MAFELEC

M-LIGHT RANGE

LED HEADLIGHTS, MARKER & TAIL LIGHTS

HEADLIGHT, MARKER & TAIL LIGHTS

15 years of development of LED railway lighting

MAFELEC develops and produces LED Headlights, Marker & Tail lights
to equip rolling stock on:
Conventional trains, High-speed trains, Locomotives and Shunters, Subways and rail maintenance machines.

With the widest range of standard products and its ability to develop customized plug and play solutions, MAFELEC is your partner for your global projects.

Thanks to its optical and electronic expertise, MAFELEC designs products to standardized features and meeting stringent requirements on light intensities, beam shapes, colorimetry and esthetic rendering. The phenomena of optical guidance, light diffusion, formatting of beams with anti glare are as many subjects of studies conducted on our sites.

OUR INNOVATIVE SOLUTIONS

- Delayed differentiation
- Precise optical adjustments
- Obsolescence management
- Improved reliability of status feedback
- Data recording for maintenance assistance
- Integrated defrosting solution
- Anti-glare solution
- Interconnecting functions

MAFELEC ACCOMPANIES YOU

In the different stages of your project, from defining the need to operation, MAFELEC brings you its expertise:

- Definition of need according current standards
- Calculation of return on investment
- Adaptation to specific characteristics of environment and customer design
- Simulation in laboratory and/or train (client platform) for assistance to integration and support to finalize train qualification
- Measurements on the existing park at train mid-life
- Replacement of modules if necessary
- Assessment of operation and ageing after a few years of commercial service.

OUR MEANS

> R&D Department

More than 40 engineers and technicians specialized in: mechanics, electronics, electricity, optics, magnetism, acoustics and materials.

- Optimization of industrial tools
- Dedicated technical and project teams
- Calculation and simulation software

> Test and qualification laboratories

In the qualification phase, all our products undergo endurance tests in our laboratories equipped with state-of-the-art equipment to ensure resistance in harsh or specific environments: mechanical, electrical and electromagnetical tests, climatic, pressure, salt mist, etc.
A dedicated optical laboratory including a 15m length dark room available for various optical measures.

OUR REFERENCES

> METRO /LRV :
Paris, Lyon, Cadiz, Amsterdam, Chennai, Caracas, Kochi, New Delhi, Bangkok, Nürnberg

> EMU/DMU :
Coradia range, NAT, Regio2N, Régiolis , Desiro, AGC Mireo, RERNG

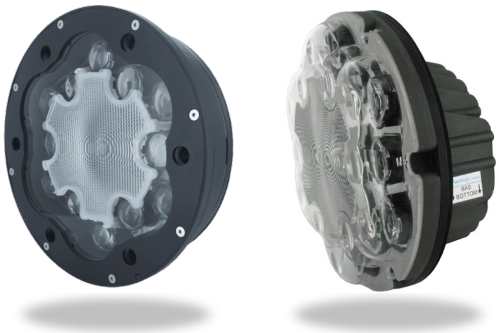
> HIGH SPEED:
Oaris, Avril G3, New Pendolino, TGV

> LOCOMOTIVES & SHUNTERS :
Vossloh Locomotives, Newag, Alstom ELOC

>RAIL TRACK MACHINERY (CONSTRUCTION & MAINTENANCE)
Matisa, Plasser & Theurer, Donelli Dimaf, Huddig, Colas Rail, SNCF, Socofer

COMBINED / COMPACT HEADLIGHT

MULTI-FUNCTION LIGHT



Optical
Diameter 170mm
5 functions:
White headlight: full and dimmed mode,
White marker light: full and dimmed mode,
Red tail light
LED technology
Life duration > 60,000 hours
Light intensities compliant with **EN 15153-1: 2013**

Mechanical
Front / rear mounting
Bearing angle adjustment(headlight)

TSI LOC & PAS 2014 Certified

Optical and mechanical variants

Glass protection / defrosting options
Headlight only, Marker light only or Tail light only
Version with cutoff compliant with **EN15153-1:2013**
American version compliant with **49 CFR 229 & NFPA 130**

Adaptation in the framework of a renovation

Mechanical and electrical adaptation
Optical measurement of the existing solution
Simulation of optical solutions

COMPACT HEADLIGHT, 2 MODES

Optical
Diameter 120 mm
White headlight: Full and dimmed mode headlight
LED technology
Life duration > 60,000 hours
Light intensities compliant with
EN 15153-1: 2013

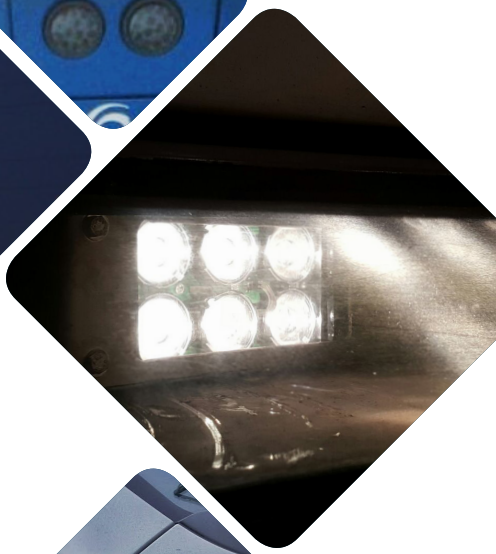
Mechanical
Front / rear mounting
Glass option

120 mm Headlight

Optical and mechanical variant

Rectangular version
Designed for japanese market
Amber version possible

Rectangular version



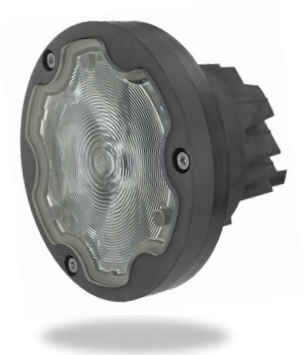
PAR 56 Headlight

Optical
Diameter 170 mm
White headlight: full and dimmed mode
Life duration > 60,000 hours
Light intensity > 200 000 cd
Compliancy with standards:
USA / Australia: 49 CFR 229
India: ELRS/SPEC/PR/2004

Mechanical
Compatible with the dimensional
array of Halogen PAR56

PAR56

MARKER & TAIL LIGHTS



Compact bicolor Marker and Tail light

Optical
Diameter 120 mm
White marker light: full and dimmed mode
Red tail light
LED technology
Life duration > 60,000 hours
Light intensities compliant with
EN 15153-1: 2013

Mechanical
Front / rear mounting
Glass option

TSI LOC& PAS 2014 certified

Optical variants

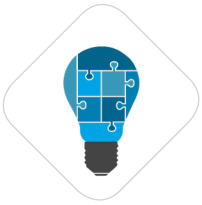
Amber flashing light

Tail light

Optical
Diameter 170 mm
Red tail light
LED technology
Life duration > 60,000 hours
Light intensities compliant with
EN 15153-1: 2013

OUR SPECIFIC SOLUTIONS

The steps of a successful collaboration



Definition of needs
Study of requirements:
- Electrical
- Mechanical
- Standards

Technical proposal
- Mechanical & electrical integration
- Optical simulation

Development of solution

Measures on train

Tests and validation

Industrialization

Manufacturing

Adaptation to customer design

A modular basis allowing various forms for
"Plug and play" solutions

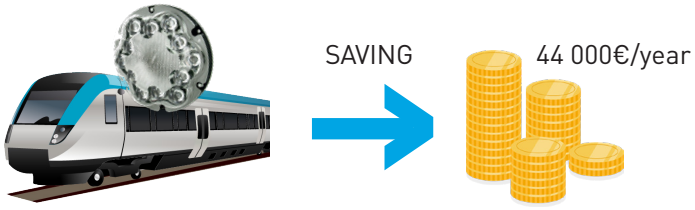
THE ADVANTAGE OF LED TECHNOLOGY

LED HEADLIGHT, MARKER AND TAIL LIGHTS HAVE MANY ADVANTAGES:

- **Reduced power consumption:**

Compared to halogen headlight, the electrical power consumption is divided by 5.

For example:
For a fleet of 100 trains, operating 10 hours per day, 365 days per year, with a price of € 0.12 per KwH



- **A reduction of maintenance costs and improvement of the availability of trains.**

Compared to halogen Headlight, the duration of life is 15 times higher, which divides the number of interventions as many times.

In addition, LED technology enables you to have

- **A stable luminous flux:**

It takes approximately 60,000 hours to observe a decrease in light intensity by 30%, against a few hundred hours for halogen.

- **Low dissipation needed**

Allowing designing lightweight and compact products.

- **A flexible arrangement, adapting to all designs**

- **Other strong points**

High mechanical resistance (shock and vibration)
Not sensitive to low temperatures
Capability to being switched on and off repeatedly
Instant lighting
Progressive reduction of light intensity
No mercury
No ultra-violet

SUMMARY TABLE

Multi-functions	Headlights				Marker & Tail lights	
						
Ø 170mm	Ø 170mm	Ø 120mm	Rectangular	PAR56	Ø 170mm	Ø 120mm

Conventional trains / High speed / Locomotives

Europe **EN 15153-1:2013** **TSI LOC & PAS 2014** Anti-glare	**Europe** **EN 15153-1:2013** **TSI LOC & PAS 2014** **India** ELRS/SPEC/PR/0024 Headlight > 200,000 Cd **Australia** AS 7531.3-2007 Upper Headlights > 200,000 Cd Lower Headlight > 20,000 Cd **USA** 49 CFR 229 Upper and Lower Headlights > 200,000 Cd	**Europe** **EN 15153-1:2013** (except illuminated surface) **TSI LOC & PAS 2014** **Australia** AS 7531.3-2007 Lower Headlight > 20,000 Cd	**Japan** **JIS-C-7503**	**India** ELRS/SPEC/PR/0024 Headlight > 200,000 Cd **Australia** AS 7531.3-2007 Upper Headlights > 200,000 Cd Lower Headlight > 20,000 Cd **USA** 49 CFR 229 Upper and Lower Headlights > 200,000 Cd	**Europe** **EN 15153-1:2013** **TSI LOC & PAS 2014** **Australia** AS 7531.3-2007	**Europe** **EN 15153-1:2013** **TSI LOC & PAS 2014** **Australia** AS 7531.3-2007

Subway systems

Multi-function	Headlight Flood light	Headlight Flood light Amber light	Headlight Amber light	Headlight Flood light	Marker light Tail light	Marker light Tail light Flashing amber light

CREATIVE ENGINEERING

CONTROL PANELS & ELECTRICAL CABINETS

- Multi-technology dashboards
- Control & signalling auxiliaries
- Special crew switches
- Signalling boxes
- Pedal and push button dead man function
- Emergency push buttons
- Circuit Breakers
- Power supply sockets

INFRASTRUCTURE

- Traffic lights
- Signalling boxes
- Power supply boxes
- Control panels
- Controls of bridges, elevators & winches

FRONT & REAR LIGHTING OF THE TRAIN

- Combined headlights
- Headlights
- Marker & Tail lights
- Customized plug and play solutions
- Specific strip lights

POWER & ELECTRICAL DISTRIBUTION

- Power switches (up to 2,000 Amps)
- Cut-off switches
- Terminal blocks
- Isolators and partition bushes
- Sensors - Hall effect

PASSENGERS CARS

Inside

- Push buttons and indicator lights (M-Door range) for:
- Door systems
- Toilet
- Disabled persons space
- Emergency call
- Emergency handles
- Power supply sockets
- USB sockets
- Pictograms & indicator lights
- Buzzers

Outside

- Door indicator lights
- Brake indicators
- Level indicators
- Door opening controls
- Bogie lighting

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MAFELEC

Creating control and signalling solutions for harsh environment

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