

Annex 2 to GRRF-74-22

Insert new paragraph 2.41 and 2.42. to read:

2.41. “ACV plug” means the male part of a separable electrical/electronic interface located on the towed vehicle and carrying connector pins.

2.42. “ACV socket” means the female part of a separable electrical/electronic interface located on the towing vehicle.

Annex 22

REQUIREMENTS FOR THE BRAKE ELECTRIC/ELECTRONIC INTERFACE OF AN
AUTOMATED CONNECTOR

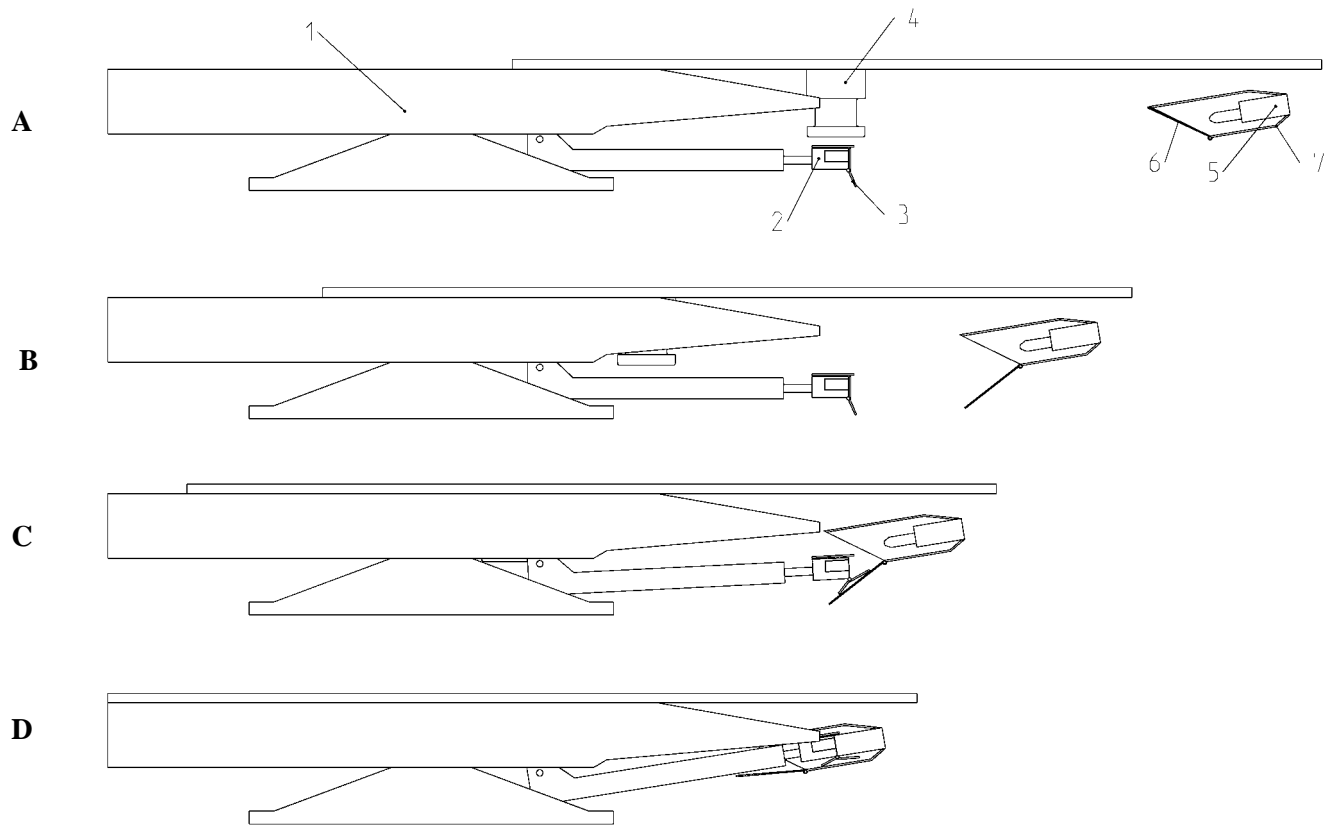
Add paragraphs:

2.1.3. The electric/electronic interface of the automated connector according to **category A** shall provide 7 poles for the electrical connection of the braking systems and running gear (incl. 2 poles for the CAN based communication compliant to ISO 11992-1 and -2), running under 24V nominal supply voltage.

2.1.4. The automated connector shall provide pneumatic connections, one control line and one supply line.

2.1.5. Mating of ACV of category A

The ACV plug module and the ACV socket module shall be connected automatically during the coupling process as illustrated below:



Components and functionality

Key:

- 1 Fifth wheel
- 2 ACV socket module
- 3 ACV socket module protection cover
- 4 King pin
- 5 ACV plug module
- 6 ACV plug module protection cover
- 7 ACV plug module housing

- A Main components
- B ACV plug approaching ACV socket. Plug module protection cover opens.
- C Socket module protection cover opened. Socket module is guided into plug module.
- D All connections coupled (mechanical, electrical, and pneumatic). ACV coupling completed.

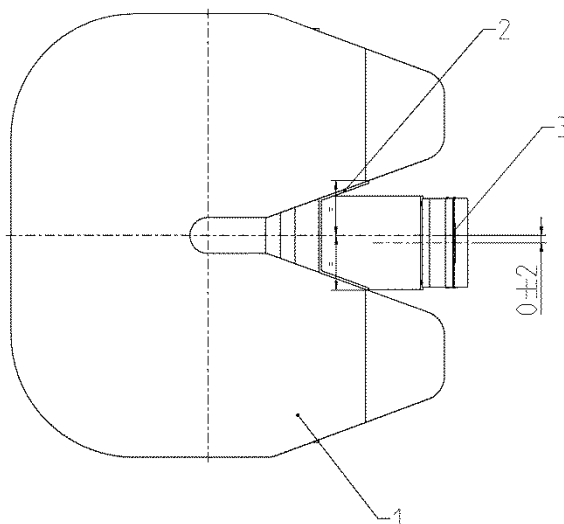
2.1.6. Guidance and alignment

2.1.5.1.General

The guidance and alignment of the ACV module shall be made by a rigid alignment pin in the centre plus two outer "self-aligning" pins, to ensure low level of forces when mating. The central alignment pin shall have the ability to align both ACV parts within a range ± 5 mm in both horizontal and vertical directions.

The two outer pins shall ensure the parallel orientation of both ACV parts. Each one of them shall have sufficient elasticity to permit a maximum of 2 mm deflection in any direction relative to the longitudinal axis of the central alignment pin. The deflection force shall be in the range from 50 N to 200 N.

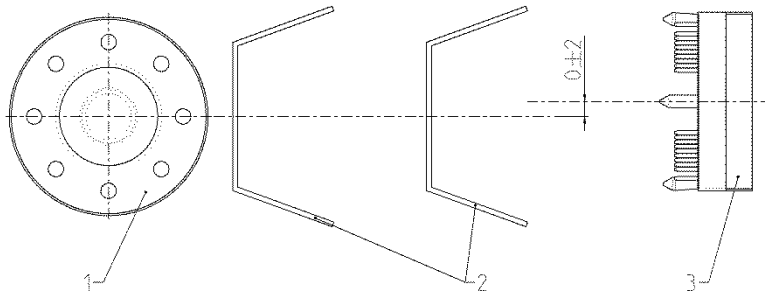
The positional tolerance between the contact surface of the alignment device and the fifth wheel shall be a maximum of ± 2 mm, according to the figure below.



ACV socket positioning tolerance (displaced shown)

Key

- 1 Fifth Wheel
- 2 Alignment device (movable in length direction, shown in contact position, see Figure 2)
- 3 Central alignment tolerance of ACV socket



ACV plug positioning tolerance (displaced shown)

Key

- 1 King pin
- 2 Alignment device (movable in length direction, shown in two positions)
- 3 ACV central alignment pin

2.1.5.2. Degrees of freedom

Degree of freedom	Towing vehicle side (ACV socket)	Towed vehicle side (ACV Plug)
Linear longitudinal	Displaceable from 0 to a minimum of 30 mm, preloaded with a force between 250 N to 500 N (when both pneumatic lines are under pressure) when uncoupled, achieved by means of either elastic elements or other stored energy. While coupling the socket module gets pushed forward to its nominal position by $s_1 = 15$ mm. When coupled, a movement of 15 mm shall be possible, without the EPI modules being disconnected or damaged	Essentially fixed
Linear in lateral direction	Essentially fixed	Essentially fixed
Linear in vertical direction	Essentially fixed	Essentially fixed
Rotational around longitudinal axis of central alignment pin/socket	Essentially fixed	$\pm 2^\circ$
Rotational around lateral articulation axis	From horizontal to a minimum of 12° upwards	$\pm 2^\circ$
Rotational degree around the vertical axis	Essentially fixed	$\pm 100^\circ$ around king pin axis, $\pm 2^\circ$ around vertical axis through EPI-Module

2.1.5.3. Degree of freedom of the contacts

Each electric male contact shall be floating and shall align to the position when ACV plug and socket are engaged according to ISO 12098, clause 4.1 and ISO 7638, clause 4.1.

Each pneumatic male contact shall be floating to allow a degree of freedom of a minimum of 0,5 mm radial to the main alignment pin axis and with a minimum of $\pm 0,5^\circ$ axis deviation.

2.1.5.4. Pneumatic valves in EPI socket module

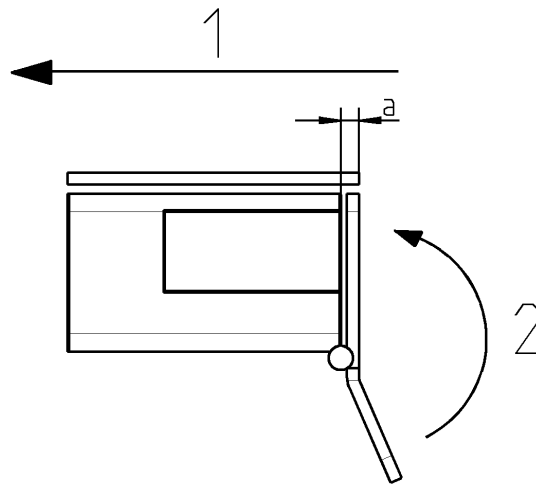
Both pneumatic sockets shall be self-closing when disconnected. These sockets shall be opened by the pneumatic plugs. The sockets shall be fully open by a minimum of 3 mm before ACV modules are fully mated. To compensate tolerances, the sockets shall stay fully open a minimum of 3 mm after the ACV modules are mated.

2.1.6. Encapsulation and protection

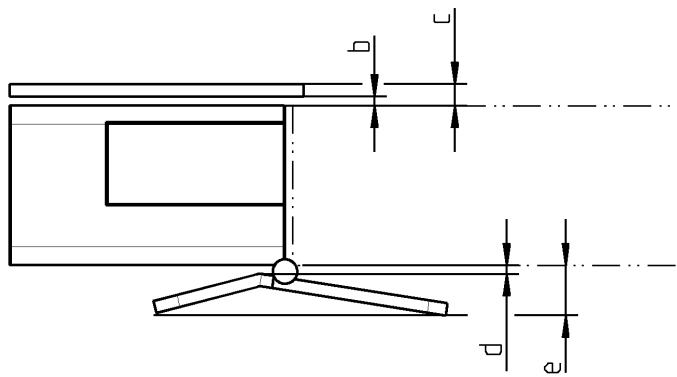
2.1.6.1 General

To ensure interchangeability, protection covers of the ACV modules shall be located in defined positions having devices and activation points which are determined as follows.

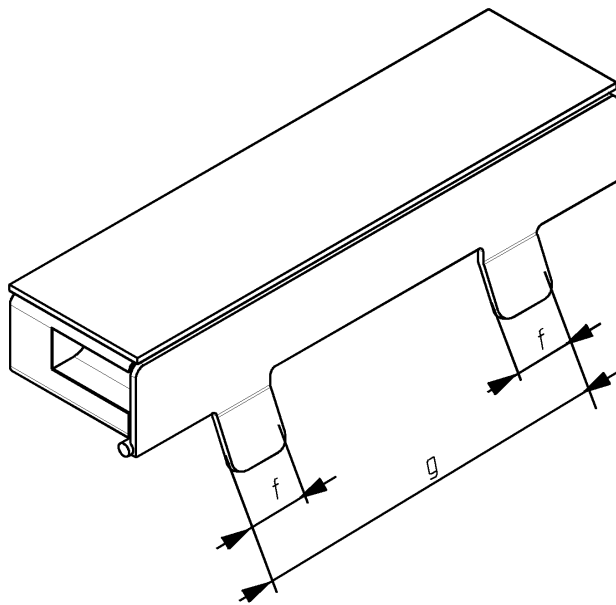
2.1.6.2. Protection cover on the ACV socket module



ACV socket module protection – closed position (left side view)

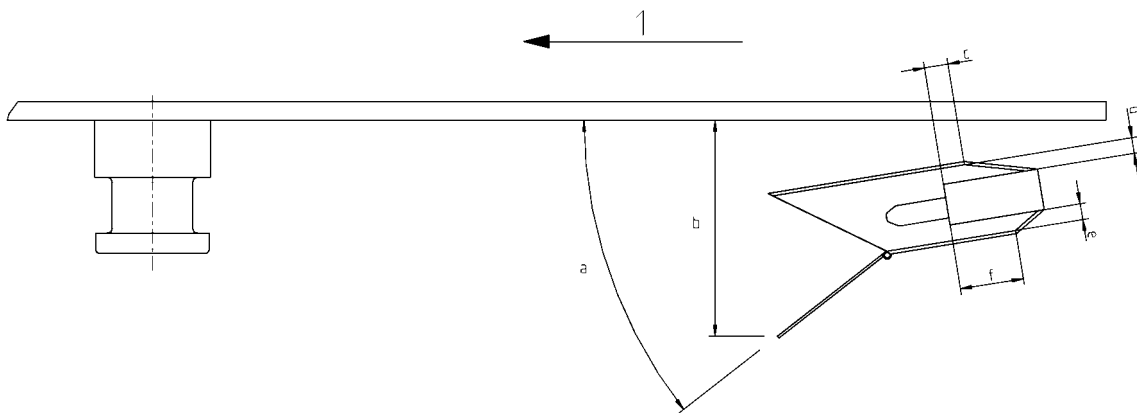


ACV socket module protection – opened position



ACV socket module protection activation tabs– Socket front view

2.1.6.3. Protection cover on the ACV plug module



ACV plug module protection --opened position

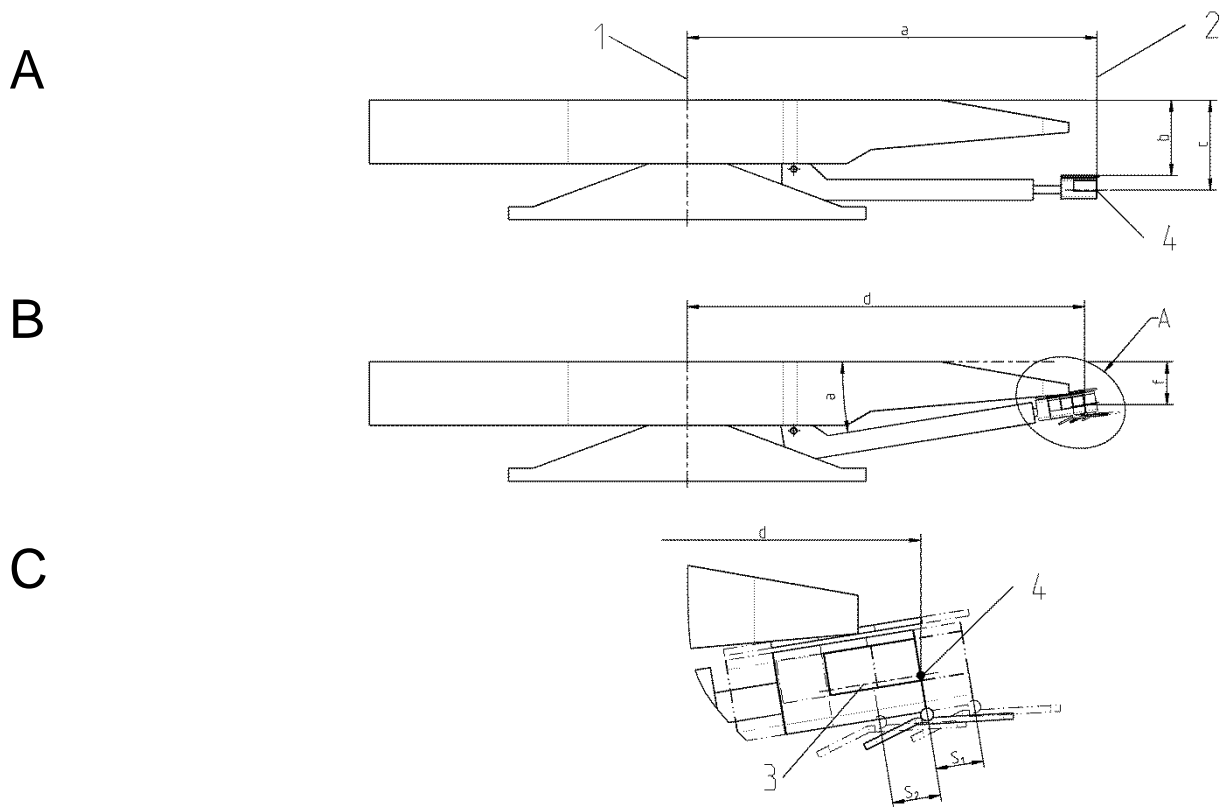
1.6.2 ACV plug protection - cover actuation

The protection cover on the ACV plug module:

- Shall open early enough to lift the ACV socket module during the coupling process;
- Shall have the tendency to close before the kingpin reaches the coupled position;
- Shall not cause damage to any part while trying to close;
- Shall close completely in case there is no ACV socket module.

2.1.7 ACV geometrical characteristics and positioning

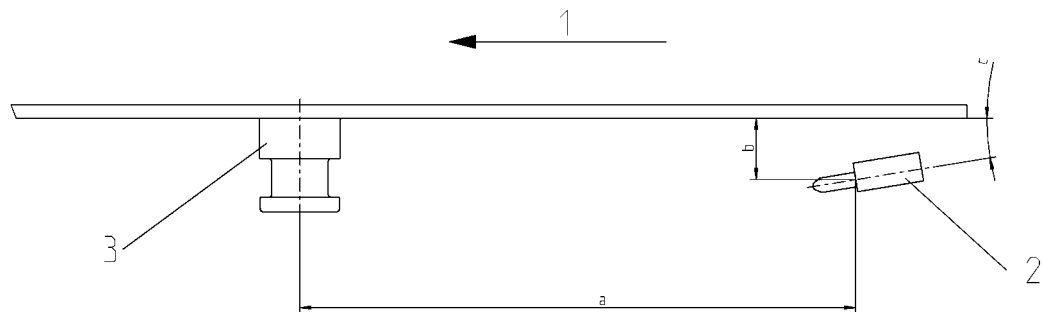
2.1.7.1 Position of the ACV socket module relative to the fifth wheel



Key:

- | | | | |
|---|---|---|---|
| 1 | Axis of the fifth wheel (coincides with the axis of the kingpin when coupled) | A | Uncoupled position |
| 2 | Front face of the ACV socket module | B | Fifth wheel ACV components in nominal coupled position |
| 3 | Axis of central alignment pin socket | C | Detail A: Possible ACV movement around nominal position |
| 4 | Central ACV operating point: intersection of front face (2) and axis(3) | | |
| 5 | Lateral articulation axis | | |

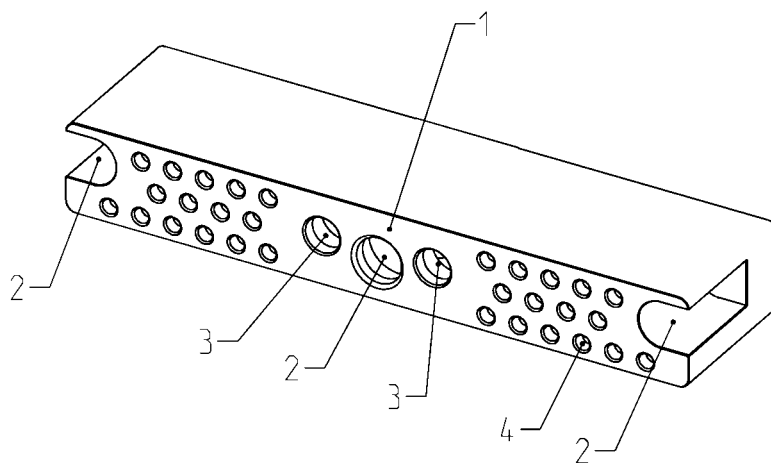
2.1.7.2. Position of the ACV plug module on the towed vehicle



Key

- 1 Kingpin
- 2 ACV towed vehicle
- 3 Forward direction

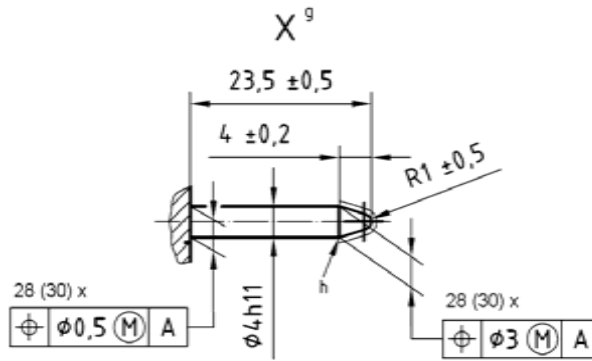
2.1.8 ACV socket



a) ACV socket – Isometric view

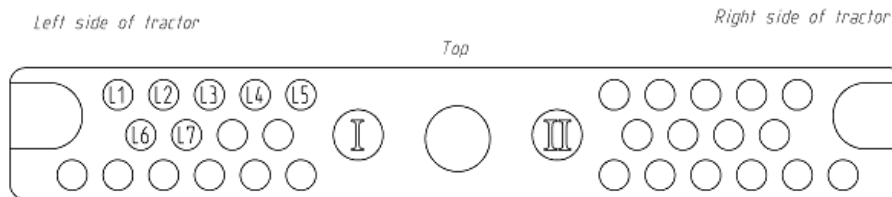
Key

- 1 Gasket
- 2 Alignment socket
- 3 Pneumatic socket
- 4 Electric sockets (30x)



d) Dimensions of male contacts (taken from ISO7638-1)

2.1.10. ACV module - contact allocation



Contact allocation – Rear view of ACV socket

Table — Electric and pneumatic contact allocation

Contact No.	a_{\min} mm ²	Reference	Function
L 1	4	ISO 7638 Pin 1	ABS/EBS plus electrovalve
L 2	1,5	ISO 7638 Pin 2	ABS/EBS plus electronics
L 3	1,5	ISO 7638 Pin 3	ABS/EBS minus electronics
L 4	4	ISO 7638 Pin 4	ABS/EBS minus electrovalve
L 5	1,5	ISO 7638 Pin 5	ABS/EBS warning device
L 6	1,5	ISO 7638 Pin 6	ABS/EBS CAN High according to ISO 11992-1 and 11992-2, for data interchange of braking systems and running gear
L 7	1,5	ISO 7638 Pin 7	ABS/EBS CAN Low according to ISO 11992-1 and 11992-2, for data interchange of braking systems and running gear
I			Control line
II			Supply line

^a Nominal cross-sectional area of the conductor connected at the rear terminal of the pin and tube