Höganäs, Sweden, 2020-10-22

Cordstrap QuickLash® 105.4 solution
Certification of the compliance with the CTU Code
MariTerm AB Certificate CS202002

MariTerm AB, Höganäs, Sweden, has on behalf of Cordstrap BV, Oostrum, the Netherlands, evaluated the strength and efficiency of the Cordstrap QuickLash® 105.4 solution according to the principles of the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code).

The evaluation has been based on the following properties and strengths in the equipment:

Fully CTU Code compliant

- Lashing length and elongation
- Lashing angles
- Securing point rated strengths

Practical calculations

- Lashing length and elongation
- Lashing angles

A Cordstrap QuickLash® 105.4 solution has the following system strength:

- SBS: 6000 daN
- MSL: 4500 daN

Where the component strengths are:

- SnapHooks in vertical parts: BS 3000 daN; MSL 1500 daN
- Double vertical lashings: BS: 2×3000 daN; MSL 2×1125 daN
- Horizontal lashings: BS: 2402 daN, in a system: BS 3000 daN; MSL 2250 daN
- Buckles in horizontal lashings: BS 8000 daN; MSL 4000 daN
- MSL in the container anchor points: min 1000 daN
- MSL in the container roof lashing points: min 500 daN

It is hereby certified that the Cordstrap QuickLash® 105.4 solution is an acceptable securing arrangement and fully complies with the CTU Code for the securing of the cargo weights given in the tables below. The calculations underlying these tables can be found in CS202002-A QuickLash 105.4 – Appendix to certificate CS202002.

Sven Sökjer-Petersen, CEO
MariTerm AB

MariTerm AB · Certified by

Lashing tables

The lashing tables below are based on the following modes of transport and accelerations:

Mode of transport	Horizontal acceleration	Vertical acceleration
Road (doors to the rear) and rail transport (doors in any direction)	0.5 g	1.0 g
Road transport (doors to the front)	0.8 g	1.0 g
Sea transport (sea area C – unrestricted)	0.4 g	1 ± 0.8 g

QuickLash® 105.4 – 20ft CTU

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.6	2.9	5.8
0.1	5.5	3.2	6.0
0.2	6.7	3.6	6.4
0.3	8.6	4.1	6.7
0.4	12.0	4.8	7.1
0.45	14.8	5.2	7.3
0.5	no slide	5.7	7.5
0.6	no slide	7.0	7.9
0.7	no slide	9.0	8.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.7	4.2	8.3
0.1	7.9	4.6	8.7
0.2	9.7	5.2	9.2
0.3	12.5	6.0	9.7
0.4	17.3	6.9	10.2
0.45	21.4	7.5	10.5
0.5	no slide	8.2	10.8
0.6	no slide	10.1	11.4
0.7	no slide	13.0	12.1

QuickLash® 105.4 – 40ft CTU

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.6	2.9	5.7
0.1	5.4	3.2	6.0
0.2	6.6	3.5	6.2
0.3	8.4	4.0	6.5
0.4	11.6	4.6	6.8
0.45	14.3	5.0	7.0
0.5	no slide	5.5	7.2
0.6	no slide	6.7	7.5
0.7	no slide	8.5	7.9

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	7.0	4.4	8.8
0.1	8.3	4.9	9.1
0.2	10.1	5.4	9.5
0.3	12.9	6.2	10.0
0.4	17.8	7.1	10.5
0.45	21.9	7.7	10.7
0.5	no slide	8.4	11.0
0.6	no slide	10.2	11.6
0.7	no slide	13.1	12.2

Notes regarding the application of the Cordstrap QuickLash® 105.4 solution

Soft or deformable cargo should be adequately protected against breakage, damage or significant deformation, e.g. by applying edge protection and/or blocking boards. Appropriate measures should be applied to keep the lashing in the right position.

Please note that the values of secured cargo weight might differ slightly for specific solutions with different dimensions.

Strength and efficiency of Cordstrap QuickLash® 105.4 solution

Appendix CS202002-A
to MariTerm AB Certificate CS202002

Cordstrap QuickLash® 105.4 solution in a 20ft CTU

Cordstrap QuickLash® 105.4 solution in a 40ft CTU

Content

Preamble

MariTerm AB has on behalf of Cordstrap BV evaluated the strength and efficiency of the Cordstrap QuickLash® 105.4 solution for securing of cargoes in freight containers. In addition Cordstrap BV and MariTerm AB have developed an Excel tool for generating tables for Quick Lashing Guides for these lashing solutions.

In this report, the theoretical background for the calculations of lashing forces as well as lashing tables for different modes of transport are given. The calculations are performed for 20ft and 40ft CTUs.

The calculations in this document are based on three principles:

1. **Fully CTU Code compliant calculations where the following parameters have been taken into account:**

    - Lashing length and elongation
    - Lashing angles
    - Securing point rated strengths

2. **Practical calculations where the following parameters have been taken into account:**

    - Lashing length and elongation
    - Lashing angles

3. **System only calculations where the following parameters have been taken into account:**

    - MSL of lashings, buckles and hooks

The calculations principles 1 and 2 above comply with the principles in the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code). Principle 1 also respects the limit rated strength of securing points of the container.

Solution Elements Specifications

A Cordstrap QuickLash® 105.4 solution consists of 2 sides, each with 3 pieces of lashing, as well as 3 buckles to close both sides together. A Cordstrap QuickLash® 105.4 solution typically has all buckles at the same location one above the other.

A Cordstrap QuickLash® 105.4 solution has the following system strength:

- SBS: 6000 daN
- MSL: 4500 daN

Where the component strengths are:

- SnapHooks in vertical parts: BS 3000 daN; MSL 1500 daN
- Double vertical lashings: BS: 2×3000 daN; MSL 2×1125 daN
- Horizontal lashings: BS: 2402 daN, in a system: BS 3000 daN; MSL 2250 daN
- Buckles in horizontal lashings: BS 8000 daN; MSL 4000 daN
- MSL in the container anchor points: min 1000 daN
- MSL in the container roof lashing points: min 500 daN

Theoretical lashing elongation, lengths, angles and forces – Cordstrap QuickLash® 105.4 solution

To calculate maximum secured cargo weight, the lashing elongation, length angles and maximum forces are considered.

The maximum lashing forces are restricted either by the container anchor points, container roof lashing points or the lashing MSL.

Given this cargo displacement, the lashing angles and the elongation of the other lashings and therefore the force in the other lashings can be determined.

Finally, the total horizontal lateral force, and the total vertical force of the lashing can be determined given the lashing angles. If a Vertical HangStrap is used and if need be, these forces are adjusted down linearly to assure that the total vertical force does not exceed the rates strength of the container roof lashing point.

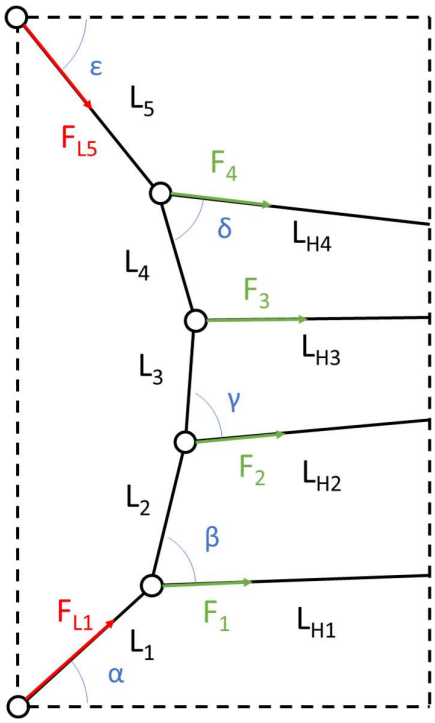
The construction of Cordstrap QuickLash® 105.4 solutions is such that the distance between the lowest and highest lashing is a fixed length. This means that $L_2+L_3+L_4$ is equal to a constant, in this case 126 cm. Since the total length of the vertical lashing is also given, L_1+L_5 is a constant as well, in this case 152 cm.

In the calculations in this document it is assumed that a recommended pre-tension of 25% MSL is applied. It is also assumed that the goods are rigid. For non-rigid goods i.e. carton

boxes, plastic drums, big bags or small bags on pallets, please see CS202002-L – QuickLash 105.4 – Load types addendum to Certificate 202002.

As presented in the calculation data below, the following sequence of calculations are made when determining the forces in the different lashings:

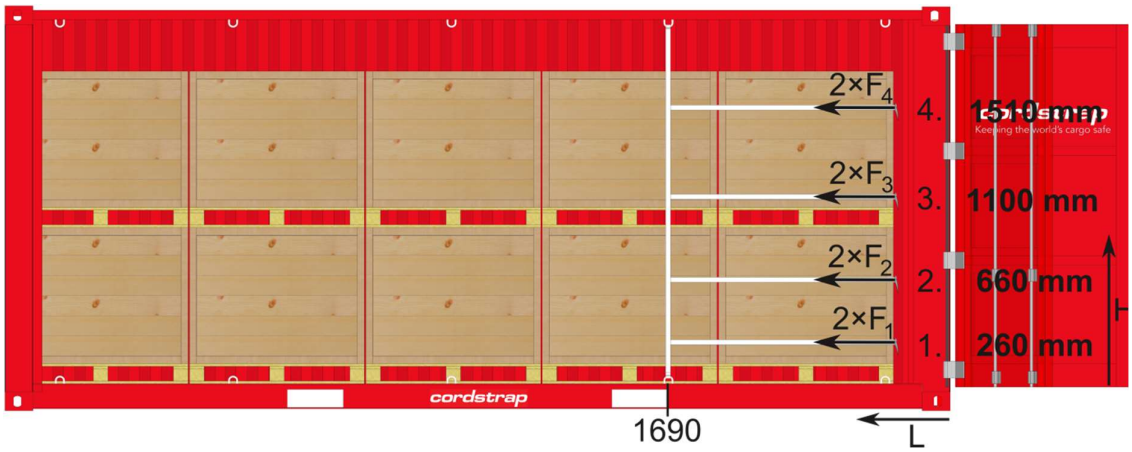
1. The maximum force in each part of the lashing solution is established. The limiting factor is either the strength in the anchor point of the container, the MSL in the lashing or the MSL in the hook, depending on which calculation principle is used.
2. The next step is that forces in the lashings are calculated in an iterative approach: the cargo displacement is increased in small steps, and the lashing angles as well as the forces for both horizontal and vertical lashings are calculated at each increment.
3. The maximum allowed displacement is determined, based on the maximum allowed force in each lashing part.
4. The lashing force components in each horizontal lashing are then calculated, at the maximum allowed displacement. Steps 2 through 4 are omitted for the system only principle.
5. Finally, the secured cargo weight for each principle is then established based on these lashing forces.



Forces in a Cordstrap QuickLash® 105.4 solution

QuickLash® 105.4 solution in 20ft CTU

The principal forces acting in the lashings, on the lashing/anchor points and on the cargo is presented in the figure below.



Cordstrap QuickLash® 105.4 solution in 20ft CTU

MAX ALLOWABLE LASHING FORCES

	CTU Code compliant	Practical calc.	System only
FL1	1000 daN	1125 daN	1125 daN
FL2	1125 daN	1125 daN	1125 daN
FL3	1125 daN	1125 daN	1125 daN
FL4	1125 daN	1125 daN	1125 daN
FL5	500 daN	1125 daN	1125 daN
F1	1125 daN	1125 daN	1125 daN
F2	1125 daN	1125 daN	1125 daN
F3	1125 daN	1125 daN	1125 daN
F4	1125 daN	1125 daN	1125 daN

MAXIMUM FORCE IN LASHINGS

	CTU Code compliant			Practical calc.			System only		
	F max	Fx	Fz	F max	Fx	Fz	F max	Fx	Fz
Force Lashing 1	500.0	500.0	-4.3	740.0	740.0	-8.7	562.5	562.5	0.0
Force Lashing 2	225.5	225.1	-12.4	358.7	358.1	-20.9	562.5	562.5	0.0
Force Lashing 3	205.1	203.9	-22.3	308.9	307.0	-33.9	562.5	562.5	0.0
Force Lashing 4	202.0	200.7	-23.0	299.5	297.6	-33.8	562.5	562.5	0.0

QuickLash® 105.4 solution in 40ft CTU

The principal forces acting in the lashings, on the lashing/anchor points and on the cargo is presented in the figure below.

Cordstrap QuickLash® 105.4 solution in 40ft CTU

MAX ALLOWABLE LASHING FORCES

	CTU Code compliant	Practical calc.	System only
FL1	1000 daN	1125 daN	1125 daN
FL2	1125 daN	1125 daN	1125 daN
FL3	1125 daN	1125 daN	1125 daN
FL4	1125 daN	1125 daN	1125 daN
FL5	500 daN	1125 daN	1125 daN
F1	1125 daN	1125 daN	1125 daN
F2	1125 daN	1125 daN	1125 daN
F3	1125 daN	1125 daN	1125 daN
F4	1125 daN	1125 daN	1125 daN

MAXIMUM FORCE IN LASHINGS

	CTU Code compliant			Practical calc.			System only		
	F max	Fx	Fz	F max	Fx	Fz	F max	Fx	Fz
Force Lashing 1	500.0	500.0	-4.0	752.6	752.6	-8.2	562.5	562.5	0.0
Force Lashing 2	221.5	221.2	-10.6	358.6	358.1	-18.2	562.5	562.5	0.0
Force Lashing 3	202.8	201.9	-18.5	310.9	309.6	-28.8	562.5	562.5	0.0
Force Lashing 4	199.9	199.0	-19.4	301.5	300.1	-29.0	562.5	562.5	0.0

Calculation of maximum secured cargo weight

The secured cargo weight in ton, m, is set up as follows for a CTU Code compliant calculation:

$$m = \frac{2 \cdot 10 \cdot (F_x - F_z \cdot \mu \cdot f_\mu)}{(c_x - c_z \cdot \mu \cdot f_\mu) \cdot g \cdot 1000}$$

where:

F_x	*Horizontal force in lashing [daN]*
F_z	*Vertical force in lashing [daN]*
c_x	*Horizontal acceleration coefficient*
c_z	*Vertical acceleration coefficient*
μ	*Friction factor*
f_μ	*Conversion factor for dynamic friction*
g	*Gravity acceleration 9.81 [m/s²]*

Example calculation

For transport in sea area C with c_x = 0.4 backward, c_z = 0.2 downwards, the friction factor μ = 0.3 and a 40ft CTU. The following secured cargo weight in ton is obtained for a CTU Code compliant calculation:

$$m = \frac{2 \cdot 10 \cdot ((500 + 221.5 + 202.8 + 199.9))}{(0.4 - 0.2 \cdot 0.3 \cdot 0.75) \cdot 9.81 \cdot 1000} = 6.5\ ton$$

Lashing tables - Cordstrap QuickLash® 105.4 solutions

Each table gives the secured cargo weight in ton per lashing solution depending on the friction factor. The lashing tables are divided into two sections with sub sections:

1. 20ft CTU
    a. Fully CTU Code compliant
    b. Practical calculations
    c. System only

2. 40ft CTU
    a. Fully CTU Code compliant
    b. Practical calculations
    c. System only

The tables have been based on the accelerations in the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code), which are the following:

Mode of transport	Horizontal acceleration	Vertical acceleration
Road (doors to the rear) and rail transport (doors in any direction)	0.5 g	1.0 g
Road transport (doors to the front)	0.8 g	1.0 g
Sea transport (sea area C – unrestricted)	0.4 g	1 ± 0.8 g

Notes regarding the application of the Cordstrap QuickLash® 105.4 solution

Soft or deformable cargo should be adequately protected against breakage, damage or significant deformation, e.g. by applying edge protection and/or blocking boards. Appropriate measures should be applied to keep the lashing in the right position.

Please note that the values of secured cargo weight might differ slightly for specific solutions with different dimensions.

QuickLash® 105.4 – 20ft CTU

Fully CTU Code compliant

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.6	2.9	5.8
0.1	5.5	3.2	6.0
0.2	6.7	3.6	6.4
0.3	8.6	4.1	6.7
0.4	12.0	4.8	7.1
0.45	14.8	5.2	7.3
0.5	no slide	5.7	7.5
0.6	no slide	7.0	7.9
0.7	no slide	9.0	8.4

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.7	4.2	8.3
0.1	7.9	4.6	8.7
0.2	9.7	5.2	9.2
0.3	12.5	6.0	9.7
0.4	17.3	6.9	10.2
0.45	21.4	7.5	10.5
0.5	no slide	8.2	10.8
0.6	no slide	10.1	11.4
0.7	no slide	13.0	12.1

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

QuickLash® 105.4 – 40ft CTU

Fully CTU Code compliant

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.6	2.9	5.7
0.1	5.4	3.2	6.0
0.2	6.6	3.5	6.2
0.3	8.4	4.0	6.5
0.4	11.6	4.6	6.8
0.45	14.3	5.0	7.0
0.5	no slide	5.5	7.2
0.6	no slide	6.7	7.5
0.7	no slide	8.5	7.9

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	7.0	4.4	8.8
0.1	8.3	4.9	9.1
0.2	10.1	5.4	9.5
0.3	12.9	6.2	10.0
0.4	17.8	7.1	10.5
0.45	21.9	7.7	10.7
0.5	no slide	8.4	11.0
0.6	no slide	10.2	11.6
0.7	no slide	13.1	12.2

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Load types addendum of Cordstrap QuickLash® 105.4 solution

Addendum CS202002-L
to MariTerm certificate CS202002

Cordstrap QuickLash® 105.4 solution in a 20ft CTU

Cordstrap QuickLash® 105.4 solution in a 40ft CTU

Content

Preamble

MariTerm AB, Höganäs, Sweden, has on behalf of Cordstrap BV, Oostrum, the Netherlands, evaluated the strength and efficiency of the Cordstrap QuickLash® 105.4 solution according to the principles of the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code).

In this document, lashing tables can be found for different load types for both 20ft and 40ft CTUs.

The evaluation has been based on the following properties and strengths in the equipment:

Fully CTU Code compliant

- Lashing length and elongation
- Lashing angles
- Securing point rated strengths

Practical calculations

- Lashing length and elongation
- Lashing angles

System only

- MSL of lashings, buckles and hooks

A Cordstrap QuickLash® 105.4 solution has the following system strength:

- SBS: 6000 daN
- MSL: 4500 daN

Where the component strengths are:

- SnapHooks in vertical parts: BS 3000 daN; MSL 1500 daN
- Double vertical lashings: BS: 2×3000 daN; MSL 2×1125 daN
- Horizontal lashings: BS: 2402 daN, in a system: BS 3000 daN; MSL 2250 daN
- Buckles in horizontal lashings: BS 8000 daN; MSL 4000 daN
- MSL in the container anchor points: min 1000 daN
- MSL in the container roof lashing points: min 500 daN

The calculations underlying these tables can be found in CS202002-A QuickLash 105.4 – Appendix to certificate CS202002.

Lashing tables

The lashing tables below are based on the following modes of transport and accelerations:

Mode of transport	Horizontal acceleration	Vertical acceleration
Road (doors to the rear) and rail transport (doors in any direction)	0.5 g	1.0 g
Road transport (doors to the front)	0.8 g	1.0 g
Sea transport (sea area C – unrestricted)	0.4 g	0.2 g

IBCs

IBC Protectors are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU - IBCs

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0	4.6	2.9	5.8
0.1	5.5	3.2	6.0
0.2	6.7	3.6	6.4
0.3	8.6	4.1	6.7
0.4	12.0	4.8	7.1
0.45	14.8	5.2	7.3
0.5	no slide	5.7	7.5
0.6	no slide	7.0	7.9
0.7	no slide	9.0	8.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.7	4.2	8.3
0.1	7.9	4.6	8.7
0.2	9.7	5.2	9.2
0.3	12.5	6.0	9.7
0.4	17.3	6.9	10.2
0.45	21.4	7.5	10.5
0.5	no slide	8.2	10.8
0.6	no slide	10.1	11.4
0.7	no slide	13.0	12.1

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

SoftPackaging

Edgeboards are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU - SoftPackaging

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.7	2.9	5.8
0.1	5.5	3.2	6.1
0.2	6.7	3.6	6.3
0.3	8.6	4.1	6.6
0.4	11.8	4.7	7.0
0.45	14.6	5.1	7.1
0.5	no slide	5.6	7.3
0.6	no slide	6.8	7.7
0.7	no slide	8.7	8.1

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.9	4.3	8.6
0.1	8.1	4.7	8.9
0.2	9.9	5.3	9.3
0.3	12.6	6.0	9.8
0.4	17.4	7.0	10.2
0.45	21.5	7.5	10.5
0.5	no slide	8.2	10.8
0.6	no slide	10.0	11.3
0.7	no slide	12.8	11.9

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

QuickLash® 105.4 – 40ft CTU – SoftPackaging

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.7	2.9	5.8
0.1	5.5	3.2	6.1
0.2	6.7	3.6	6.4
0.3	8.6	4.1	6.7
0.4	11.9	4.7	7.0
0.45	14.6	5.1	7.1
0.5	no slide	5.6	7.3
0.6	no slide	6.8	7.7
0.7	no slide	8.7	8.1

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.8	4.3	8.6
0.1	8.1	4.7	8.9
0.2	9.9	5.3	9.3
0.3	12.6	6.0	9.8
0.4	17.4	7.0	10.2
0.45	21.4	7.5	10.5
0.5	no slide	8.2	10.7
0.6	no slide	10.0	11.3
0.7	no slide	12.8	11.9

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Drums – floor loaded

Hangstraps are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Drums – floor loaded

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.5	2.8	5.6
0.1	5.3	3.1	5.8
0.2	6.4	3.5	6.1
0.3	8.2	3.9	6.3
0.4	11.3	4.5	6.6
0.45	13.9	4.9	6.8
0.5	no slide	5.3	7.0
0.6	no slide	6.5	7.3
0.7	no slide	8.3	7.7

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	7.3	4.6	9.1
0.1	8.6	5.0	9.5
0.2	10.5	5.6	9.9
0.3	13.4	6.4	10.4
0.4	18.4	7.4	10.8
0.45	22.7	8.0	11.1
0.5	no slide	8.7	11.4
0.6	no slide	10.6	12.0
0.7	no slide	13.5	12.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Drums – palletized

Hangstraps are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Drums – palletized

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.5	2.8	5.6
0.1	5.3	3.1	5.9
0.2	6.5	3.5	6.1
0.3	8.3	4.0	6.4
0.4	11.4	4.6	6.7
0.45	14.0	4.9	6.9
0.5	no slide	5.4	7.0
0.6	no slide	6.6	7.4
0.7	no slide	8.4	7.8

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	7.2	4.5	9.0
0.1	8.5	5.0	9.4
0.2	10.4	5.6	9.8
0.3	13.3	6.3	10.3
0.4	18.3	7.3	10.8
0.45	22.5	7.9	11.0
0.5	no slide	8.6	11.3
0.6	no slide	10.5	11.9
0.7	no slide	13.4	12.5

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Soft Drums – floor loaded

Flexboards are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Soft Drums – floor loaded

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.7	3.0	5.9
0.1	5.6	3.3	6.2
0.2	6.8	3.7	6.4
0.3	8.7	4.1	6.7
0.4	11.9	4.8	7.0
0.45	14.7	5.2	7.2
0.5	no slide	5.6	7.4
0.6	no slide	6.8	7.7
0.7	no slide	8.7	8.1

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.8	4.2	8.5
0.1	8.0	4.7	8.8
0.2	9.7	5.2	9.2
0.3	12.4	5.9	9.6
0.4	17.1	6.9	10.1
0.45	21.1	7.4	10.3
0.5	no slide	8.1	10.6
0.6	no slide	9.8	11.1
0.7	no slide	12.6	11.7

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Soft Drums – palletized

Flexboards are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Soft Drums – palletized

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.8	3.0	6.0
0.1	5.6	3.3	6.2
0.2	6.9	3.7	6.5
0.3	8.8	4.2	6.8
0.4	12.1	4.9	7.1
0.45	15.0	5.3	7.3
0.5	no slide	5.7	7.5
0.6	no slide	7.0	7.9
0.7	no slide	8.9	8.3

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.7	4.2	8.3
0.1	7.9	4.6	8.7
0.2	9.6	5.2	9.1
0.3	12.3	5.9	9.5
0.4	16.9	6.8	10.0
0.45	20.9	7.3	10.2
0.5	no slide	8.0	10.4
0.6	no slide	9.7	11.0
0.7	no slide	12.4	11.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Small BigBags

Hangstraps are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Small BigBags

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.8	3.0	6.0
0.1	5.7	3.3	6.3
0.2	7.0	3.8	6.6
0.3	9.0	4.3	7.0
0.4	12.5	5.0	7.3
0.45	15.4	5.4	7.5
0.5	no slide	5.9	7.8
0.6	no slide	7.3	8.2
0.7	no slide	9.4	8.7

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.4	4.0	8.0
0.1	7.6	4.4	8.4
0.2	9.3	5.0	8.8
0.3	12.0	5.7	9.3
0.4	16.6	6.6	9.8
0.45	20.6	7.2	10.0
0.5	no slide	7.9	10.3
0.6	no slide	9.7	10.9
0.7	no slide	12.5	11.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Large BigBags

Hangstraps are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Large BigBags

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	5.3	3.3	6.7
0.1	6.3	3.7	7.0
0.2	7.7	4.2	7.3
0.3	9.9	4.7	7.7
0.4	13.8	5.5	8.1
0.45	17.0	6.0	8.3
0.5	no slide	6.5	8.5
0.6	no slide	8.0	9.0
0.7	no slide	10.3	9.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.0	3.7	7.5
0.1	7.1	4.2	7.8
0.2	8.7	4.7	8.2
0.3	11.1	5.3	8.6
0.4	15.5	6.2	9.1
0.45	19.1	6.7	9.3
0.5	no slide	7.3	9.6
0.6	no slide	9.0	10.1
0.7	no slide	11.5	10.7

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

QuickLash® 105.4 – 40ft CTU – Large BigBags

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	5.4	3.4	6.8
0.1	6.4	3.8	7.1
0.2	7.8	4.2	7.4
0.3	10.0	4.8	7.8
0.4	13.9	5.6	8.2
0.45	17.2	6.0	8.4
0.5	no slide	6.6	8.6
0.6	no slide	8.0	9.1
0.7	no slide	10.3	9.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.1	3.8	7.6
0.1	7.2	4.2	7.9
0.2	8.8	4.7	8.3
0.3	11.3	5.4	8.7
0.4	15.6	6.2	9.2
0.45	19.3	6.8	9.4
0.5	no slide	7.4	9.7
0.6	no slide	9.0	10.2
0.7	no slide	11.6	10.8

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Small BigBags with soft materials

Flexboards are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Small BigBags with soft material

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	4.8	3.0	6.0
0.1	5.7	3.3	6.3
0.2	7.0	3.8	6.6
0.3	9.0	4.3	7.0
0.4	12.5	5.0	7.3
0.45	15.4	5.4	7.5
0.5	no slide	5.9	7.8
0.6	no slide	7.3	8.2
0.7	no slide	9.4	8.7

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.4	4.0	8.0
0.1	7.6	4.4	8.4
0.2	9.3	5.0	8.8
0.3	12.0	5.7	9.3
0.4	16.6	6.6	9.8
0.45	20.6	7.2	10.0
0.5	no slide	7.9	10.3
0.6	no slide	9.7	10.9
0.7	no slide	12.5	11.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Large BigBags with soft materials

Flexboards are used to keep the lashings in place.

QuickLash® 105.4 – 20ft CTU – Large BigBags with soft material

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	5.5	3.4	6.9
0.1	6.5	3.8	7.2
0.2	8.0	4.3	7.6
0.3	10.2	4.9	7.9
0.4	14.2	5.7	8.3
0.45	17.5	6.1	8.5
0.5	no slide	6.7	8.8
0.6	no slide	8.2	9.3
0.7	no slide	10.5	9.8

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.2	3.9	7.7
0.1	7.3	4.3	8.1
0.2	9.0	4.8	8.5
0.3	11.5	5.5	8.9
0.4	15.9	6.4	9.4
0.45	19.6	6.9	9.6
0.5	no slide	7.5	9.8
0.6	no slide	9.2	10.4
0.7	no slide	11.8	11.0

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

QuickLash® 105.4 – 40ft CTU – Large BigBags with soft material

Fully CTU Code compliant

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	5.2	3.2	6.5
0.1	6.1	3.6	6.8
0.2	7.5	4.0	7.1
0.3	9.6	4.6	7.4
0.4	13.3	5.3	7.8
0.45	16.4	5.8	8.0
0.5	no slide	6.3	8.2
0.6	no slide	7.7	8.7
0.7	no slide	9.8	9.1

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	6.3	3.9	7.8
0.1	7.4	4.3	8.2
0.2	9.0	4.9	8.6
0.3	11.6	5.5	9.0
0.4	16.0	6.4	9.4
0.45	19.8	6.9	9.7
0.5	no slide	7.6	9.9
0.6	no slide	9.2	10.4
0.7	no slide	11.8	11.0

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	9.2	5.7	11.5
0.1	10.8	6.3	11.9
0.2	13.1	7.1	12.4
0.3	16.7	8.0	12.9
0.4	22.9	9.2	13.5
0.45	28.2	9.9	13.8
0.5	no slide	10.8	14.1
0.6	no slide	13.1	14.8
0.7	no slide	16.7	15.5

Notes regarding the application of the Cordstrap QuickLash® 105.4 solution

Soft or deformable cargo should be adequately protected against breakage, damage or significant deformation, e.g. by applying edge protection and/or blocking boards. Appropriate measures should be applied to keep the lashing in the right position.

Please note that the values of secured cargo weight might differ slightly for specific solutions with different dimensions.