

1 General Information

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Basic Safety Instructions

FREEWAY2458Pe have been designed in accordance with the latest modern technology and meet all the relevant safety regulations.

Newer and better solutions are always implemented to our vehicles, also we have now changed the names of all our vehicles so that they are more user friendly and quicker to identify.

Passenger stair have the name **FREEWAY2458Pe**, in which **FREEWAY** is the name, **2458** is the height range, **P** is for steering on the platform and **e** is the type of drive – electric.

The Contractor is responsible for maintenance of the condition of the safety and protective equipment.

Safety and protective equipment must not be removed, nor should it be deemed non-operational.

The manufacturer shall not be responsible for any damages resulting from unauthorized changes to the passenger stairs.

The sign “WARNING” or “ATTENTION” indicates that it is necessary to consider special instructions for protection of people and prevention of damage to the equipment.

Non-compliance with these instructions endangers lives and/or health of personnel.



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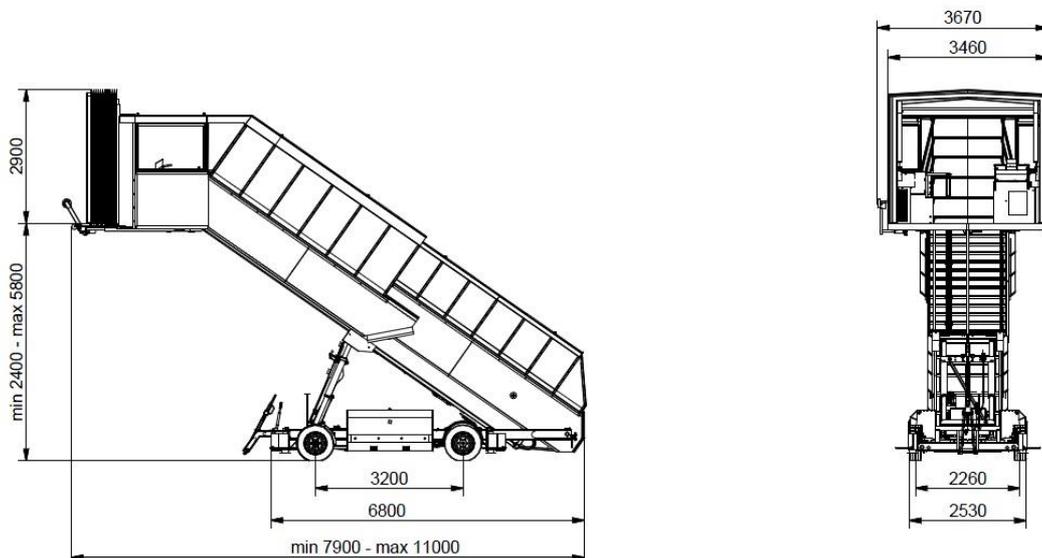
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1.1 Specific Purpose

The passenger stair are designed for use at airports or airport area and provide a safe passage of passengers into and from the airplane. The passenger stairs **FREEWAY2458Pe** are a universal towable vehicle with a built-in auxiliary engine for final adjustment to the aircraft door threshold. The passenger stairs **FREEWAY2458Pe** are used with medium height aircraft doors. They are adjustable in height from 2.40 m to 5.80 m and are suitable for the following aircrafts:

F28 / F50 / F100	2,04 - 2,49			
EMB170 / 175	2,30 - 2,68			
B737	2,46 - 2,79			
MD-80	2,20 - 2,80			
YAK-42	1,80 - 3,11			
EMB190 / 195	2,53 - 3,15			
CS100/300	2,92 - 3,16			
A318 / A319 / A320 / A321		3,42 - 3,73		
IL-62 / M		3,50 - 3,76		
TU-154		3,59 - 3,77		
B757		3,79 - 4,14		
B767		3,99 - 4,50		
B787		4,24 - 4,93		
IL-86		4,20 - 5,00		
TU-204		4,08 - 5,10		
DC10-10 / 10CF		4,62 - 5,18		
MD-11		4,57 - 5,21		
A300-800		5,11 - 5,27		
A350		5,05 - 5,41		
A380		5,10 - 5,42		
B747		4,52 - 5,46		
B777		4,69 - 5,66		
A300		4,37 - 5,40		
A330 / A340		4,40 - 5,70		
2458		2,40 - 5,80		

1.2 Overview **FREEWAY2458Pe**



2 Technical Information

2.1 Construction of Passenger Stair FREEWAY2458Pe

Chassis

The chassis is specially designed for the requirements of the passenger stair **FREEWAY2458Pe**. Strong steel construction made from steel profiles and steel tubes is the basis of the vehicle and carries the axis drive, stabilizers, staircase and the stair's lifting system. The complete chassis, including the welded parts, has a permanent corrosion protection by hot dip galvanizing.

Axles

The front axle is designed as a steering axle and the steering is hydraulically operated. At the rear, there are two hydrostatic motors directly mounted on the wheels.

Steering and brakes

A two-way hydraulic cylinder is mounted on the front steering axle, which is controlled by a hydrostatic control unit. The steering axle is also mechanically connected to the drawbar, so steering in the event of an emergency is also allowed.

Service brake - braking with hydrostatic drive.

The parking brake is designed as a drum brake on rear wheels. It works on the principle of a SAHR brake - spring applied and hydraulically released. Parking brake is automatically released when switching into drive mode or, in case of towing, manually with a parking brake lever next to the drawbar. When the vehicle is in neutral mode, the pressure in the hydraulic cylinder falls, the brake spring overcomes the pressure in the hydraulic system and the parking brake is activated automatically because the spring operates directly on the brake rope through the brake-bearing distributor to both wheels. When the drive mode is selected, the parking brake is released due to the pressure in the hydraulic cylinder. Manual activation of the parking brake is done with a mechanical lever, which moves from the vertical position back to the horizontal, thereby overcoming the action of the brake spring and brake and releasing the brakes.

Drive

The electric motor (24V AC, 4kW) to which the piston hydraulic pump is connected, provides the drive of hydrostatic motors on the rear wheels.

Stabilizers

Four hydraulically-operated stabilizers hold the stair firm in their working position and guarantee maximum stability. In the event of pressure-loss, they are secured by a pilot operated check valve, which prevents unexpected retracting due to a pressure drop in the hydraulic system. Integrated springs in the stabilizers prevent unwanted extending of the cylinders, so the stabilizers do not get stuck or grind on the running surface.

Lighting

For better visibility during docking, a working light is mounted under the platform.

The inner covers of the staircase sides include LED lighting, which provides lighting of more than 50 lux on each step.

The lighting of the vehicle: driving light behind the drawbar.

Operator's position

Operator's post is located on the left back of the platform. The operator has an excellent overview of the distance between the front edge of the platform and the aircraft. The operator desk includes switches, steering wheel and display. At the operator's stand, there is an operator presence switch (activation pedal) and a gas pedal, which allows infinitely variable speed control, without jerks and jolts. The operator's stand offers the operator a backrest and a safety bow to the right. Ergonomics of the driver's post is designed in accordance with the guidelines for non-road vehicles. The operator panel continues upwards with a protective panel arch and a display bracket. Large rear-view mirror mounted on the right facilitates reversing and maneuvering in restricted areas.

Staircase construction

The staircase is designed as a telescopic staircase, changing the height of the platform by changing the number of extended steps of the telescope, whereby the height of the steps remains the same. A fixed staircase with a lower linkage of the staircases and a tilting mechanism forms a stable triangle. It consists of 15 steps. The telescopic staircase is bearing on the fixed staircase and consists of 12 steps. The telescopic staircase is locked in position with locking wedges. The telescoping and unlocking of the locking wedges has a hydraulic activation. After the telescope is extended, the system automatically moves the wedges to the locked position and releases the staircase into the lock. This is ensured by a spring, so that it locks the telescope even in the event of a power failure.

The upper platform is designed as a so-called wide platform. With an effective width of 2.900 mm and a depth of 2.800 – 3.100 mm, it is possible for the doors of all models of aircraft to be opened with the platform in docking position. At the front, the platform frame ends with a sliding floor and side adapters - all adaptable to the aircraft. A sliding floor with a 400mm stroke allows for depth adjustability and a 10° horizontal adjustment to the fuselage of the aircraft. The design of the sliding floor with gas springs prevents the impact of the front edge of the platform in an airplane with all the mass of the stairs and also maintains the contact of the platform with the fuselage of the airplane in the event of an airplane raising or lowering due to changed load. The sliding floor is cushioned along the front, in full width with a rubber tube with a marked centre for easy docking to the left side of the door. The side adapters move simultaneously with the sliding floor so that they automatically adjust to the fuselage of the aircraft. The front edge is cushioned with fuselage-formed cushions, which are mounted on the principle of scale, making adaptability perfect. The gap which appears between the side of the platform and the side adapter on both sides of the platform is closed with the help of UV-resistant rubber curtains.

Additionally, the tilting frame represents the mechanical support of the platform and the staircase, mounted on the chassis along the front axle. It operates hydraulically and allows changing of staircase and platform tilt in the range of $\pm 3^\circ$. This makes it possible for fine height adjustment of the platform at each position of the telescope, and the installation of a safety shoe and an auto-following system.

The walking surfaces are made of self-supporting, self-cleaning, aluminum drainage profiles with anti-slip factor R12, left and right mounted on the side of the staircase. The cover under the steps along the stairways ensures that water and dirt are kept in the stairway area and do not fall into the vital parts of the chassis. At the same time, it prevents seeing through gaps between the steps (which increases safety feeling of the passengers).

Hydraulic installation

Hydraulic system is divided into the hydrostatic drive system and the operating hydraulics. Hydrostatic drive system consists of electrically driven piston pump and hydrostatic wheel motors. The operating hydraulics system consists of electrically driven gear pump, which provides the operating pressure for the steering and working hydraulics. All hydraulic valves are being electrically actuated. A hydraulic valve block and an emergency manual pump enable the hydraulic functions to be operated in the event of an emergency. The hydraulic oil reservoir is equipped with ball valves for the purpose of closing the hydraulic oil supply to the pipeline in the case of maintenance work on the hydraulic system.

Optionally, hydraulic oil pre-heating can be installed, thus ensuring normal working conditions of the stairs and allows them to operate in winter conditions with temperatures down to -35°C . It includes creates normal working conditions for the hydraulic system and the safe operation of hydraulic functions at start-up. Preheating is carried out with heating in an oil reservoir and operates during the charging of batteries, when the vehicle is connected to the mains voltage. The thermostat integrated in the heater maintains the appropriate temperature.

Electrical system

The vehicle installation is 24V DC. Electricity is provided by a lead-acid battery (24 V, 720 Ah).

The electrical system contains 2 main electrical distribution cabinets which communicate with one another through CAN-BUS. Cabinets on the chassis and on the platform. Electrical cabinets are installed in such a way that they are easily accessible for control or service.

Stair control is via PLC (programmable logical computer), allowing flexibility. The PLC type is designed for mobile applications, which means a longer lifetime in an environment with vibrations and operates in a wider temperature range.

Cabling of the vehicle is made without intermediate coupling centres. The cable runs from the cabinet to the cabinet or from the cabinet to the consumer in one piece, making it easier to detect any error. All the flexible parts use energy chains and high-flex cables.

2.2 Technical Information

Motor 1 (for hydrostatic drive)	Manufacturer	CFR
	Type	AC Asynchron 24 V, 4 kW
	Rated torque	14,4 Nm at 2650 rpm
	Protection	IP44
Motor 2 (for working hydraulics)	Manufacturer	CFR
	Type	AC Asynchron 24 V, 4 kW
	Rated torque	14,4 Nm at 2650 rpm
	Protection	IP44
Empty weight	Basic unit	Ca. 7450 kg
	With roof and bellow	Ca. 8100 kg
Load (with extended stabilizers)	75 persons with 80 kg or 500 kg/m ²	6000 kg
Max. front axle load		9200 kg
Max. rear axle load		4000 kg
Gross vehicle weight		14200 kg
Dimensions	Total length retracted	8000 mm
	Overall width	ca. 3700 mm
	Total height basic unit	min. 4000 mm max. 6800 mm
	Total height with roof and bellow	min. 5200 mm max. 8500 mm
Platform height		min. 2400 mm, max. 5800 mm
Turning circle (retracted telescope)		16000 mm
Ground clearance		150 mm
Number of steps	Telescope retracted	15
	Telescope extended	27
Step height		19 cm
Step depth		27 cm
Staircase inclination	Fine height raised, 3°	38°
	Fine height middle, 0°	35°
	Fine height lowered, -3°	32°
Horizontal adapting angle of the platform		+/-10°
Tyres (4x)		245/70 R17,5
Tyre pressure		9,0 bar

Max. Speed	Driving forward	6 km/h
	Driving in reverse	4 km/h
	Towing	25 km/h
Slope of climbing		max. 7 %
Wind stability	Allowed wind speed in working position	max. 45Kn, 23 m/s
Electric	Battery voltage	24V DC
	Battery Type	720 Ah, lead-acid
	Operating voltage	24 V DC
	Controls	PLC, Tip: RZ Compact Mfr.: Inter Control
Hydraulic installation	Hydrostatic drive	Mfr.: SAI, P _{max} = 280 bar
	Steering	Mfr.: FPW, P _{max} = 120 bar
	Hydraulic functions	Mfr.: S. Danfoss, P _{max} = 120 bar
	Hydraulic cylinder	Mfr.: Vista, P _{max} = 210 bar
	Tank capacity	Ca. 100 litres
	Oil type	Fuchs Renolin B 32 HVI