General information on towing units

Towing units is a collective term for one or more components with which the vehicle must be equipped in order to tow a trailer.

The purpose of the towing unit is to transfer the vehicle’s pulling power to the trailer.

A towing unit is normally one of the following:

- Drawbeam with trailer coupling
- Tow beam
- Fifth wheel

More information on towing units is found in the Rear end adaptations document.

More information on fifth wheels is found in the Specification of fifth wheels document.
Selecting a towing unit

Select a towing unit taking the following 3 aspects into considering:

- Type of trailer
- Gross trailer weight
- Operating conditions

The maximum trailer weight is limited by a number of factors such as the following:

- Trailer coupling performance
- Maximum gross train weight recommended for the gearbox and rear axle gear under the specific operating conditions
- The number of axles with parking brake
- Dynamic driving characteristics of the vehicle combination
- Traction of the vehicle combination

---

1. When the number of axles with parking brake limits the permitted gross laden train weight to less than 60 tonnes this is specified on the manufacturer’s certificate.
Drawbeam with trailer coupling

Drawbeams

A drawbeam can be fitted in one of the following ways:

1. Centrally mounted
2. Semi-underslung
3. Fully underslung and low underslung
4. Adapted for close coupling

The drawbeam is dimensioned to resist the loads that occur during operation in a road train with $D$, $D_c$, $V$ and $S$ values that do not exceed the maximum values for the drawbeam. Calculation of $D$, $D_c$, $V$ and $S$ values is described further on in this document. Permissible combinations of maximum $D$, $D_c$, $V$ and $S$ values are indicated on the drawbeam type plate.

IMPORTANT!

It is not permitted to drill or weld in the end plates and drawbeams as these are exposed to high dynamic stresses and are certified components.

Note:

It is not permitted to cover or paint the type plate. The information must be visible for the certificate to be valid.
Before attaching the drawbeam

- Follow the manufacturer’s instructions for attaching the drawbeam and end plates.
- Check that the truck’s rear overhang is fitted with the correct number of cross-members and end beam.
- Fit the drawbeam or end plates in the chassis frame web using screw joints.

If measurement L is greater than 100 mm (see diagram) the rear overhang must be reinforced with an X-rod in the subframe or a torsionally rigid end beam in the chassis frame.

Note:
The drawbeam must be positioned with a gap (at least 1 mm) to the chassis frame flange.

Trailer coupling height relative to the top of the frame (H).

More information on the rear overhang is found in the Reinforcements document.
### Vehicle production period

<table>
<thead>
<tr>
<th>Production site</th>
<th>Chassis serial number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-04-01</td>
<td>-</td>
</tr>
<tr>
<td>Södertälje</td>
<td>2 110 714</td>
</tr>
<tr>
<td>Zwolle</td>
<td>5 384 918</td>
</tr>
<tr>
<td>Angers</td>
<td>9 196 419</td>
</tr>
<tr>
<td>2015-06-01</td>
<td>-</td>
</tr>
<tr>
<td>São Bernardo do Campo</td>
<td>3 877 235</td>
</tr>
</tbody>
</table>

#### Drawbeam position

<table>
<thead>
<tr>
<th>Drawbeam position</th>
<th>Height, H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrally mounted</td>
<td>167 mm</td>
</tr>
<tr>
<td>Semi-underslung</td>
<td>267 mm</td>
</tr>
<tr>
<td>Fully underslung</td>
<td>364 mm</td>
</tr>
<tr>
<td></td>
<td>420 mm</td>
</tr>
<tr>
<td></td>
<td>480 mm</td>
</tr>
</tbody>
</table>

### Vehicle production period

<table>
<thead>
<tr>
<th>Production site</th>
<th>Chassis serial number</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 2015-03-31</td>
<td>-</td>
</tr>
<tr>
<td>Södertälje</td>
<td>- 2 110 713</td>
</tr>
<tr>
<td>Zwolle</td>
<td>- 5 384 917</td>
</tr>
<tr>
<td>Angers</td>
<td>- 9 196 418</td>
</tr>
<tr>
<td>São Bernardo do Campo</td>
<td>- 3 877 234</td>
</tr>
</tbody>
</table>

#### Drawbeam position

<table>
<thead>
<tr>
<th>Drawbeam position</th>
<th>Height, H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrally mounted</td>
<td>159 mm</td>
</tr>
</tbody>
</table>
### Towing units

<table>
<thead>
<tr>
<th>Drawbeam position</th>
<th>Height, H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-underslung</td>
<td>279 mm</td>
</tr>
<tr>
<td>Fully underslung</td>
<td>369 mm</td>
</tr>
</tbody>
</table>
Towing units

Drawbeam with trailer coupling

Trailer coupling

The trailer coupling, like the drawbeam, is dimensioned to resist the loads that occur during operation in a road train with \(D, D_c, V\) and \(S\) values that do not exceed the maximum values for the trailer coupling. Permitted combinations of maximum \(D, D_c, V\) and \(S\) values comprise the lowest values indicated for the trailer coupling and drawbeam for the respective \(D, D_c, V\) and \(S\) value.
Tow beam

Tow beams may be used for the following purposes on trucks without trailer coupling:

- Temporary towing
- Freeing stuck vehicle
- Shunting of trucks and trailers

The tow beam is dimensioned for a maximum D or $D_c$ value.

**Note:**

A tow beam may not be used as the only beam at the end of the frame.

More information on how the tow beam must be fitted can be found in the section Rear end adaptations.
Final fitting of the under-slung drawbeam and underrun protection

Underslung drawbeams combined with underrun protection are transport-mounted for delivery and must be finally mounted by the bodybuilder.

1. Detach the end plates from the frame.
2. Rotate the end plates $90^\circ$ downwards.
3. Secure the end plates at the right distance from the frame end.

See below for fitting depending on type of end plate and drawbeam.

**Note:**
The drawbeam is finally mounted even when the end plates are temporarily mounted.

![Diagram of end plate detachment and rotation](image)

**IMPORTANT!**

All screws and nuts must be renewed when finally mounting drawbeams, underrun protection and end beams that are temporarily mounted. Make sure the correct number of screws and nuts are fitted.
**Fitting the end plate**

*Vehicle production period*

<table>
<thead>
<tr>
<th>Production site</th>
<th>Chassis serial number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Södertälje</td>
<td>2 110 714 -</td>
</tr>
<tr>
<td>Zwolle</td>
<td>5 384 918 -</td>
</tr>
<tr>
<td>Angers</td>
<td>9 196 419 -</td>
</tr>
<tr>
<td>São Bernardo do Campo</td>
<td>3 877 235 -</td>
</tr>
</tbody>
</table>

| 2015-04-01 -     |                |
|------------------|                |
| 2015-06-01 -     |                |

The following applies when fitting an end plate:

- Tightening torque (M14) $135 \pm 20$ Nm, angle tightening $60 \pm 10^\circ$
- The screw joints must comprise grade 10.9 fully threaded screws and class 10 lock nuts.

**Note:**
Check and inspect the fitting after 5,000 km.

<table>
<thead>
<tr>
<th></th>
<th>Long end plate for assembly together with</th>
<th>Use 12 x M14 screws on each side.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DB7A.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Short end plate for assembly together with</td>
<td>Use 6 x M14 screws on each side.</td>
</tr>
<tr>
<td></td>
<td>DB5A/DB7A/only RUP</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Long end plate for assembly together with</td>
<td>Use 9 x M14 screws on each side</td>
</tr>
<tr>
<td></td>
<td>DB5A/DB7A/only RUP</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Long end plate for assembly together with</td>
<td>Use 9 x M14 screws on each side</td>
</tr>
<tr>
<td></td>
<td>DB7A.</td>
<td></td>
</tr>
</tbody>
</table>

More information on dimensions is found in the Rear underrun protection document.
The following applies when fitting an end plate:

- Tightening torque (M16) 275 Nm ± 15%
- The screw joints must comprise grade 10.9 fully threaded screws and class 10 lock nuts.

**Note:**
Check and inspect the fitting after 5,000 km.

| 1 | Scania’s short end plate | Use 4 x M16 screws on each side |
| 2 | Scania’s long end plate  | Use 6 x M16 screws on each side |
| 3 | End plate kit DB35V      | Use 8 x M16 screws on each side  |
| 4 | End plate kit DB75V      | Use 10 x M16 screws on each side  |
Technical legal requirements

The positioning of the underrun protection is covered by certificates supplied by Scania. In order for these certificates to apply, certain technical legal requirements regulate the position of the underrun protection.
End beam

A truck with semi-, fully underslung, or without drawbeam may be delivered without end beam if the bodybuilder needs to fit a custom end beam.

If the vehicle is to be equipped with a custom end beam, fit it as follows:

- On vehicles with a fully or low underslung drawbeam, the front fixing hole of the end beam must be 100 mm (on vehicles up to and including 2014-11-26: 47 mm) in front of the drawbeam’s first fastening hole.

Note:
For fully underslung drawbeams it is possible to order torsionally rigid end beams.

Recommendations

Order a truck without end beam if one of the following applies:

- If the frame end is going to be subjected to heavy loads, an extra rigid frame end is needed. Fit a reinforced end beam during the bodywork combined with a semi or fully underslung or without drawbeam. For example tipper trucks and timber trucks.
- If the frame is going to be shortened in connection with the bodywork

Order a truck with an end beam if the following applies:

- If the frame end is not going to be subjected to heavy loads. Combined with a semi- or fully underslung or without drawbeam.

For centrally mounted drawbeams, the drawbeam functions as an end beam.

More information on end beams is found in the Rear end adaptations document.
IMPORTANT!

Fit an end beam which matches Scania’s original end beam dimensions or sturdier. Otherwise, the drawbeam certificate will not be valid.

Scania’s original end beam can be ordered from the factory. Contact a Scania dealer for more information.

<table>
<thead>
<tr>
<th>End beam</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame F950, F957, F958</td>
<td>293 247</td>
</tr>
<tr>
<td>Frame F800</td>
<td>1 376 222</td>
</tr>
<tr>
<td>Frame F700</td>
<td>1 760 125</td>
</tr>
<tr>
<td>Torsionally rigid end beam</td>
<td>2 293 542</td>
</tr>
</tbody>
</table>

*Torsionally rigid end beam.*
Load values

The D, Dc, V and S values are taken from EU Directive 94/20/EC and are used when dimensioning the towing unit.

Dimensioning

When dimensioning towing units, the entire chain of components which form the towing unit should have D, Dc, V and S values which do not fall below the values calculated for the road train.

D value

Applies to trailers with an articulated drawbar:

The D value defines a theoretical horizontal reference force for towing units for forces in the vehicle’s longitudinal direction. The D value applies to trailers with an articulated drawbar.

\[ D = g \cdot \frac{T \cdot R}{T+R} \text{ (kN)} \]

T = Maximum total weight of tractor in tonnes
R = Maximum total weight of trailer in tonnes
g = Gravity (9.81 m/s²)
**Towing units**

### D<sub>c</sub> value

Applies to trailers with a rigid drawbar:

The D<sub>c</sub> value defines a theoretical horizontal reference force for towing units for forces in the vehicle’s longitudinal direction. The D<sub>c</sub> value applies to trailers.

\[ D_c = g \cdot \frac{T \cdot C}{T + C} \text{(kN)} \]

- **T** = The total of the tractor maximum total weight and the vertical static maximum load that the trailer transfers to the trailer coupling (S value) in tonnes.
- **C** = The total of the trailer maximum axle weight in tonnes.
- **g** = Gravity (9.81 m/s<sup>2</sup>)

### S value

Applies to trailers with a rigid drawbar:

The S value defines the vertical static load that the trailer transfers to the tractor under static conditions. The S value is measured at the connection point.

\[ S = \frac{A \cdot m}{L} \text{(tonnes)} \]

- **A** = Axle weight in tonnes
- **m** = Distance between centre of axles and centre of gravity in metres
- **L** = Distance between centre of towing eye and centre of axles in metres
V value

Applies to trailers with a rigid drawbar:

The V value defines a theoretical vertical reference force for towing units for forces in the vertical direction. The V value applies to the connection between tractors and trailers.

\[ V = a \cdot \frac{X^2 \cdot C}{L^2} (\text{kN}) \]

- \( X \) = Length of trailer loading area in metres
- \( L \) = Theoretical length of drawbar in metres
- \( C \) = The total of the trailer’s maximum axle weight in tonnes
- \( a \) = Equivalent vertical acceleration at the connection point (dependent on type of suspension of tractor)
  - \( a_1 = 1.8 \text{ m/s}^2 \) for trucks with air suspension
  - \( a_2 = 2.4 \text{ m/s}^2 \) for trucks with leaf spring suspension