Subframe design

General

The subframe can be used for the following purposes:

- It provides clearance for wheels and other parts which protrude above the frame.
- It provides rigidity and reduces the stress in the rear overhang.
- It protects the chassis frame by distributing the load from the bodywork evenly over a larger area of the chassis frame.
- It contributes to dampening frame oscillations that cause discomfort.

To adapt the subframe to the torsionally flexible part of the chassis frame, the subframe should also be torsionally flexible, provided the bodywork allows it. Therefore, the side members and crossmembers of the subframe should consist mainly of open profiles, e.g. U-profiles.

More information on chassis frames is found in the document Chassis frames.

More information on chassis frames and subframes is found in the document Selecting the subframe and attachment.

More information on the concepts of torsional rigidity and torsional flexibility is found in the document Forces and movements.
Subframe design

The subframe can appear differently depending on the characteristics required.

The subframe length can vary. It can cover the whole chassis frame or be short and only cover part of the chassis frame.

The height of the chassis frame can be adjusted to the current area of application.
Subframe design

Side members
The subframe’s side members are usually manufactured from U-profiles, just as the chassis frame’s side members. An open profile allows twisting without exposing the side member to unnecessary stresses.

Crossmembers
The subframe’s crossmembers are made of open profiles, e.g. U-profiles. The main purpose of the crossmembers is to absorb the lateral forces and to keep the subframe together.

For the purpose of reinforcing the chassis, the crossmembers may be made of closed hollow profiles, such as tubes or square profiles.

IMPORTANT!
If the chassis is exposed to recurring twisting motions it is not unusual to find cracks around the attachment to the side members. The design of the crossmember attachment to the side members is therefore particularly important. Scania recommends the use of a folding beam or crossmember with end pieces.

Place the crossmembers adjacent to the body adaptation brackets. This gives the best load transfer and prevents the subframe’s side members from folding or tipping when the body adaptation bracket is loaded.

Example of a crossmember with end pieces.
Subframe design

Front part of subframe

The chassis frame and the subframe move in relation to each other when flexing due to driving on uneven roads. The movement is dampened by the friction that arises between the subframe and chassis frame. To achieve the highest possible friction, the subframe (1) must be designed in such a way that it follows the chassis frame’s outward-curving contour.

For vehicles with frame strength level 1 Medium, a straight subframe (2) can be used, provided that adapters (3) are fitted that follow the chassis frame’s outward-curving contour and that rest against the chassis frame’s upper flange. Make sure that the adapters are firmly fastened to the subframe and flexible against the chassis frame to get adequate damping between the subframe and chassis frame.

More information on frame strength levels is found in the document Selecting the subframe and attachment.

More information on which frame strength level the vehicle has is found in the ICS (Individual Chassis Specification).
The subframe should be pressed against the chassis frame and moved forward as close to the front axle as possible. This decreases the load on the chassis frame and reduces the risk of frame oscillations that cause discomfort.

Maximum permitted distance between the centre of the front axle and the front edge of the subframe is 600 mm, see illustration.

The first attachment point of the subframe must be as close to the front axle as possible, as this will counteract any frame oscillations.
Fitting and designing the front part of the subframe

Fit

• Fit the subframe in such a way that the friction between the subframe and chassis frame is as high as possible. Bear the following in mind:
  – The subframe should rest tightly against the chassis frame.
  – The subframe must have a large contact surface against the chassis frame and consequently follow the contour of the chassis.

• Fit the body adaptation brackets in the subframe’s front part in a way that gives a gradual increase of the bending resistance in the construction. Select one of the following ways:
  – Use flexible brackets in the front section of the subframe.
  – Make the beam web lower in the first 500 mm on the side members.
Subframe design

Front edge

- Design the front of the subframe in such a way that it gives a gradual increase of the bending resistance. See the illustration for examples of design of the subframe front.
- Round off the front lower edge of the subframe to a smallest radius of 5 mm to avoid wear damage to the chassis frame’s upper flange, see illustration. Wear damage can gradually lead to fractures.

Joins

- If the subframe needs to be constructed with joins, these must be shaped so that a smooth surface lays against the chassis frame. Any welds must be ground down to a smooth surface.

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1. Subframe.
2. Chassis frame.
3. Gradual increase of the bending resistance in the subframe.
Subframe design

Rear part of subframe

For torsionally flexible bodywork, it is usually necessary to make the rear overhang torsionally and flexurally rigid. This is especially important in order to get good stability on, for example, tipper trucks, concrete mixer trucks, demountable body trucks and vehicles with rear-mounted crane. A long overhang with a drawbeam also increases the requirement for subframe rigidity.

More information on the recommended reinforcements in the rear overhang is available in the document Reinforcement.

Design of the rear section of the subframe

Joins

- If the subframe needs to be constructed with joins, these must be shaped so that a smooth surface lays against the chassis frame. Any welds must be ground down to a smooth surface.