CTU-Certification

global transport safety EUROSAFE

Version: 01 Date: 01 Nov. 20	**Cordstrap CornerLash® AAR 200LE.4 solution** **Certification of the compliance with the CTU Code**	**Certificate Number** 2020-11-008

1. Summary

EUROSAFE GmbH, has on behalf of Cordstrap BV, Oostrum, the Netherlands, evaluated the strength and efficiency of the Cordstrap CornerLash® AAR 200LE.4solution according to the principles of the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code).

2. Base of Evaluation

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 CornerLash® AAR 200LE.4 solution has the following system strength:

- SBS: 24000 daN
- MSL: 12000 daN

Where the component strengths are:

- Cornerelements: BS 6000 daN; MSL 3000 daN
- Lashings: BS: 4893 daN, in a system: BS 8500 daN; MSL 4250 daN
- Buckles: BS 6000 daN; MSL 3000 daN
- MSL in the container Corner points: min 1000 daN
- MSL in the container roof lashing points: min 500 daN

3. Conclusion

It is hereby certified that the Cordstrap CornerLash® AAR 200LE.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 2020-11-008-1 CornerLash 105.4 – Appendix to certificate 2020-11-008.

01 Nov. 20, Bruchköbel (Germany)

Verpackung und Ladungssicherung (EuroZert) Euro Zert Certification Überwacht durch: SVG office GmbH Wolfgang Neumann DIN EN ISO/IEC 17024:2012 ZN-2012-05-07-0253 Gültig bis 08/2022 Personenzertifizierter Sachverständiger

Personal certified expert acc. to EN ISO/IEC 17024:2012,
Certificate number: ZN - 20120307 – 0253, valid until 08/2022
for packaging, load units, load securing with additional qualification
for heavy duty transports as well as damage and cause analysis for road, rail and sea traffic
(including dangerous goods)

EUROSAFE GmbH
Wolfgang Neumann
Am Germanenring 30
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Germany

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4 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

CornerLash® AAR 200LE.4– 20 ft 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	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.7
0.3	42.2	20.2	32.7
0.4	57.3	22.9	33.7
0.45	70.1	24.6	34.2
0.5	no slide	26.6	34.8
0.6	no slide	31.9	36.0
0.7	no slide	40.1	37.4

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.7
0.3	42.2	20.2	32.7
0.4	57.3	22.9	33.7
0.45	70.1	24.6	34.2
0.5	no slide	26.6	34.8
0.6	no slide	31.9	36.0
0.7	no slide	33.3	31.0

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CornerLash® AAR 200LE.4– 40 ft 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	22.1	13.8	27.7
0.1	26.0	15.3	28.8
0.2	31.6	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.3	22.1	32.6
0.45	68.1	23.9	33.3
0.5	no slide	26.0	34.1
0.6	no slide	31.6	35.7
0.7	no slide	40.3	37.5

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.1	13.8	27.7
0.1	26.0	15.3	28.8
0.2	31.6	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.3	22.1	32.6
0.45	68.1	23.9	33.3
0.5	no slide	26.0	34.1
0.6	no slide	31.6	35.7
0.7	no slide	40.3	37.5

Notes regarding the application of the Cordstrap CornerLash® AAR 200LE.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.

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Strength and efficiency of Cordstrap CornerLash® AAR 200LE.4 solution

Appendix 2020-11-008-1
to EUROSAFE certificate 2020-11-008-1

Cordstrap CornerLash® AAR 200LE.4 solution in a 20 ft CTU

Cordstrap CornerLash® AAR 200LE.4 solution in a 40 ft CTU

Content

Preamble

EUROSAFE GmbH has on behalf of Cordstrap BV evaluated the strength and efficiency of the Cordstrap CornerLash® AAR 200LE.4 solution for securing of cargoes in freight containers.

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 20 ft and 40 ft 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 CornerLash® AAR 200LE.4 solution consists of 2 sides, each with 2 CornerElements, 2 pieces of lashing, as well as 4 buckles to close both sides together. A Cordstrap CornerLash® AAR 200LE.4 solution typically has all buckles at the same location one above the other.

A Cordstrap CornerLash® AAR 200LE.4 solution has the following system strength:

- SBS: 24000 daN
- MSL: 12000 daN

Where the component strengths are:

- Cornerelements: BS 6000 daN; MSL 3000 daN
- Lashings: BS: 4893 daN, in a system: BS 8500 daN; MSL 4250 daN
- Buckles: BS 6000 daN; MSL 3000 daN
- MSL in the container Corner points: min 1000 daN
- MSL in the container roof lashing points: min 500 daN

Theoretical lashing elongation, lengths, angles and forces – Cordstrap CornerLash® AAR 200LE.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.

These maximum lashing forces represent a specific lashing elongation, which implies that the shortest lashing will reach the maximum lashing force first. The elongation at maximum force of the shortest lashing will give its lashing angle at maximum force, which again will give the cargo displacement at which this maximum force will occur.

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.

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

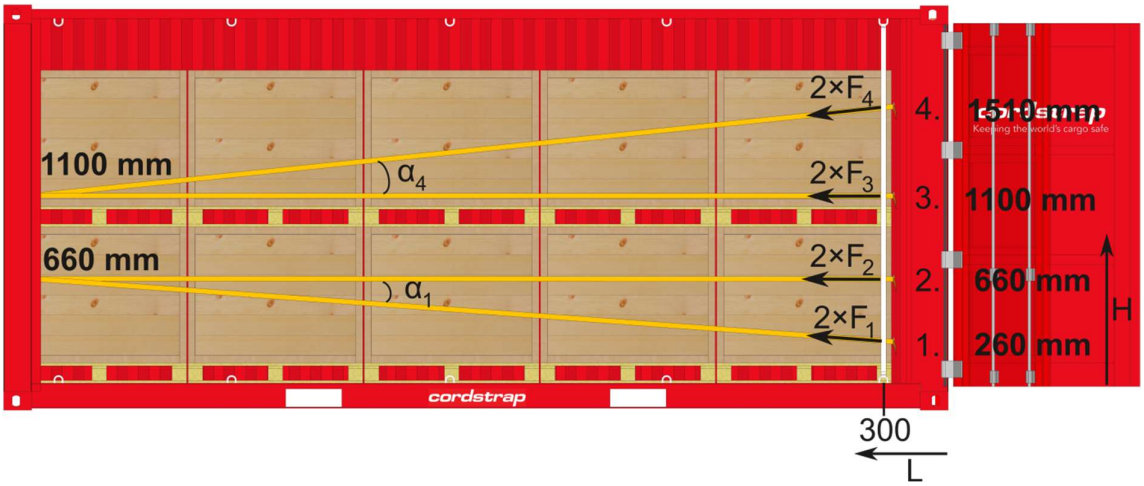
boxes, plastic drums, big bags or small bags on pallets, please see 2020-11-008-2 – CornerLash AAR 200LE.4 – Load types addendum to Certificate 2020-11-008.

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 allowed is established. The limiting factor is either the strength in the CornerElement or the MSL in the lashing. From this, the elongation in % at maximum force can be established.
2. The cargo displacement and the lashing length at maximum force in the shortest lashing are then calculated. The length of each lashing is depending on the position of the Vertical lashing, the cargo dimensions, and the elongation of the lashing.
3. The angles for the different lashings are then calculated. This is depending on the position of the CornerElements, the position of the Vertical lashing, the cargo dimensions, and the elongation of the lashing. This step is omitted for the system only principle.
4. The force in each lashing is then calculated. The force is divided into a horizontal force and a vertical force. The force is depending on the same parameters mentioned above as well as the breaking strength of the lashing.
5. Finally, the secured cargo weight for each principle is then established based on the lashing forces.

CornerLash® AAR 200LE.4 solution in 20 ft CTU

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



Cordstrap CornerLash® AAR 200LE.4 solution in 20 ft CTU

CALCULATION OF ELONGATIONS

PTε = ε @ pre-tension
MLε = ε @ max load
LBSε = ε @ LBS
L = Lashing Length
L0 = Original Lashing Length

PTε = Fpt / Flbs * LBSε
L0 = L / (1 + PTε)
MLε = Fmax / Flbs * LBSε
relative MLε = (1 + MLε)* L0 / L - 1

Fpt = Pre-tension 956 daN
PTε 2.2%

	CTU Code compliant	Practical calc.	System only
Fmax= Max lashing force	1500 daN	1500 daN	1500 daN
MLε = Elongation @ Fmax	3.4%	3.4%	3.4%
relative MLε	1.2%	1.2%	1.2%
Flbs = LBS			

CALCULATION OF LASHING LENGTHS

		Length before pre-tension	Length at max force w/o pre-tension	CTU Code compliant	Practical calc.	System only
Length Lashing 1	561.4 cm	549.6 cm	568.5 cm	568.1 cm	568.1 cm	568.1 cm
Length Lashing 2	560.0 cm	548.2 cm	567.1 cm	566.7 cm	566.7 cm	566.7 cm
Length Lashing 3	560.0 cm	548.2 cm	567.1 cm	566.7 cm	566.7 cm	566.7 cm
Length Lashing 4	561.5 cm	549.7 cm	568.6 cm	568.2 cm	568.2 cm	568.2 cm
		Cargo displacement:	18.9 cm	6.7 cm	6.7 cm	6.7 cm

CALCULATION OF LASHING ANGLES

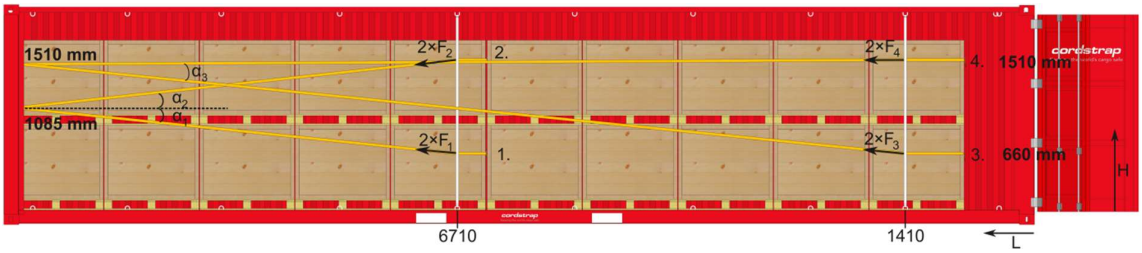
		Angles at max force w/o pre-tension	CTU Code compliant Angles at max force	Practical calc. Angles at max force	System only Angles at max force
Lashing Angle α1	-4.1 °	-4.1 °	-4.1 °	-4.1 °	0.0 °
Lashing Angle α2	0.0 °	0.0 °	0.0 °	0.0 °	0.0 °
Lashing Angle α3	0.0 °	0.0 °	0.0 °	0.0 °	0.0 °
Lashing Angle α4	4.2 °	4.2 °	4.2 °	4.2 °	0.0 °

CALCULATION OF MAXIMUM FORCE IN LASHINGS

	Fmax, based on Lashing Points			Fmax, based on Lashing Points (CTU)				CTU Code compliant		Practical calc.		System only	
	F	Fx	Fz MAX	F	Fx	Fz MAX	F max	Fx	Fz	Fx	Fz	Fx	Fz
Force Lashing 1	282642.3	281923.5	-20144.6	282642.3	281923.5	-20144.6	1498.6	1494.8	-106.8	1494.8	-106.8	1500.0	0.0
Force Lashing 2	282903.0	282903.0	0.0	282903.0	282903.0	0.0	1500.0	1500.0	0.0	1500.0	0.0	1500.0	0.0
Force Lashing 3	282903.0	282903.0	0.0	282903.0	282903.0	0.0	1500.0	1500.0	0.0	1500.0	0.0	1500.0	0.0
Force Lashing 4	282629.1	281874.1	20644.6	282629.1	281874.1	20644.6	1498.5	1494.5	109.5	1494.5	109.5	1500.0	0.0
			500.0			500.0							

CornerLash® AAR 200LE.4 solution in 40 ft CTU

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



Cordstrap CornerLash® AAR 200LE.4 solution in 40 ft CTU

CALCULATION OF ELONGATIONS

				CTU Code compliant	Practical calc.	System only
PTε = ε @ pre-tension	PTε = Fpt / Flbs * LBSε	Fpt = Pre-tension	956 daN			
MLε = ε @ max load	L0 = L / (1 + PTε)	PTε	2.2%			
LBSε = ε @ LBS	MLε = Fmax / Flbs * LBSε					
L = Lashing Length	relative MLε = (1 + MLε)* L0 / L - 1					
L0 = Original Lashing Length		Fmax= Max lashing force		1500 daN	1500 daN	1500 daN
		MLε = Elongation @ Fmax		3.4%	3.4%	3.4%
		relative MLε		1.2%	1.2%	1.2%
		Flbs = LBS				

CALCULATION OF LASHING LENGTHS

		Length before pre-tension	Length at max force w/o pre-tension	CTU Code compliant	Practical calc.	System only
Length Lashing 1	1110.4 cm	1087.1 cm	1105.4 cm	1117.0 cm	1117.0 cm	1117.0 cm
Length Lashing 2	1103.7 cm	1080.5 cm	1098.8 cm	1110.2 cm	1110.2 cm	1110.2 cm
Length Lashing 3	544.6 cm	533.1 cm	551.5 cm	551.1 cm	551.1 cm	551.1 cm
Length Lashing 4	544.6 cm	533.1 cm	551.5 cm	551.1 cm	551.1 cm	551.1 cm
		Cargo displacement:	18.4 cm	6.5 cm	6.5 cm	6.5 cm

CALCULATION OF LASHING ANGLES

		Angles at max force w/o pre-tension	CTU Code compliant Angles at max force	Practical calc. Angles at max force	System only Angles at max force
Lashing Angle α1	-9.1 °	-9.1 °	-9.1 °	-9.1 °	0.0 °
Lashing Angle α2	0.0 °	0.0 °	0.0 °	0.0 °	0.0 °
Lashing Angle α3	-2.3 °	-2.3 °	-2.3 °	-2.3 °	0.0 °
Lashing Angle α4	2.3 °	2.3 °	2.3 °	2.3 °	0.0 °

CALCULATION OF MAXIMUM FORCE IN LASHINGS

	Fmax, based on Lashing Points			Fmax, based on Lashing Points (CTU)				CTU Code compliant		Practical calc.		System only	
	F	Fx	Fz MAX	F	Fx	Fz MAX	F max	Fx	Fz	Fx	Fz	Fx	Fz
Force Lashing 1		0.0			0.0		1222.9	1207.6	-193.0	1207.6	-193.0	1500.0	0.0
Force Lashing 2		0.0			0.0		1224.5	1224.5	0.0	1224.5	0.0	1500.0	0.0
Force Lashing 3		0.0			0.0		1500.0	1498.8	-60.0	1498.8	-60.0	1500.0	0.0
Force Lashing 4		0.0			0.0		1500.0	1498.8	60.0	1498.8	60.0	1500.0	0.0
			0.0			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 40 ft CTU. The following secured cargo weight in ton is obtained for a CTU Code compliant calculation:

$$m = \frac{2 \cdot 10 \cdot ((1207.6 + 1 \quad .5 + 1498.8 + 1498.8))}{(0.4 - 0.2 \cdot 0.3 \cdot 0.75) \cdot 9.81 \cdot 1000} = 31.2\ ton$$

Lashing tables - Cordstrap CornerLash® AAR 200LE.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. 20 ft CTU
    a. Fully CTU Code compliant
    b. Practical calculations
    c. System only

2. 40 ft 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 CornerLash® AAR 200LE.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.

CornerLash® AAR 200LE.4 – 20 ft 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	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.7
0.3	42.2	20.2	32.7
0.4	57.3	22.9	33.7
0.45	70.1	24.6	34.2
0.5	no slide	26.6	34.8
0.6	no slide	31.9	36.0
0.7	no slide	40.1	37.4

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.7
0.3	42.2	20.2	32.7
0.4	57.3	22.9	33.7
0.45	70.1	24.6	34.2
0.5	no slide	26.6	34.8
0.6	no slide	31.9	36.0
0.7	no slide	40.1	37.4

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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	22.1	13.8	27.7
0.1	26.0	15.3	28.8
0.2	31.6	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.3	22.1	32.6
0.45	68.1	23.9	33.3
0.5	no slide	26.0	34.1
0.6	no slide	31.6	35.7
0.7	no slide	40.3	37.5

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.1	13.8	27.7
0.1	26.0	15.3	28.8
0.2	31.6	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.3	22.1	32.6
0.45	68.1	23.9	33.3
0.5	no slide	26.0	34.1
0.6	no slide	31.6	35.7
0.7	no slide	40.3	37.5

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Load types addendum of Cordstrap CornerLash® AAR 200LE.4 solution

Addendum 2020-11-008-2
to EUROSAFE certificate 2020-11-008

Cordstrap CornerLash® AAR 200LE.4 solution in a 20 ft CTU

Cordstrap CornerLash® AAR 200LE.4 solution in a 40 ft CTU

Content

Preamble

EUROSAFE GmbH, has on behalf of Cordstrap BV, Oostrum, the Netherlands, evaluated the strength and efficiency of the Cordstrap CornerLash® AAR 200LE.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 20 ft and 40 ft 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 CornerLash® AAR 200LE.4 solution has the following system strength:

- SBS: 24000 daN
- MSL: 12000 daN

Where the component strengths are:

- CornerElements: BS 6000 daN; MSL 3000 daN
- Lashings: BS: 4893 daN, in a system: BS 8500 daN; MSL 4250 daN
- Buckles: BS 6000 daN; MSL 3000 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 2020-11-008-1 CornerLash AAR 200LE.4 – Appendix to certificate 2020-11-008.

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

IBCs

IBC Protectors are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft 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
0.0	22.4	14.0	28.0
0.1	25.9	15.2	28.6
0.2	30.8	16.6	29.1
0.3	38.4	18.4	29.7
0.4	51.7	20.7	30.4
0.45	62.9	22.1	30.7
0.5	no slide	23.8	31.1
0.6	no slide	28.2	31.9
0.7	no slide	35.1	32.8

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.4	14.0	28.0
0.1	25.9	15.2	28.6
0.2	30.8	16.6	29.1
0.3	38.4	18.4	29.7
0.4	51.7	20.7	30.4
0.45	62.9	22.1	30.7
0.5	no slide	23.8	31.1
0.6	no slide	28.2	31.9
0.7	no slide	35.1	32.8

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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
0.0	21.6	13.5	27.0
0.1	25.3	14.8	27.9
0.2	30.4	16.4	28.8
0.3	38.4	18.4	29.8
0.4	52.5	21.0	30.9
0.45	64.3	22.6	31.4
0.5	no slide	24.5	32.0
0.6	no slide	29.5	33.3
0.7	no slide	37.3	34.8

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	21.6	13.5	27.0
0.1	25.3	14.8	27.9
0.2	30.4	16.4	28.8
0.3	38.4	18.4	29.8
0.4	52.5	21.0	30.9
0.45	64.3	22.6	31.4
0.5	no slide	24.5	32.0
0.6	no slide	29.5	33.3
0.7	no slide	37.3	34.8

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

SoftPackaging

Edgeboards are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft 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	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.5
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.5
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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	22.4	14.0	28.0
0.1	26.3	15.4	29.1
0.2	32.0	17.2	30.3
0.3	40.7	19.5	31.5
0.4	56.0	22.4	32.9
0.45	68.9	24.2	33.7
0.5	no slide	26.3	34.5
0.6	no slide	32.0	36.1
0.7	no slide	40.7	38.0

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.4	14.0	28.0
0.1	26.3	15.4	29.1
0.2	32.0	17.2	30.3
0.3	40.7	19.5	31.5
0.4	56.0	22.4	32.9
0.45	68.9	24.2	33.7
0.5	no slide	26.3	34.5
0.6	no slide	32.0	36.1
0.7	no slide	40.7	38.0

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Drums – floor loaded

Hangstraps are used to keep the lashings in place.

CornerLash® AAR 200LE.4– 20 ft 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	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4– 40 ft 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	22.2	13.9	27.8
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.7
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.2
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.9	27.8
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.7
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.2
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Drums – palletized

Hangstraps are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft 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	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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	22.2	13.9	27.8
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.7
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.2
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.9	27.8
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.7
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.2
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Soft Drums – floor loaded

Flexboards are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft 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	24.1	15.1	30.1
0.1	28.0	16.4	30.9
0.2	33.7	18.1	31.9
0.3	42.4	20.3	32.8
0.4	57.7	23.1	33.9
0.45	70.6	24.8	34.5
0.5	no slide	26.8	35.1
0.6	no slide	32.2	36.4
0.7	no slide	40.5	37.8

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.1	15.1	30.1
0.1	28.0	16.4	30.9
0.2	33.7	18.1	31.9
0.3	42.4	20.3	32.8
0.4	57.7	23.1	33.9
0.45	70.6	24.8	34.5
0.5	no slide	26.8	35.1
0.6	no slide	32.2	36.4
0.7	no slide	40.5	37.8

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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	22.1	13.8	27.7
0.1	25.9	15.2	28.6
0.2	31.4	16.9	29.7
0.3	39.8	19.0	30.8
0.4	54.5	21.8	32.1
0.45	67.0	23.5	32.7
0.5	no slide	25.6	33.4
0.6	no slide	30.9	34.9
0.7	no slide	39.2	36.5

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.1	13.8	27.7
0.1	25.9	15.2	28.6
0.2	31.4	16.9	29.7
0.3	39.8	19.0	30.8
0.4	54.5	21.8	32.1
0.45	67.0	23.5	32.7
0.5	no slide	25.6	33.4
0.6	no slide	30.9	34.9
0.7	no slide	39.2	36.5

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Soft Drums – palletized

Flexboards are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft 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	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.8
0.3	42.3	20.2	32.8
0.4	57.5	23.0	33.9
0.45	70.4	24.7	34.4
0.5	no slide	26.8	35.0
0.6	no slide	32.1	36.3
0.7	no slide	40.4	37.7

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.1	15.0	30.1
0.1	28.0	16.4	30.9
0.2	33.6	18.1	31.8
0.3	42.3	20.2	32.8
0.4	57.5	23.0	33.9
0.45	70.4	24.7	34.4
0.5	no slide	26.8	35.0
0.6	no slide	32.1	36.3
0.7	no slide	40.4	37.7

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft 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	22.1	13.8	27.6
0.1	25.9	15.2	28.6
0.2	31.2	16.8	29.6
0.3	39.6	18.9	30.6
0.4	54.1	21.6	31.8
0.45	66.4	23.3	32.5
0.5	no slide	25.3	33.1
0.6	no slide	30.6	34.5
0.7	no slide	38.7	36.1

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.1	13.8	27.6
0.1	25.9	15.2	28.6
0.2	31.2	16.8	29.6
0.3	39.6	18.9	30.6
0.4	54.1	21.6	31.8
0.45	66.4	23.3	32.5
0.5	no slide	25.3	33.1
0.6	no slide	30.6	34.5
0.7	no slide	38.7	36.1

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Small big bags

Hangstraps are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft CTU – Small big bags

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	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft CTU – Small big bags

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	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Large big bags

Hangstraps are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft CTU – Large big bags

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	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.6
0.1	28.8	16.9	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.3	34.4
0.4	61.1	24.4	35.9
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft CTU – Large big bags

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	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.3	19.3	31.2
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.3	37.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.3	19.3	31.2
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.3	37.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Small big bags with soft materials

Flexboards are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft CTU – Small big bags 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	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.4	15.3	30.5
0.1	28.7	16.8	31.7
0.2	34.9	18.8	33.0
0.3	44.4	21.2	34.4
0.4	61.0	24.4	35.9
0.45	75.1	26.4	36.7
0.5	no slide	28.7	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.4	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft CTU – Small big bags 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	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.9	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.1	30.0
0.3	40.4	19.3	31.3
0.4	55.5	22.2	32.6
0.45	68.3	24.0	33.4
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.8
0.7	no slide	40.4	37.6

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Large big bags with soft materials

Flexboards are used to keep the lashings in place.

CornerLash® AAR 200LE.4 – 20 ft CTU – Large big bags 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	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.0
0.3	44.5	21.3	34.4
0.4	61.1	24.5	36.0
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.5	41.4

Practical calculations

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.0
0.3	44.5	21.3	34.4
0.4	61.1	24.5	36.0
0.45	75.2	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.4
0.7	no slide	44.5	41.4

System only

Friction factor, µ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

CornerLash® AAR 200LE.4 – 40 ft CTU – Large big bags 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	22.2	13.8	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.4	22.2	32.6
0.45	68.2	24.0	33.3
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.7
0.7	no slide	40.3	37.6

Practical calculations

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	22.2	13.8	27.7
0.1	26.1	15.3	28.8
0.2	31.7	17.0	29.9
0.3	40.3	19.3	31.2
0.4	55.4	22.2	32.6
0.45	68.2	24.0	33.3
0.5	no slide	26.1	34.1
0.6	no slide	31.7	35.7
0.7	no slide	40.3	37.6

System only

Friction factor, μ	Secured cargo weight in ton		
	Road (Doors to rear) & Rail	Road (Doors to front)	Sea area C
0.0	24.5	15.3	30.6
0.1	28.8	16.9	31.8
0.2	34.9	18.8	33.1
0.3	44.5	21.3	34.5
0.4	61.2	24.5	36.0
0.45	75.3	26.4	36.8
0.5	no slide	28.8	37.6
0.6	no slide	34.9	39.5
0.7	no slide	44.5	41.5

Notes regarding the application of the Cordstrap CornerLash® AAR 200LE.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.