INFORMATION AND GUIDANCE
DURING STUFFING AND SECURING
OOG (out of gauge)

Project Cargo Division
22/04/2020
CMA CGM Global partner for the transport of OOG

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CMA CGM Global partner for the transport of OOG

CMA CGM, with the capacity to transport oversized and overweight cargo to anywhere in the world, has a track record transporting the wide variety of project cargoes.

Combined with efficient loading and discharging capabilities in the ports we cover, regular sailings and short transit times, the versatility and flexibility of service offerings enable us to go the extra mile securing our clients efficient tailor-made solutions.

- 500'000 equivalent Teus of Out of Gauge
- 3% of Group volume with the aim reaching 5%

CMA CGM is constantly increasing the number of OOG shipments and hence the OOG capacities and acceptance, to meet with customer high technical requirements. Notwithstanding these technical limits to overcome, our technical staff always bear in mind:

SAFETY FIRST
Why a proper cargo stuffing, lashing securing is so important

Because a vessel is subject to several motions at sea, generating accelerations on the cargo:

https://youtu.be/OZA6gNeZ5G4

Depending on navigation area, Those accelerations can reach up to 2.0 g force

$1g = 9.81 \text{m/s}^2$

In all directions (forward, backward, lateral and vertical)

https://www.youtube.com/watch?v=SJR6KH6R2oA
Why a proper cargo stuffing, lashing securing is so important

Stowage position onboard can increase those constraints

So unless specific acceptance from shipper, OOG on FR or open top default stowage position is under deck! If ondeck stowage is accepted by shipper, advanced inspection prior loading will be conducted. Stowage is to be avoided on sea sides to prevent falling over board and they should not be on higher tier. Location of OOG on board, is to be be chosen to ease access for the crew to strengthen lashing if necessary.
Why a proper cargo stuffing, lashing securing is so important...

Your cargo can be lifted up to 45 meters and during loading the cargo will be subject to vertical and horizontal accelerations

https://youtu.be/isIcqkYUHws

People can be injured or killed during operations if your cargo is not properly stuffed…
Let’s talk technical…

### TECHNICAL DATA

**SIZE AND TYPE GROUPING CODE**

|                  | 20' x 8' x 8'6" | 40' x 8' x 8'6"
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20 PC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>40 PC</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DIMENSIONS & TYPE CODE**

<table>
<thead>
<tr>
<th></th>
<th>22 P3</th>
<th>42 P3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LENGTH (MM) L1</strong></td>
<td>6,028</td>
<td>12,192</td>
</tr>
<tr>
<td><strong>HEIGHT (MM) H1</strong></td>
<td>2,213</td>
<td>2,591</td>
</tr>
<tr>
<td><strong>LENGTH BETWEEN END HEADERS (MM) L2</strong></td>
<td>5,920</td>
<td>12,054</td>
</tr>
<tr>
<td><strong>LENGTH BETWEEN CORNER POSTS (MM) L3</strong></td>
<td>5,634</td>
<td>11,652</td>
</tr>
<tr>
<td><strong>WIDTH BETWEEN CORNER POST (MM) W1</strong></td>
<td>2,224</td>
<td>2,227</td>
</tr>
<tr>
<td><strong>WIDTH OF FLOOR (MM) W2</strong></td>
<td>2,208</td>
<td>2,374</td>
</tr>
<tr>
<td><strong>WIDTH BETWEEN SIDE ACCESSORY POCKETS (MM) W3</strong></td>
<td>2,158</td>
<td></td>
</tr>
</tbody>
</table>

**MAXIMUM GROSS WEIGHT (KG)**

<table>
<thead>
<tr>
<th></th>
<th>34,000</th>
<th>45,000 / 50,000</th>
</tr>
</thead>
</table>

**AVERAGE TARE (KG)**

|                  | 2,750 | 5,100 |

**MAXIMUM PAYLOAD (KG)**

|                  | 31,250 | 39,980 / 44,900 |

**SECURING RINGS**

|                  | 12    | 12    |

**NUMBER PER SIDE**

### Top View

[Image of Top View]

### Side View

[Image of Side View]

### End View

[Image of End View]
Let’s talk technical…

Dimensions for a 40’FR:

SIDE BEAMS
Or « side rails »

- Stanchion pockets closing bar
  - Load test 500 kgs

- Lashing ring SWL 5000 kgs

- 2.44
- 1.95

11.65 m
12.02 m
12.19 m
Why a proper cargo stuffing is so important…

Shipper/ packer is responsible of stuffing lashing and securing.

The positioning of the cargo on the flatrack must take into account the necessary weight distribution and determinate the position of the center of gravity of the cargo.

Various types of FR exist and their capacities and the shape of the cargo will determinate the possibilities to accept or not OOG.

A proper stuffing is also a proper dunnage and bedding.

Please note you need approval before stuffing in «end walls down configuration».
Why a proper cargo stuffing is so important…

It starts with the position of the center of gravity…

The center of gravity is usually marked by this symbol on the cargo. It is the center of the weight of the cargo.

Center of gravity for containers flat racks end walls up must be positioned:
Below +/- 1.95 m from the bottom of the cargo for a 40’ flat rack
 +/- 2.20 m for a 20’ flat rack

In the middle of the length of the cargo placed in the center of the flat rack. However, up to 60% of the weight of the cargo can be loaded on one half of the flat rack:

In the middle of the width of the flat rack and width of the cargo with a tolerance of 5%, exceptionally 10%:
Why a proper cargo stuffing is so important…

If not properly stuffed…
What are the options in terms of stuffing

OOG shipment of a drilling machine on 40’FR

The choice of the equipment is determined by:
- the weight (including dunnage and lashing material), must comply with max payload of equipment available.
- The footprints of the cargo … must comply with below loading chart
- If cargo is self supportive, end point load may be a solution…

<table>
<thead>
<tr>
<th>Container Type</th>
<th>Max Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>20’FR</td>
<td>Max payload 31,2t</td>
</tr>
<tr>
<td>40’FR</td>
<td>Max payload 40,1t</td>
</tr>
<tr>
<td>40’FR</td>
<td>Max payload 44,9t</td>
</tr>
<tr>
<td>40’FR</td>
<td>Max payload 47,4t</td>
</tr>
<tr>
<td>40’FR</td>
<td>Max payload 47,4t</td>
</tr>
</tbody>
</table>
Let’s talk technical… Dunnage

**Dunnage/bedding:**
In order to distribute the weight of the cargo across the width of the flat rack supported by side beams.

The wooden blocks used for this purpose must be as wide as they are high.
Let’s talk technical… Dunnage
Let’s talk technical… Friction

Friction is a natural mean to prevent the cargo from sliding. The target will be to avoid steel to steel contact. Steel to steel friction coefficient is nearly ZERO, so cargo will slide.

The friction can be increased by increasing the friction coefficient or by increasing the surface pressure.

2 types of dunnage:

Timber dunnage or plywood:
increase friction factor up to 0.3 to prevent the cargo from slipping on the flat rack

Rubber pad or friction mats:
increase friction factor up to 0.6 to prevent the cargo from slipping on the flat rack.
Let’s talk technical… Blocking

Usual mistakes
Lack of chocking with timber beams or wooden wedges especially on transversal direction

Partly blocked

No blocking at all
Let’s talk technical… Lifting

Always keep Corner casting free for lifting!!!

- **Top View**
  - 12.192m
  - 11.65m
  - W > 2.11m, L < 11.65m
  - Keep Corner casting free for lifting

- **Top View**
  - 12.192m
  - 11.65m
  - L > 11.65m, W > 2.11m
  - Narrow shape on both ends
  - Keep Corner casting free for lifting

- **Top View**
  - 12.192m
  - 11.65m
  - L > 11.65m, W > 2.11m
  - Narrow shape on one end
  - Keep Corner casting free for lifting

- Keep corner casting clear
- OL on bow
- Keep corner casting clear
Let’s talk technical… Lifting

In case the cargo requires end walls to be collapsed, it is still possible to proceed to side/ end or top lifting on demand…

Not all terminals accept top lifting with end walls down. Our default instruction is to load flatracks with end walls down on deck only. Only a few terminals exceptionnaly load under deck.
Do and Do not…

Blocking by placing wedges under the wheels is not sufficient.

In case of slow puncture, the lashing could be loosen leading to potential damage.

The dunnage should be placed under the axles
Quick assessment:

- Securing equipment sufficient in quantity, direction or angle and the total of the Maximum Securing Load (MSL) values of the securing devices on each side of a unit of cargo should equal at least the weight of the unit.

- Transverse lashing angles greater than 60° are not included in assessment calculation.

- Additional Lashings going over the top of the cargo unit, only act to increase friction by their pre-tension, and prevent tipping but cannot be taking in count in the assessment of lashings MSL.

- Lashings leading directly forward and aft are not include in the assessment calculation.

- When the components of a lashing device are connected in series (for example, a wire to a shackle to a deck eye), the minimum MSL in the series shall apply to that device.

- Balanced number of lashing on each side of the cargo.
Let’s talk technical… Lashing

Various type of lashing material can be used, but keep in mind:

- Use securing elements of similar material and length in order to provide a uniform elastic behavior within the arrangement.

- The stronger lashing point on a FR is the lashing loop 7/8” with a SWL of 49 kN.

<table>
<thead>
<tr>
<th>Material</th>
<th>MSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shackles, rings, deckeyes, turnbuckles of mild steel</td>
<td>50% of breaking strength</td>
</tr>
<tr>
<td>Fibre ropes</td>
<td>33% of breaking strength</td>
</tr>
<tr>
<td>Web lashing</td>
<td>50% of breaking strength</td>
</tr>
<tr>
<td>Wire rope (single use)</td>
<td>80% of breaking strength</td>
</tr>
<tr>
<td>Wire rope (re-useable)</td>
<td>30% of breaking strength</td>
</tr>
<tr>
<td>Steel band (single use)</td>
<td>70% of breaking strength</td>
</tr>
<tr>
<td>Chains</td>
<td>50% of breaking strength</td>
</tr>
<tr>
<td>Lumber, timber</td>
<td>0.3 kN per cm² normal to the grain</td>
</tr>
</tbody>
</table>

Web lashing

Steel wire

Chain
Let’s talk technical… Lashing

Web lashing

Don’t make knots…

use hooks

But, use hooks with the correct radius.

If not this could be leading to this situation

Use protectors to prevent deterioration of lashing equipments on cutting edges.
Let’s talk technical… Lashing

Narrow rounded bends reduce the strength of wire ropes considerably. Bending a wire rope around sharp corners, like passing it through the edged hole of an eye-plate, reduces its strength even more. The residual MSL after a 180° turn through such an eye-plate is only about 25% of the MSL of the plain rope, if steady in the bend.

Wire rope lashings in sea transport are usually assembled by means of wire rope clips. It is of utmost importance that these clips are of appropriate size and applied in correct number, direction and tightness.
Let’s talk technical… Lashing

Spring lashing, Top over lashing, Straight lashing, half loop lashing…

To be used in pairs!

DO:

Cross Lashing: Prevents sliding and tipping but needs securing points on the cargo unit.

Loop Lashing: Prevents transverse sliding and tipping but to be used by pair.

Spring Lashing: Prevents longitudinal sliding and tipping.

Top Over Lashing: Increase friction only, so not sufficient.

DO NOT:

Round turn lashing: Ropes or belts wound around a piece of cargo. Not recommended as the cargo can move freely in the loop.
Let’s talk technical… Lashing

Stake pockets closing bars are not designed for lashing

Use Corner lashing plate to create extra lashing points you can apply direct lashings. This allows you to calculate with the safe working load of your lashing system, instead of just the tension as you normally do with a tie-down system.

When ratchets are tightened, make sure they are properly locked.

Wire slings lashings request specific skills, and improper use affects seriously the quality of lashing.

Correctly used clips, sufficient in number.

Not sufficient slack taken up, too many turns required.

Not homogeneous.
Let’s talk technical… Lashing
Usual mistakes…

-Bad quality of connect shackles or SWL is too low to be changed for a bigger one…

-Not secured turnbuckles and shackles, they can loosen due to vibrations.

-Some lashings on closing bar of stake pocket which is prohibited for lashing and marked on FR clearly

-Lack of cross lashing force on transversal direction to prevent cargo sliding on transversal direction since OOG(cargo) loaded on board on along ship direction

-The mix of different materials for lashing on the same cargo (like web lashing and wire slings); at least avoid to mix them in the same lashing direction…

-Knotting on web lashing.

-Special case: flanges, lack of lashing points on cargo body, must limit the size of those items… otherwise BBK.
The ultimate check prior loading...

Ship’s master will take final decision after Chief Officer check actual condition of OOG at pier before loading. Below points are checked on OOG prior loading:

- No “steel on steel” loading, dunnage or anti-friction material between.
- Transversal & longitudinal lashing on all OOG.
- If an additional steel skids is used between the cargo and the flat track, there should be also an additional dedicated lashings.
- Lashings with no damaged and protected for vessel rolling (ex: straps not directly on sharp angles)
- Lifting corner not damaged, not hidden by cargo, clear for cell guide
- The weight of the cargo unit does not exceed the container Max Payload and the container floor load limit per square meter, linear meter or square foot, linear foot.

If the securing is not seaworthy, shipment should be rejected and Agent and Ship manager immediately advised.

At sea, if heavy weather is expected lashing should be checked prior entering bad weather.
Useful links:

https://www.containerhandbuch.de/chb_e/stra/index.html?/chb_e/stra/stra_04_04_00.html

www.ichca.com

THANK YOU