

## 7 Options for linear guideways

### 7.1 Quality classes (SQ and SSQ)

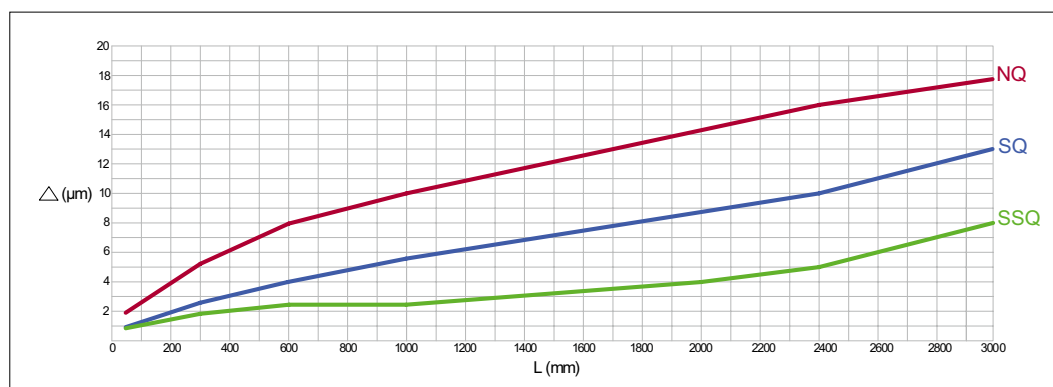
Depending upon the application different levels of accuracy are required. SCHNEEBERGER linear guideways are available in three quality classes to address a variety of applications:

NQ*	Normal quality	Represents normal requirements in mechanical engineering
SQ	Special quality	In case of very stringent requirements
SSQ	Super special quality	In case of the most stringent requirements

**Note:**

\*NQ represents standard quality and is not subsequently listed as an order code

The corresponding tolerance values ( $\Delta$ ) for parallelism of the running surfaces in relation to the reference and locating surfaces can be seen in the diagram below.



In terms of the quality classes SQ and SSQ the following limitations technically exist:

- Max. lengths according to the table „Dimensions and load capacities“ of the respective product.
- Coatings (see chapter 7.6 and 7.7).

### 7.2 Guideways made of corrosion-resistant steel (RF)

For certain applications such as, for example, medical technology, food industry or in a vacuum, the guide rails can be made of corrosion-resistant steel.

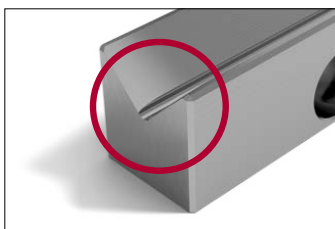
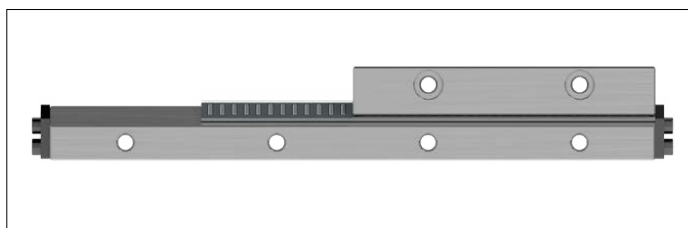
**Notes:**

- The max. rail length in normal quality as well as in options SQ and SSQ is limited (see „dimensions and load capacities“ of the respective product).
- The hardness of the steel reduces compared with tool steel to min. 54 HRC, which should be taken into account in the food calculation.

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### 7.3 Run-ins rounded (EG)

Overrunning cages are expedient to use if a short table is to be moved on a long guideway track. As a result the upper part is at any time supported over its entire length, which has a positive effect on the load carrying capacity and rigidity.



So that the cage run-in causes as little pulsation as possible, the short rails are provided with rounded run-ins. The run-ins are ground following manufacture of the guideway track.

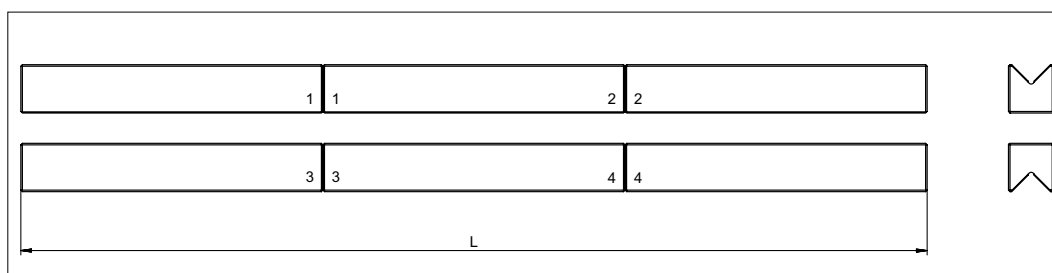
**Note:**

On rare occasions (e.g. under very high preload), in spite of rounded run-ins the pulsation of the overrunning cage can have a disruptive effect on the application. This phenomenon can be largely eliminated by taking appropriate measures (on request).

### 7.4 Multi-part linear guideways (ZG)

If the desired overall length of the guideway is greater than the maximum length listed in this catalogue, individual rails can be ground together. The offset between the individual guideway tracks for this is max. 0.002 mm. The length tolerance L is within +/- 2 mm.

During installation it is important to pay attention to the numbering at the butt joint.

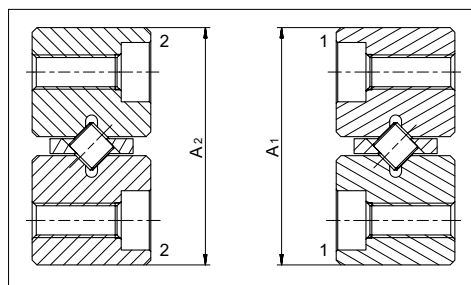


## 7 Options for linear guideways

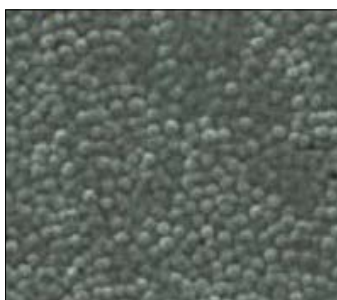
### 7.5 Height-matched guideways (HA)

The tolerance of height A is as standard 0/-0.3 mm. In the case of surface-mounted guideways, which must be matched to the same height, A (and/or A<sub>1</sub> and A<sub>2</sub>) is made in consignments with a tolerance of +/- 0.01 mm.

The rails are identified/numbered correspondingly. If multiple consignments are supplied, they are given serial numbers.



### 7.6 DURALLOY® coating (DU)



For applications in which a corrosion protection and/or increased wear resistance of the surfaces is required, it is recommended to coat the guideways with DURALLOY®.

#### Technical information

- Max. rail length 3000 mm
- Hardness HRC 64 - 74
- Coating thickness 2.5 - 4.0 µm
- Structure "Pearlescent" (see figure)
- Vacuum-compatible 10<sup>-7</sup> mbar

#### The advantages of DURALLOY®

- Increased wear resistance
- Corrosion protection
- The pearl structure acts as a lubricant reservoir
- Good emergency running characteristics
- Protection from abrasive corrosion
- High degree of chemical resistance

#### Notes:

- The ZG special versions (multi-part linear guideway) and the maximum quality grade SSQ are not possible.
- Special quality SQ only on request

**7 Options for linear guideways****7.7 DryRunner coating (DR and DRC1)**

Without lubrication the running surfaces of linear guideways are completely destroyed after only 10'000 passes.

A guideway coated with DryRunner supports more than 100 million passes and thus a service life extended by 10'000 times - without lubrication. In vacuum an unlubricated guideway coated with DryRunner supports more than 50 million passes.

DryRunner coated linear guideways can of course be used with standard lubricants, which means the previously listed running performance statistics increase considerably.

**Technical information**

Area of use	Order code	Film thickness	Max. length of the guideway
Air	DR	1.5–3.0 µm	900 mm
Vacuum (up to 10 <sup>-7</sup> mbar)	DRC1	1.0–2.0 µm	900 mm

- The coating is only applied to the running surfaces. From a production technology standpoint, it is possible that other exterior surfaces are coated; but not the supporting and locating surface of the guideway.
- DryRunner does not provide any protection against corrosion. If corrosion resistance is required, the guideway must be ordered in a non-corrosive material.

**The advantages of DryRunner**

- Supports dry running
- Suitable for applications in air or vacuum
- Minimal wear as a result of abrasion

**Notes**

- DryRunner supports operation without a lubricant, which is why we recommend the use of the cage control FORMULA-S (KS) option (see chapter 7.8).
- The special versions of multi-part linear guideways ZG and the quality class SSQ are not possible. Quality class SQ on request (see chapter 7.4 and 7.1).

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### 7.8 Cage control FORMULA-S (KS)



In every linear guideway the cage can be shifted from the centre along the longitudinal axis. Cage creep reduces the optimal load distribution and requires a correct stroke to return the cage to a centered position. The correction stroke requires a large expense of energy.

#### The causes of cage creep

- High accelerations and speeds
- Vertical installation of the guideway
- Uneven load distribution
- Protruding cage
- Different heat expansion coefficients
- Design and installation (lacking rigidity and/or accuracy of the connecting structure)

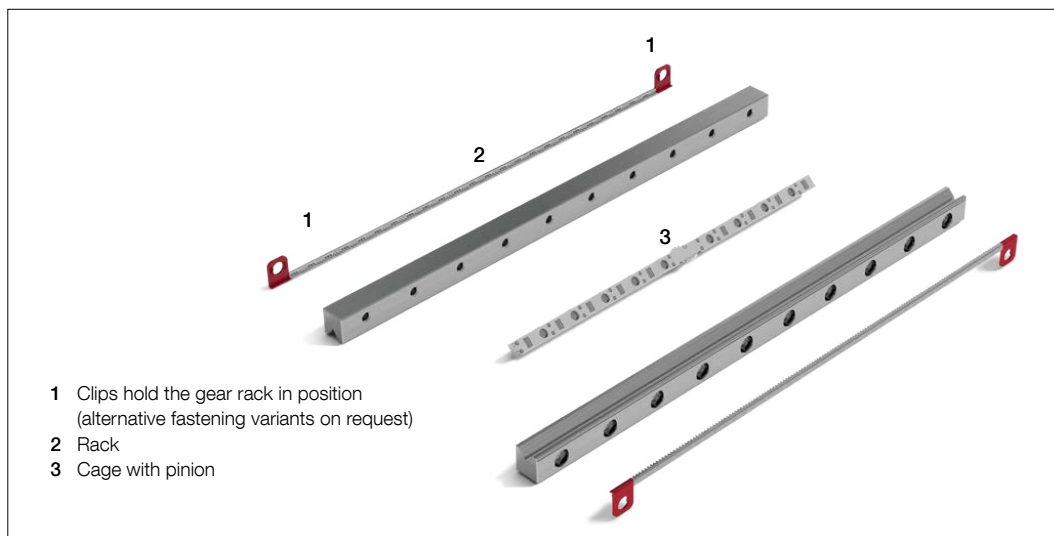
#### The benefits and advantages of FORMULA-S

- Perfect load distribution
- Avoids correction strokes
- No force required for cage reset
- Accelerations up to 300 m/s<sup>2</sup> (30 g)
- Max speed 1 m/s
- Easy to install and/or uninstall
- Extended service life
- Vacuum-compatible up to 10<sup>-7</sup> mbar

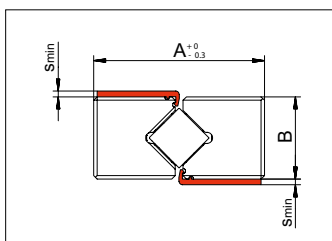
#### Suitable for the following guideways

- RN 3, RN 4 and RN 6
- RNG 4, RNG 6 and RNG 9

FORMULA-S meets the requirements fully in respect of productivity and cost-effectiveness. It is very robust and consists of only a few components.



- 1 Clips hold the gear rack in position (alternative fastening variants on request)
- 2 Rack
- 3 Cage with pinion

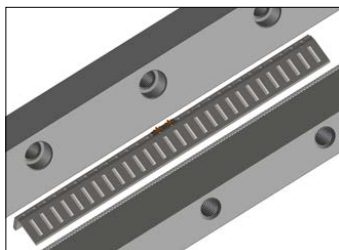


#### Connecting structure

In the case of the connecting structure, the thickness  $s_{min}$  should be taken into account. The remaining dimensions correspond to the guideways RN and RNG (see chapter 5, dimensions and load capacities).

## 7 Options for linear guideways

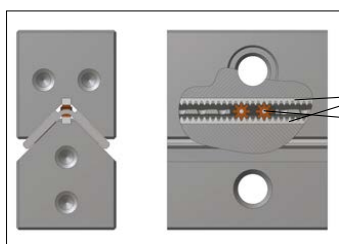
### 7.9 Cage control for N/O and M/V guideways (KZST)



The needle guideways of type N/O and M/V can be fitted with a cage control which ensures that process security is significantly increased. The causes and effects of cage creep are set out in chapter 7.8.

#### The benefits and advantages

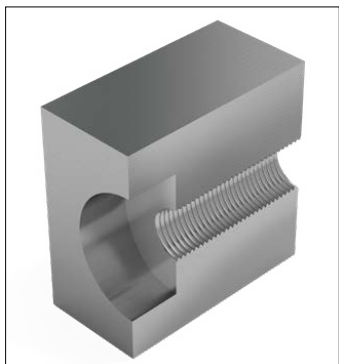
- Perfect load distribution
- Avoids correction strokes
- No force required for cage reset
- Accelerations up to  $200 \text{ m/s}^2$  (20 g)
- Max. speed 1 m/s
- Extended service life



This type of cage control fully meets the requirements in terms of productivity and cost-effectiveness. It is very robust, has a simple structure and consists of only a few components:

- A A gear rack made of tool steel per guide rail
- B Two pinions made of tool steel per cage

### 7.10 Fixing Hole Variants (V, G, or D)

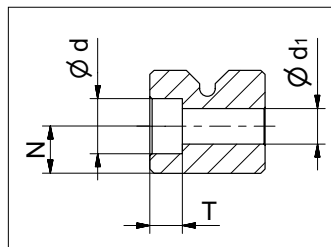
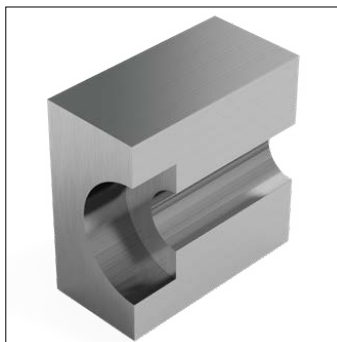


The SCHNEEBERGER standard

All SCHNEEBERGER guideways have as standard a counterbore with thread (not suitable for linear guideways of type M/V). This design supports the use of a tapped fixing hole as well as the through fixing hole. The dimensions can be seen in the respective product specifications (chapter 5).

## 7 Options for linear guideways

Special versions type V (standard for linear guideway of type M/V)



Dimensions for R-guideways

Type	N	Ø d	T	Ø d <sub>1</sub>
R 1	1.8	3	1.4	1.65
R 2	2.5	4.4	2	2.55
R 3	3.5	6	3.2	3.5
R 6	6	9.5	5.2	5.5
R 9	9	10.5	6.2	6.5
R 12	12	13.5	8.2	8.5
R 15	14	16.5	10.2	10.5
R 18	18	18.5	12.2	12.5
R 24	24	22.5	14.2	14.5

Dimensions for RN-guideways

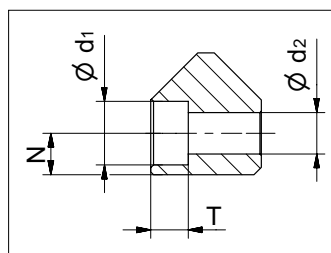
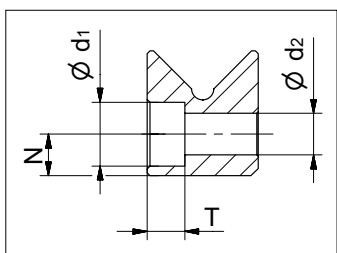
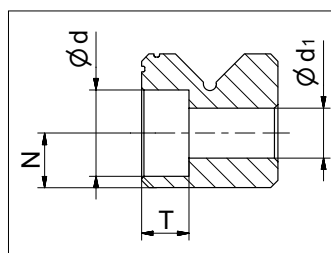
Type	N	Ø d	T	Ø d <sub>1</sub>
RN 3	3.5	6	3.2	3.5
RN 4	4.5	8	4.1	4.5
RN 6	6	9.5	5.2	5.5
RN 9	9	10.5	6.2	6.5
RN 12	12	13.5	8.2	8.5
RN 15	14	16.5	10.2	10.5
RN 18	18	18.5	12.2	12.5
RN 24	24	22.5	14.2	14.5

Dimensions for RNG-guideways

Type	N	Ø d	T	Ø d <sub>1</sub>
RNG 4	3.5	6	3.2	3.5
RNG 6	5	7	3.2	4
RNG 9	6	8.5	4.2	4.8
RNG 12	8	12	6.2	7
RNG 15	10	15	8.2	9
RNG 20	12	18	11	10.5

Dimensions for RNG guideways with a cage control system (KS)

Type	N	Ø d	T	Ø d <sub>1</sub>
RNG 4-KS	3.5	6	3.2	3.5
RNG 6-KS	5	7.8	3.5	3.8
RNG 9-KS	6	8.5	4.2	4.8

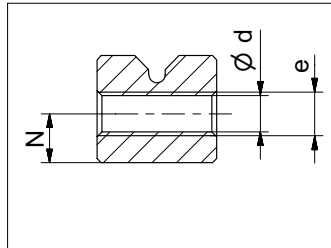
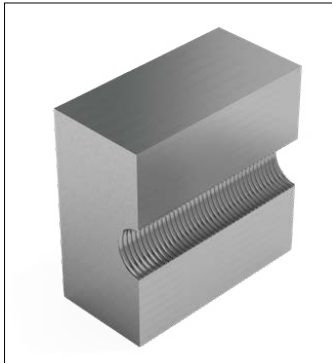


Dimensions for N/O-guideways

Type	N	Ø d <sub>1</sub>	T	Ø d <sub>2</sub>
N/O 62015	6	9.5	5.2	5.5
N/O 92025	9	10.5	6.2	6.8
N/O 2025	10	13.5	8.2	8.5
N/O 2535	12	16.5	10.2	10.5
N/O 3045	14	18.5	12.2	12.5
N/O 3555	14	18.5	12.2	12.5

## 7 Options for linear guideways

### Special versions type G



#### Dimensions for R-guideways

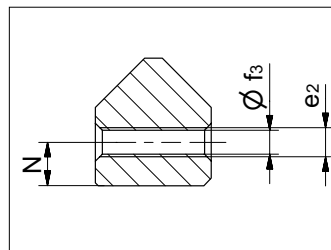
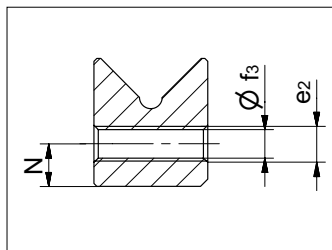
Type	N	e	Ø d
R 1	1.8	M2	1.65
R 2	2.5	M3	2.55
R 3	3.5	M4	3.3
R 6	6	M6	5.2
R 9	9	M8	6.8
R 12	12	M10	8.5
R 15	14	M12	10.5
R 18	18	M14	12.5
R 24	24	M16	14.5

#### Dimensions for RN-guideways

Type	N	e	Ø d
RN 3	3.5	M4	3.3
RN 4	4.5	M5	4.3
RN 6	6	M6	5.2
RN 9	9	M8	6.8
RN 12	12	M10	8.5
RN 15	14	M12	10.5
RN 18	18	M14	12.5
RN 24	24	M16	14.5

#### Dimensions for RNG-guideways

Type	N	e	Ø d
RNG 4	3.5	M3	2.65
RNG 6	5	M4	3.3
RNG 9	6	M5	4.4
RNG 12	8	M8	6.8
RNG 15	10	M10	8.5
RNG 20	12	M12	10.5

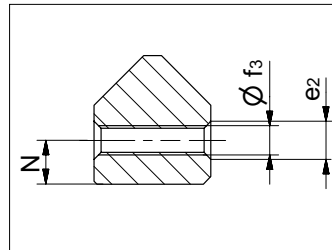
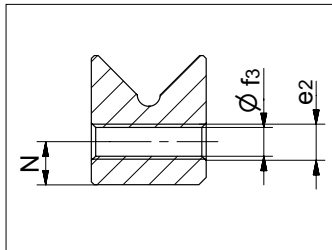


#### Dimensions for N/O-guideways

Type	N	e <sub>2</sub>	Ø f <sub>3</sub>
N/O 62015	6	M6	5.2
N/O 92025	9	M8	6.8
N/O 2025	10	M10	8.5
N/O 2535	12	M12	10.5
N/O 3045	14	M14	12.5
N/O 3555	14	M14	12.5

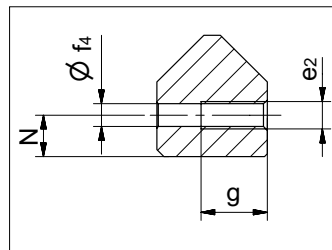
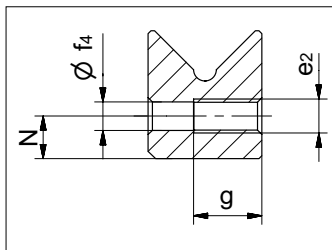


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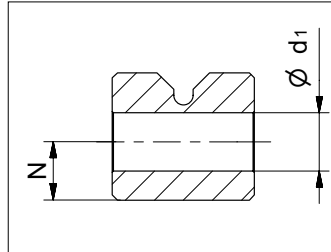
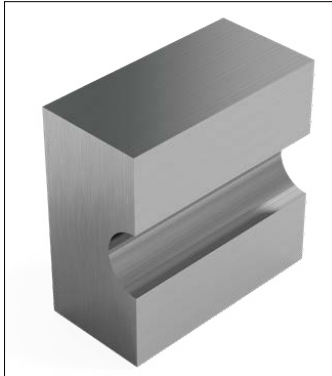
Dimensions for M/V-guideways

Type	N	e <sub>2</sub>	g	Ø f <sub>3</sub>	Ø f <sub>4</sub>
M/V 3015	5.5	M4	-	3.2	-
M/V 4020	7.5	M6	-	5.2	-
M/V 5025	10	M6	15	5.2	5
M/V 6035	11	M8	20	6.8	6.8
M/V 7040	13	M10	25	8.5	8.5
M/V 8050	14	M12	30	10.5	10.3



## 7 Options for linear guideways

Special versions type D



### Dimensions for R-guideways

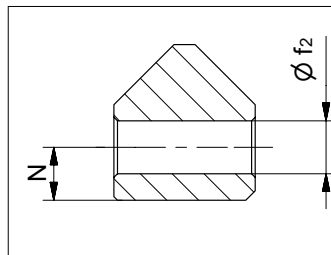
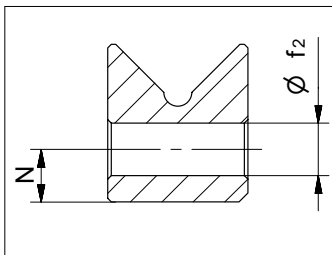
Type	N	Ø d <sub>1</sub>
R 1	1.8	1.65
R 2	2.5	2.55
R 3	3.5	3.5
R 6	6	5.5
R 9	9	6.5
R 12	12	8.5
R 15	14	10.5
R 18	18	12.5
R 24	24	14.5

### Dimensions for RN-guideways

Type	N	Ø d <sub>1</sub>
RN 3	3.5	3.5
RN 4	4.5	4.5
RN 6	6	5.5
RN 9	9	6.5
RN 12	12	8.5
RN 15	14	10.5
RN 18	18	12.5
RN 24	24	14.5

### Dimensions for RNG-guideways

Type	N	Ø d <sub>1</sub>
RNG 4	3.5	3.5
RNG 6	5	4
RNG 9	6	4.8
RNG 12	8	7
RNG 15	10	9
RNG 20	12	10.5



### Dimensions for N/O-guideways

Type	N	Ø f <sub>2</sub>
N/O 62015	6	5.5
N/O 92025	9	6.5
N/O 2025	10	8.5
N/O 2535	12	10.5
N/O 3045	14	12.5
N/O 3555	14	12.5

### Dimensions for M/V-guideways

Type	N	Ø f <sub>2</sub>
M/V 3015	5.5	5.3
M/V 4020	7.5	7.5
M/V 5025	10	7.5
M/V 6035	11	10
M/V 7040	13	12.5
M/V 8050	14	14