising the roll-out stops in the doorway. In the worst case scenario, this means that if the aircraft is parked leaning a little to the right and the cargo doors are opened, load positioned in the doorway CAN roll out.
Loading ULD’s

It is of the outmost importance that care is taken when loading ULD’s into forward or aft cargo hold. Loading pallet can damage the pressure seals around the edge of the cargo hold (1) and when having overhang the inner construction of the cargo door (2).
It is of the outmost importance that care is taken when loading ULD’s into forward or aft cargo hold. The highloader MUST be adjusted in order for the loader platform to be aligned with the floor of the A/C. If highloader is not adjusted the loader platform will be higher than the A/C floor. This will lead containers to tilt forward when loaded into the cargo hold. This in turn will make the aft part of the container to rise and scrape and severely damage the A/C ceiling. (1), (2) and (3)
ULD on Norwegian Boeing-787 Dreamliner will mostly consist of AKE containers and PMC pallets. Norwegian AKE tare weight vary between 51-65 kilo. The older AKE are made of composite materials while the new AKE are made of very lightweight aluminum.

NOTE: It is imperative that all ULD loaded on Norwegian A/C is airworthy with regard to damage, and that all ULDs have been cleaned of snow, sand and water. This is to avoid potentially damaging wires and other equipment in the cargo hold.
Unit Loading Device (ULD, Containers)

ULD on Norwegian Boeing-787 Dreamliner will mostly consist of AKE containers and PMC pallets. ALF containers is in use between LGW and the US only. ALF containers is not to fly to any destination other than the US and London Gatwick. Norwegian ALF tare weight is 148 kilo. The ALF containers are made of composite materials.

NOTE: It is imperative that all ULD loaded on Norwegian A/C is airworthy with regard to damage, and that all ULD have been cleaned of snow, sand and water. This is to avoid potentially damaging wires and other equipment in the cargo hold.
Norwegian PMC pallets without straps and nets have a tare weight of 104 kg. Norwegian does not normally fly with PAJ pallets but do observe the difference between PAJ and PMC pallets as shown below.
In Norwegian a PMC pallet can accommodate 12 m³ of freight. This freight can be build to a maximum height of 5 feet 3 inches (1.6 meters).

Norwegian allows overhang when building PMC pallets but this overhang can be built to a maximum of 36 inches (11 centimetres).
Boeing 787-8/9 Bulk area (CPT 5)

In the bulk area all loose items are loaded as well as crew bags.

CARGO DOCUMENTS MUST ALWAYS BE PLACED IN THE BULK

Note: Allow for a minimum clearance of 2 inches / 5.1 cm from the ceiling liner, lights, and smoke detectors when loading the bulk hold.
Before loading anything in the bulk area make sure that the size of the items can pass through the cargo door without touching the cargo door and the hold walls.

**CARGO DOCUMENTS MUST ALWAYS BE PLACED IN THE BULK**

### Bulk Hold allowable package sizes

<table>
<thead>
<tr>
<th>Height (IN / cm)</th>
<th>Width (IN / cm)</th>
<th>5 / 12.7</th>
<th>10 / 25.4</th>
<th>15 / 38.1</th>
<th>20 / 50.8</th>
<th>25 / 63.5</th>
<th>30 / 76.2</th>
<th>35 / 88.9</th>
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<td>120 / 304.8</td>
<td>120 / 304.8</td>
<td>115 / 292.1</td>
<td>110 / 279.4</td>
<td>105 / 266.7</td>
<td>100 / 254.0</td>
<td>95 / 241.3</td>
<td></td>
</tr>
<tr>
<td>40 / 101.6</td>
<td>125 / 317.5</td>
<td>120 / 304.8</td>
<td>115 / 292.1</td>
<td>110 / 279.4</td>
<td>105 / 266.7</td>
<td>100 / 254.0</td>
<td>95 / 241.3</td>
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<td>36 / 91.4</td>
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<td>120 / 304.8</td>
<td>115 / 292.1</td>
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<td>105 / 266.7</td>
<td>100 / 254.0</td>
<td>95 / 241.3</td>
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<tr>
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<td>120 / 304.8</td>
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<td>95 / 241.3</td>
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<tr>
<td>28 / 71.1</td>
<td>130 / 330.2</td>
<td>125 / 317.5</td>
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<td>115 / 292.1</td>
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<td>100 / 254.0</td>
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<tr>
<td>20 / 50.8</td>
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<td>125 / 317.5</td>
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<td>16 / 40.6</td>
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<tr>
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<td>135 / 342.9</td>
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<td>125 / 317.5</td>
<td>120 / 304.8</td>
<td>115 / 292.1</td>
<td></td>
</tr>
</tbody>
</table>
By-pass pins are the same as the pin used on newer Boeing-737 and on Boeing-757/767/777. Depending on the pushback and tow-bar type, the pushback can be dangerously close to the nose of the aircraft.
Headset operation is like on any other wide body Boeing aircraft. Unless there is an emergency, the headset operator are only allowed to use the plug and button within the area highlighted with a yellow square.
There are three LED lights facing the pushback on the nose gear. They indicate if the aircraft brakes are on or off and thereby if the aircraft can be pushed or not.

1. **Top left is on** = Pilot have activated the brakes
2. **Top right is on** = Parking brake is set to park.
3. **Bottom blue light is on (the two top lights are off)** = Brakes are off. Ready to push
When equipment is guided to the front hold of the aircraft, the guide person MUST be placed between the equipment and the aircraft engine as shown on the picture below, this person shall ensure that the highloader does not hit the engine.
Water service must be provided from the right hand side of the aircraft. The reason for this is that when the jet-bridge goes on door 2, there is no room for any service trucks on this side. In most airports it is illegal to drive underneath a potential moving jet-bridge, and this is why water service must be provided from the right hand side.

As the picture below shows, there are plenty of space on the right side of the aircraft, even when a high loader is placed on the forward cargo door. Guide persons must be used at all times when equipment is positioned to A/C (refer to GOM 7.1.1 regarding guidance of GSE).

On Norwegian Dreamliner's the amount of water allowed on the aircraft is set in the cabin by the cabin crew.
The service hatch for portable water is placed on the lower left side of the fuselage, right next to engine one. Servicing the aircraft is different than on any other aircraft, mainly because of the digital display that controls the water.
When the water hose is connected, the "Fill" (1) button must be activated.
A yellow warning sign is shown (2) This indicate that the onboard disinfection system is warming up. The warming up period last for 80 seconds, and the aircraft does not accept water until the yellow UV light turns off.
When water service is over, the "Flight" button (3) must be activated (The aircraft should do this automatically, once the desired amount of water is reached) If not, the cabin doesn’t have any water until the aircraft takes off (Lavatory, coffee machines etc.)
Draining the aircraft is very much like filling the aircraft. The button "Drain" (1) must be activated to allow the aircraft to drain all water from three holes along the A/C. Once the aircraft is drained (or the amount of water to drain has been reached) the button "Flight" (2) must be activated. This will automatically stop the draining, and it will also allow water access to the cabin.

Always end all sessions with pressing the "Flight" button
The lavatory service hatch is located in the tail of the aircraft. The Dreamliner have two tanks that are larger than normal lavatory tanks. This is because used water drains to these tanks as well.

- Each tank holds 814 liters
- Each tank must be flushed with 38 liters

That means that the total amount can be 2200 liters (Waste water included) Most lavatory trucks are not designed to hold this much. This means that servicing 787 flights should be done with an empty lavatory truck.
Waste Service

Lavatory hose is connected (1)
Once connected the small button is activated to allow draining (2)
One tank at a time is drained, this is done by pulling the handle straight down (3) When one tank is drained, the other is drained in the same way
Each tank is also flushed one at a time. Open the fill point (4) and flush the tank. Once done, the other tank is flushed the same way
The two handles must now be pressed straight up (3)
One tank is now filled with 38 liters. Once done, the other tank is filled with 38 liters (The first fill point is left open) (4) once excess filling fluid has been wiped, both access points are closed.
The small button (2) is shut, and the drain hose is disconnected. All access points are wiped clean, and the service hatch is closed.
End