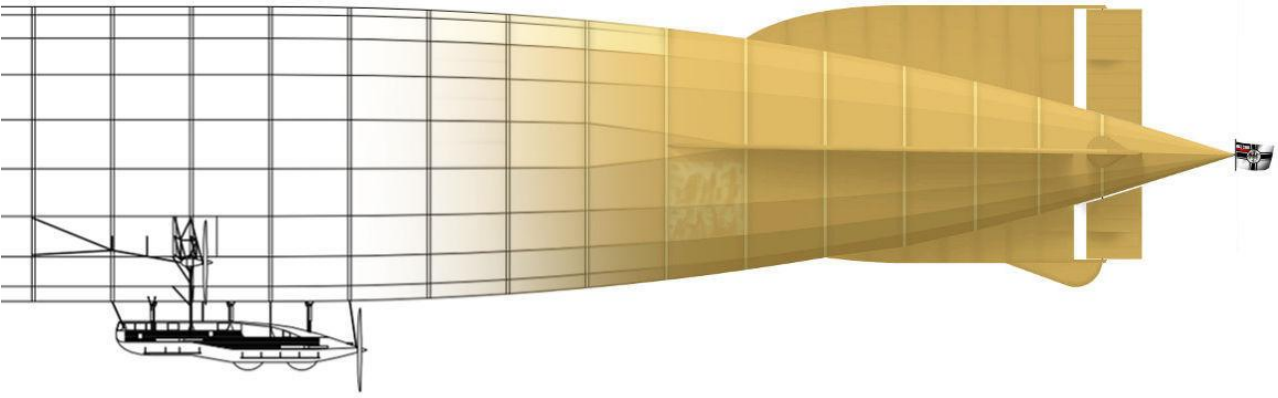
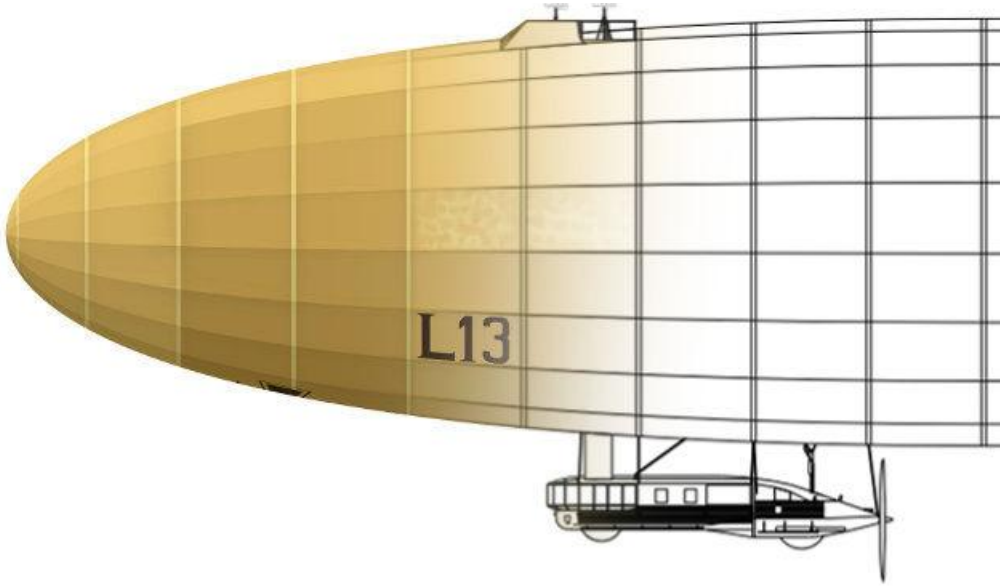
Zeppelin p-class

Description of design features and differences between the ships

Thorsten Brand





This document is the result of the research for a model of the p-class airship LZ 45 (L 13). It summarizes the geometrical properties of the vehicle as well as the differences between the individual ships of this class. Original drawings were the major source material to the extent that they were available, photos and texts as listed on the last page. No secondary sources were used to create the drawings as seen on the following pages. The amount of information available strongly varies from ship to ship, so the information may not be regarded as complete.

If errors in either the descriptions or the drawings are found or additional information is available, please contact me at thorstenbrand@gmx.net.

To print this document with the drawings at the correct scale, the "fit to page"-function has to be deactivated.

Thorsten Brand, 2012

General Information

The Zeppelins of the p-class were intended to fly in military service for Germany during World War I for the army and navy. Therefore, they received a new designation which must not be confused with the builder's number.

Army Zeppelins kept the prefix "LZ", but the number changed on many airships. Navy Zeppelins got the prefix "L" and an all-new number. To avoid confusion, the names of the individual units in this document are the builder's number, optionally followed by the service number in brackets (example: LZ 45 (L 13)). A list of all p-class Zeppelins with both names are included in the table at the end.

Technical data (LZ 45)[1]:

Length	:	163.5	m
Height	:	21.962	m
Width	:	25.789	m
Volume	:	32000	m^3
Engines	:	4 x Maybach C.X, 210 1200 rpm	hp,
Mass	:	21470	kg
Crew	:	18	

The p-class was succeeded by the q-class which was 15m longer. Some p-class ships were altered to the latter type by inserting three 5m-sections to the body. The rebuilt ships are not part of this document.

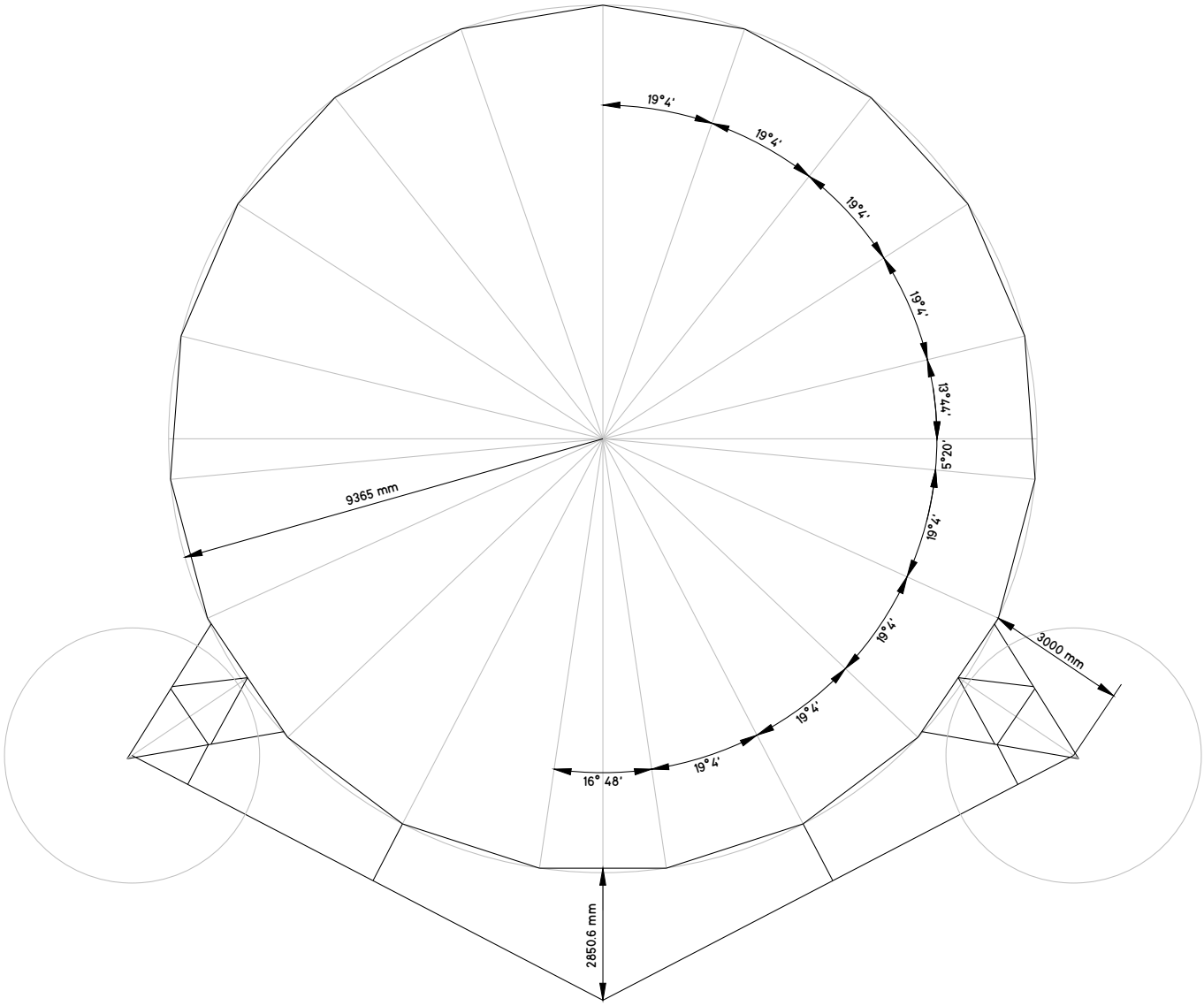
1 Schiffskunde LZ 45

Airship body

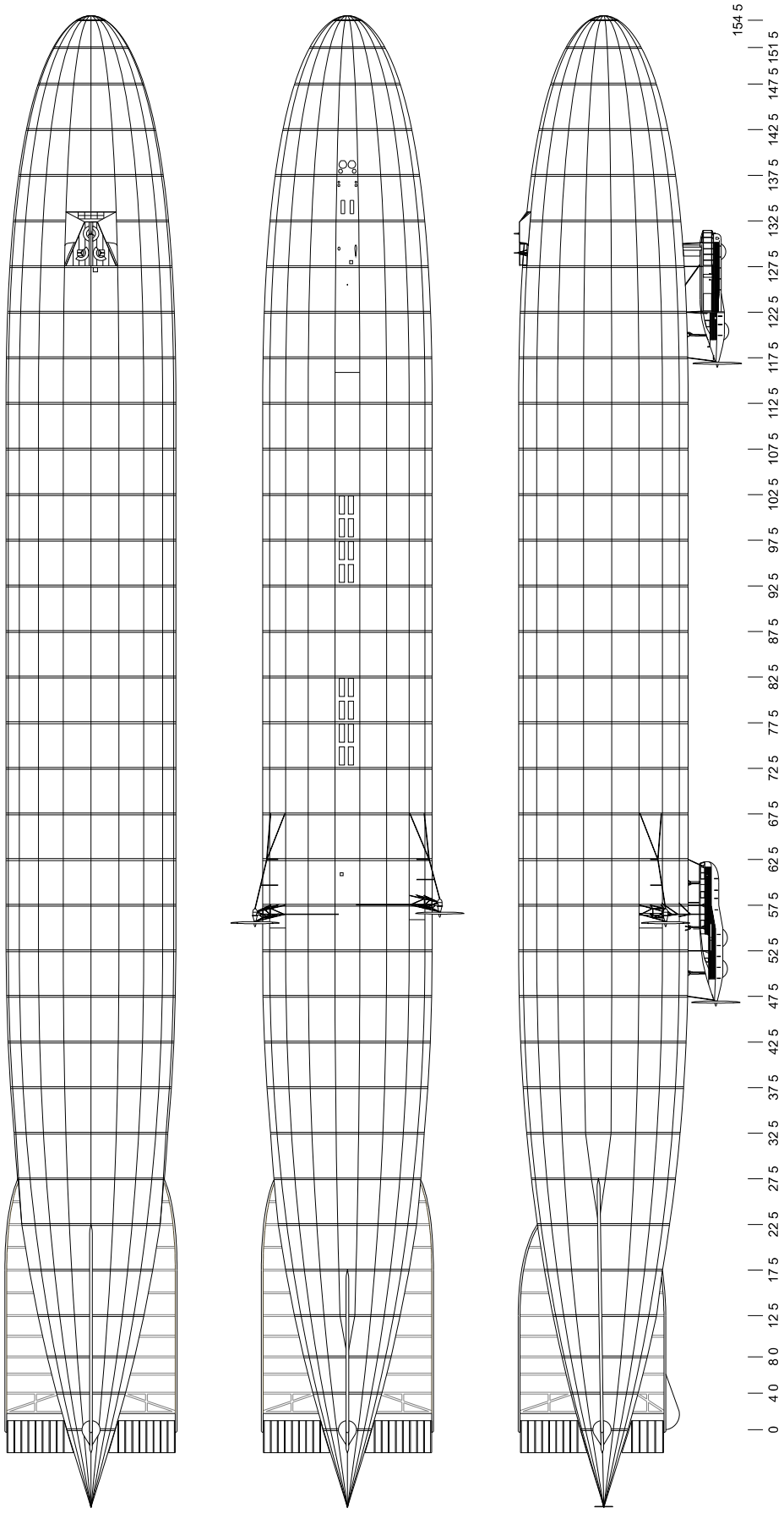
The body of Zeppelins of class p is formed by longitudinals which are attached to 33 rings, 14 of them are main rings.
The longitudinal coordinate has its zero point at the rearmost ring, where the rudder axes are mounted, 8.5m in front of the rear end. The distance between most of the main rings is 10m. In the middle (57.5m-107.5m), the rings have the maximum radius of 9365mm, here the body is "cylindical".

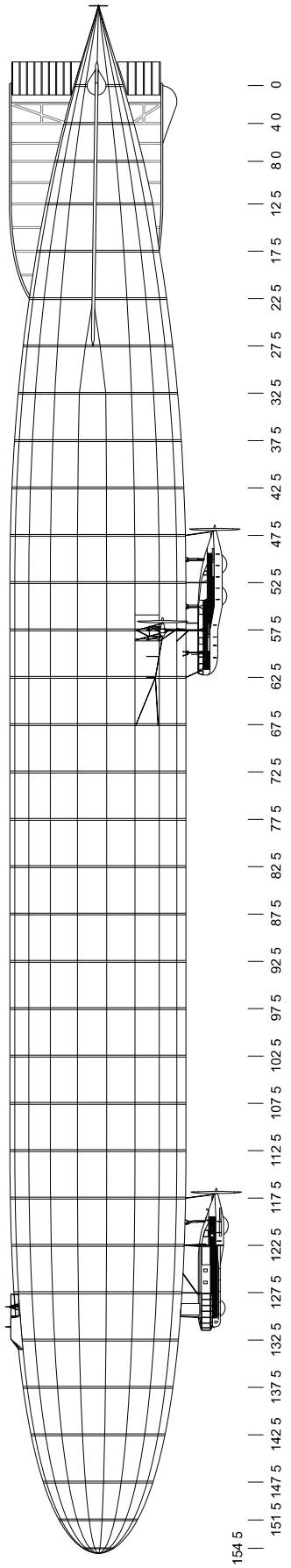
The rings have 19 edges for most of the length, with one longitudinal at each edge. The angle between the keel longitudinals is 16°48', between all others 19°4'.

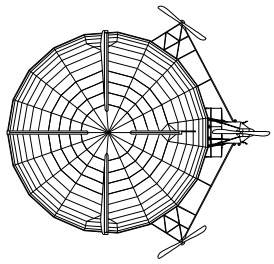
Below is a cross section of the central section.
On pages 5 and 6, general arrangement drawings of LZ 45 (L 13) in 1:144 scale are shown.

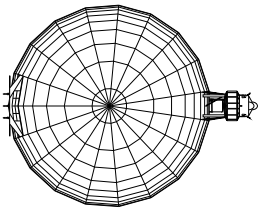


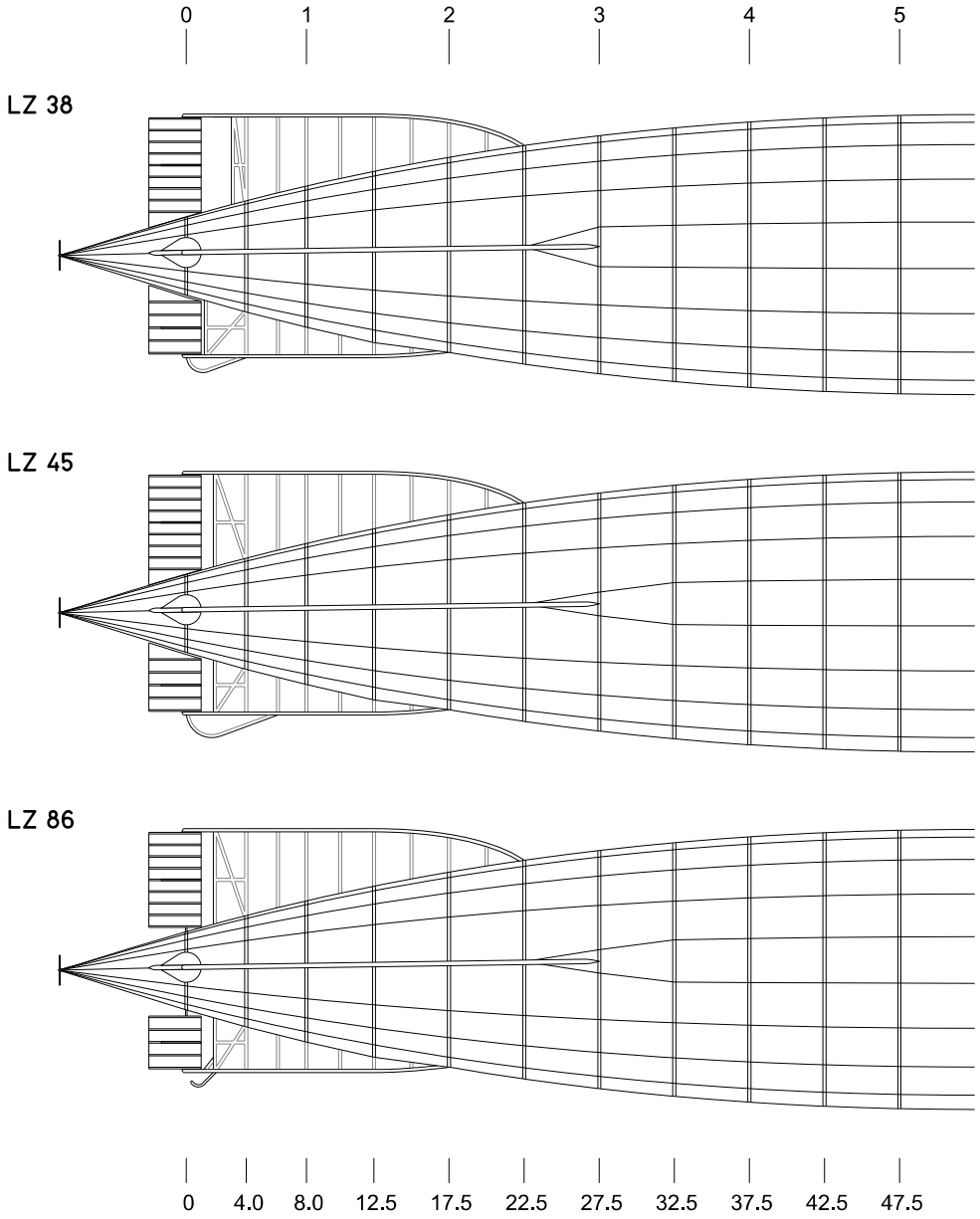
A cross section of the Zeppelin at its largest diameter. The remote drive shafts and the supporting struts are also shown. All measurements are in mm (1:144 scale).









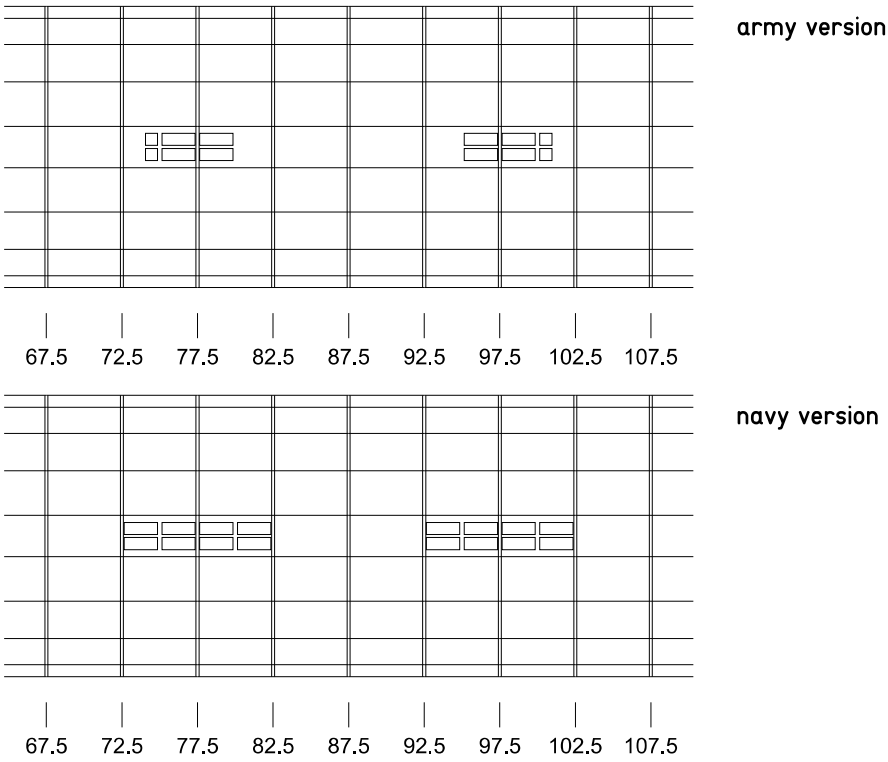


Differences between the tails. LZ 38, LZ 45 and LZ 86 are shown, representing all main options (1:500).

At the tail, the four longitudinals near the horizontal center of the body run together. Here, two versions can be seen. At LZ 38 and LZ 42, the transition is kept between a single 5m-section. On all other ships, the longitudinals need a full main ring distance of 10m to come together. The longitudinals at the keel do the same but behind ring 17.5. The stabilizing horizontal fins start at the ring 27.5. Because of the geometrical properties, they are not fully horizontal but have a positive pitch. This helps to correct the off-center propulsion forces of the propellers.

Behind the fins, rudders are placed for aerodynamic control. Two versions were built: the earlier version follows the shape of the hull while some of the later ones were rectangular. On LZ 38, the space between the fins and the rudders was different than on any other ship as seen above.

At the aft end of the lower vertical stabilizer, a skid is built in. Three variants existed. On most ships the skid is skinned. These could be long as at LZ 45 or shorter as at LZ 38. Some vehicles had an open skid, as had LZ 86.



The different bomb bay door versions. (1:500)

At the rearmost end of the ship, a flagpole was mounted.

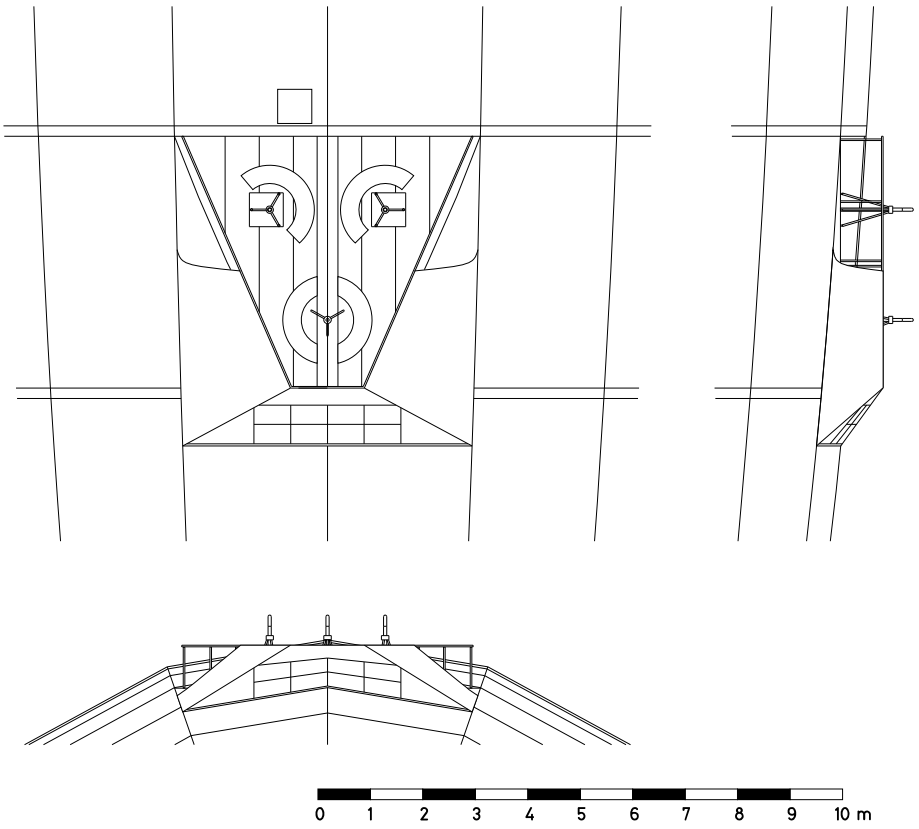
The bombs were carried in the keel of the ship between the gondolas. Bomb bay doors closed the openings and could be folded to the outside.

At least two types of bomb bay door arrangements were employed. All available photos support the theory that army airships, capable of flying greater distances, had a lighter bomb load and, therefore, fewer bomb bays.

In the keel, water ballast was carrieed in bags. Openings through which this ballast could be ejected had to be present at these areas. No photos could be found which show them, so they were omitted in the drawings.

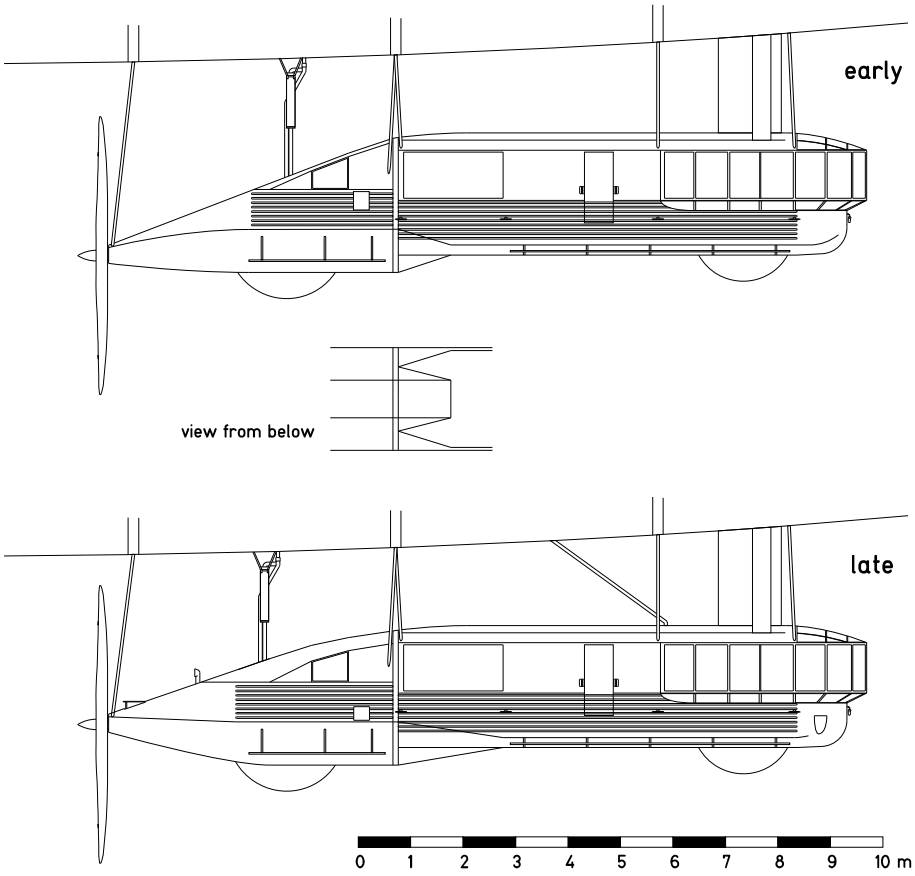
Access to the gondolas was provided by hatches in the keel above the cars.

At the keel, in front of the commander's car, hatches for ropes were placed. They may have varied in size, number and placement, but no sufficient data is available to determine this feature in detail.



The MG platform on top of the ship's bow with three tripods. (1:144 scale)

On top of the ships' bows, platforms with machine guns for defence were mounted. These featured three tripods, but apparently only two MGs. Circular pedestals surrounded the tripods to allow the gunners to depress the MGs in order to fire at enemy aircraft coming up from below the Zeppelin. A handrail encased the platform and a windshield was placed in front of it. A hatch behind the platform allowed the crew to access the platform via a funnel from the gangway at the keel.



The two main types of the front gondola. (1:144 scale)

Front gondola

The front gondola was, in fact, a unit comprised of two seperate cars.

The foremost section was the commander's car which featured a glasshouse-like bow complete with control instrumentation and equipment and a separate room for the radio operator on the left side of the gondola. Behind the radio room, two large windows could be seen, with mounts for MGs.

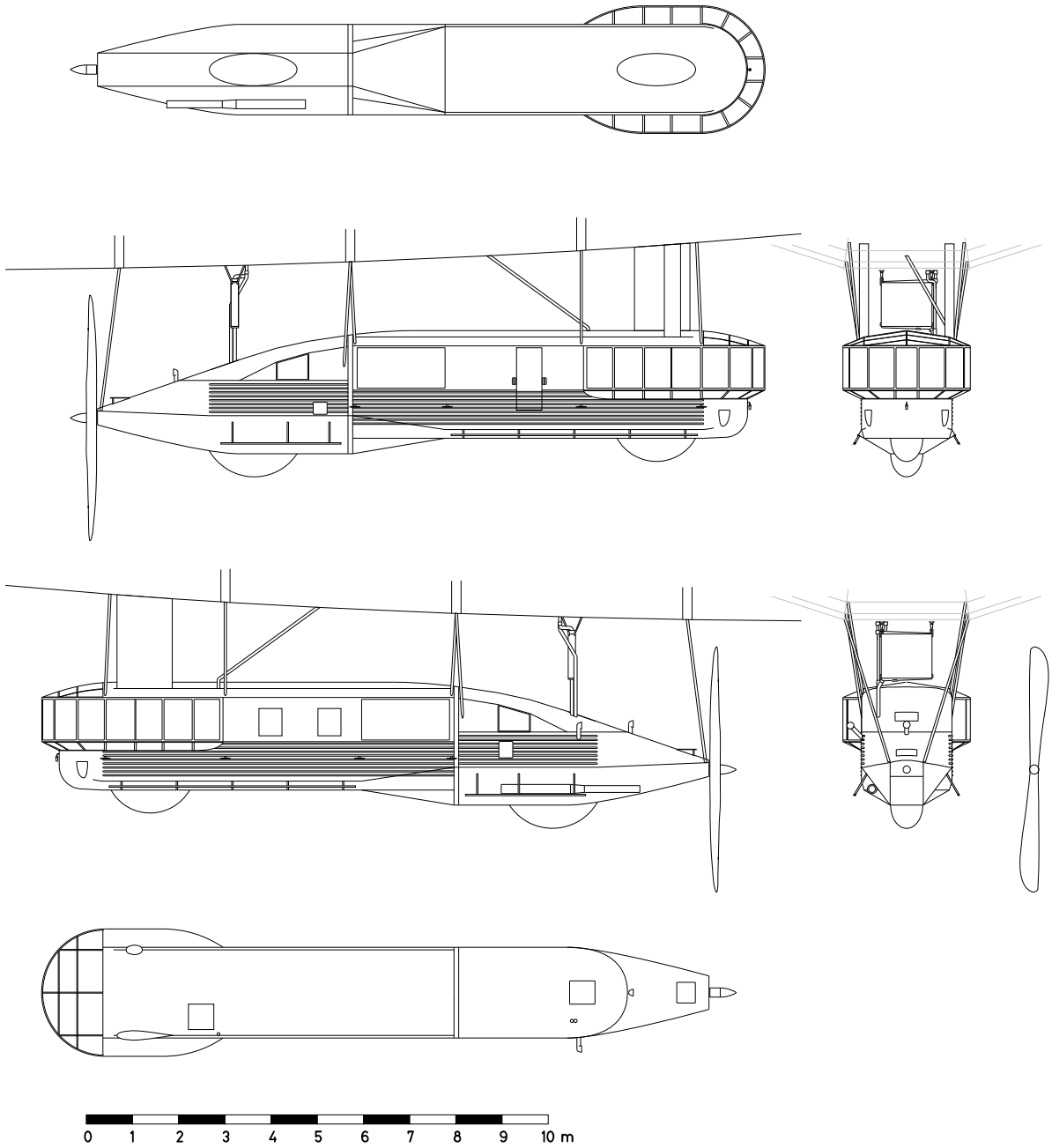
The rear section contained one engine which drove a propeller at the end of the gondola. To protect the hull of the ship, the fabric directly above the propeller was strengthened by a second layer.

Bumpers were mounted at the floor of the gondolas to cushion the landings.

The front gondola varied considerably on the individual ships. Two main types can be distinguished, with the most noticeable difference on the engine section. On some early p-class ships, the roof fell down straighter than on the other ships. On these units, the transition between the commander's car and the front engine car was also different.

The windows, especially of the radio compartment, varied from ship to ship, in number and placement. Some ships had no windows in that area at all, some had two.

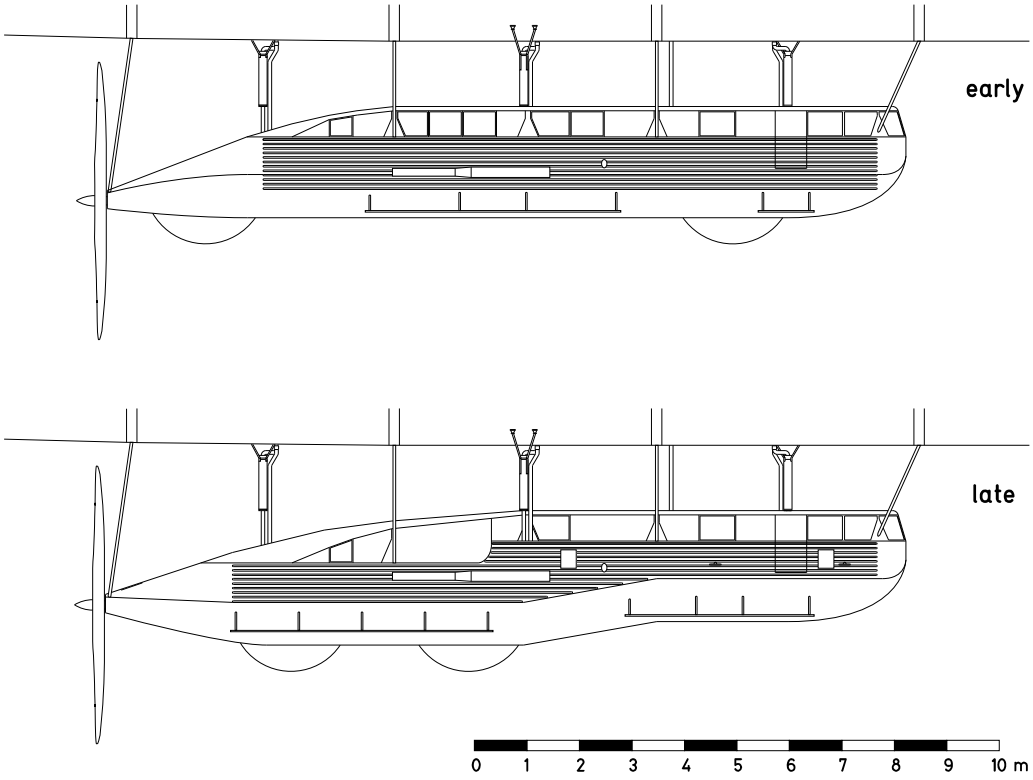
In the available photos it seems that LZ 44 (LZ 74) had a very special front engine gondola with a round floor under the engine. LZ 60 (LZ 90) had experimental, streamlined gondolas at least temporarily.



A 6-side drawing of the gondola of LZ 45 (L 13) (1:144 scale).

The above 6 sided drawing illustrates the front gondola of LZ 45 (L 13), which is representative for most p-class gondolas.

The oil cooler above the front engine car was mounted to the ship's hull, the pipes to the gondola did not carry any loads. The position of the oil cooler varied from ship to ship.



The two main types of the rear gondola (1:144 scale).

Rear gondola

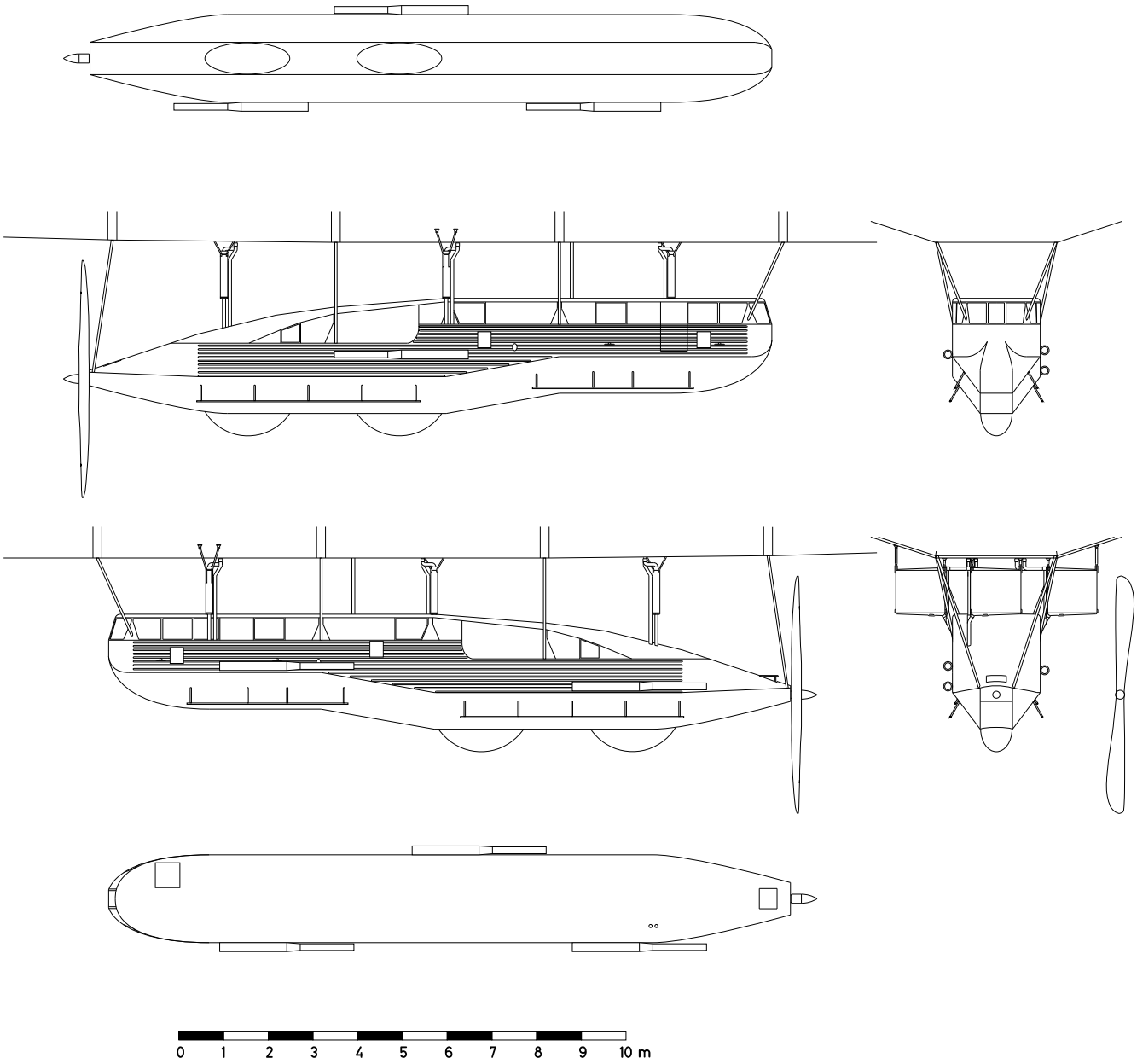
The rear gondola contains three engines. The rearmost engine drives a propeller directly at the aft end of the car, the two others power remote drive shafts which run propellers attacched to the outriggers. Since the engines are mounted in tandem, the drive shafts for the outrigger gears are not inline with each other when viewed from the side. The truss structures which hold the gearboxes are mounted in different longitudinal positions as can be seen on the drawings on page 5.

Like the front gondola, there were two main types of rear engine cars. On LZ 38 and LZ 42, the gondola missed the prominent bend of the floor which can be seen on all other ships. Also, the roof falls straighter and deeper to the aft end as on the early type of the front engine car.

At the later rear gondolas large windows were present with mounts for MGs.

The drawing of the early-type rear engine car was made from a minimum of reference material; it may be regarded as a sketch with most details missing or estimated.

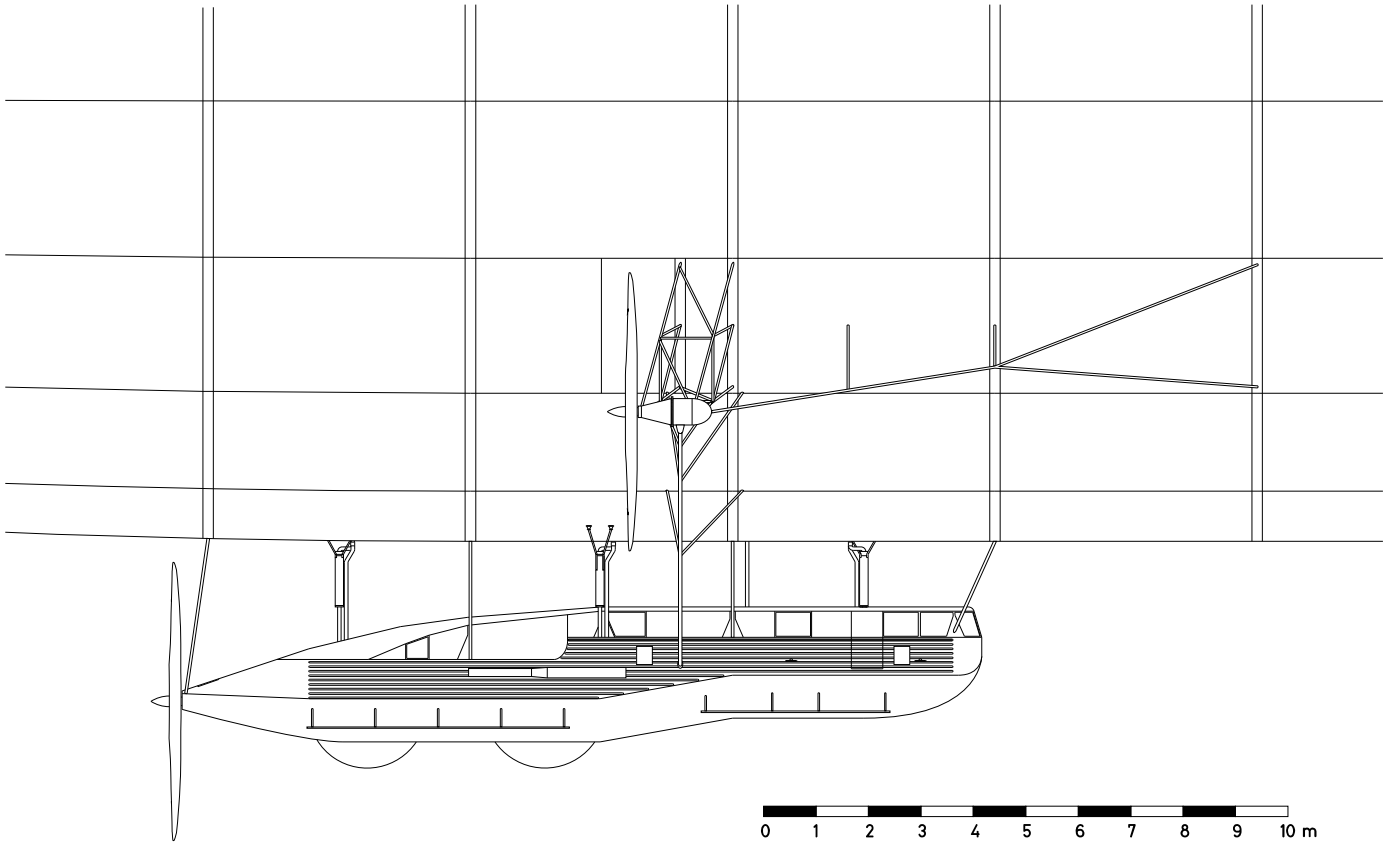
The engine exhausts were placed on the sides of the gondola but their exact positions varied.



A 6-side view of the rear gondola of LZ 45 (L 13) (1:144 scale).

The 6 sided view above depicts the rear engine car of LZ 45 (L 13) which is representative for most ships.

As on the front gondola, the oil coolers hung from the ship's body, and their positions seemed to be constant.



The right outrigger with the remote drive gear from the rear gondola to the outboard propeller (1:144 scale)

Builder's No.	Service No.	Front Car	Rear Car	Rudder	Equator End	Skid Form	Skid length	Special Features
LZ 38	LZ 38	early	early	trapezoid	short	skinned	short	upper rudder with longer opening
LZ 40	L 10	late	late	trapezoid	long	skinned	short	-
LZ 41	L 11	early	late	trapezoid	long	skinned	short	-
LZ 42	LZ 72	early	early	trapezoid?	short	open	-	-
LZ 43	L 12	late	late	trapezoid	long	skinned	short	-
LZ 44	LZ 74	early/special	late	trapezoid	long	skinned	short	front engine car with round underside
LZ 45	L 13	late	late	trapezoid	long	skinned	long	-
LZ 46	L 14	late	late	trapezoid	long	skinned	long	-
LZ 47	LZ 77	late	late	trapezoid	long	skinned	long	-
LZ 48	L 15	late	late	trapezoid	long	skinned	long	-
LZ 49	LZ 79	late	late	rectangular	long	?	?	-
LZ 50	L 16	late	late	trapezoid	long	skinned	long	-
LZ 51	LZ 81	late	late	?	long	skinned	long	-
LZ 52	L 18	late	late	trapezoid	long	?	?	-
LZ 53	L 17	late	late	trapezoid	long	skinned	long	-
LZ 54	L 19	late	late	trapezoid	long	skinned	?	-
LZ 55	LZ 85	late	late	rectangular	long	open	-	-
LZ 56	LZ 86	late	late	rectangular	long	open	-	-
LZ 57	LZ 87	late	late	trapezoid	long	skinned	short	Skid disassembled on some photos
LZ 58	LZ 88, L 25	late	late	rectangular	long	open	-	-
LZ 60	LZ 90	late/special	late/special	rectangular	long	open	-	Spy basket, experimental gondolas
LZ 63	LZ 93	late	late	rectangular	long	open	-	-

This table lists the most important visible differences between the airships of the p-class. A question mark signifies that no information could be found.

References

- Admiralty War Staff Intelligence Division, *German Rigid Airships*, The Naval & Military Press Ltd, 1917 (Reprint 2008)
- Rimell, R. L., *Windsock Datafile Special Zeppelin Vol. 1*, Albatros Productions Ltd, 2006
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- Author unknown, *Schiffskunde LZ 45*, Archiv der Luftschiffbau Zeppelin GmbH, 1915
- Author unknown, *various detail drawings and photos of p-class Zeppelins*, Archiv der Luftschiffbau Zeppelin GmbH, 1915-1918
- http://www.luftschiff.de/

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