



M-DOOR PUSH BUTTON

MAFELEC and TSL-ESCHA GmbH

MAFELEC develops control and signaling solutions for harsh environments. From push buttons to switches, from complete control panels to door control solutions, the company offers products that are best suited to the needs of our partners.

TSL stands for Touch, Signal and Light. Door opening push buttons, signal lights, sounders, indicator and display devices as well as LED lighting are part of the product portfolio. TSL-ESCHA develops, manufactures, and distributes individual customer solutions for public transportation.

Members of the MAFELEC TEAM

TSL-ESCHA based in Halver (Germany) and MAFELEC in Chimilin (France) are part of the MAFELEC TEAM. The owner-managed group of companies offers solutions for HMI, lighting and sensors and is active in the markets of bus and railway, industrial vehicle, industry, energy, defense, aerospace, and elevators.

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M-DOOR PUSH BUTTONS

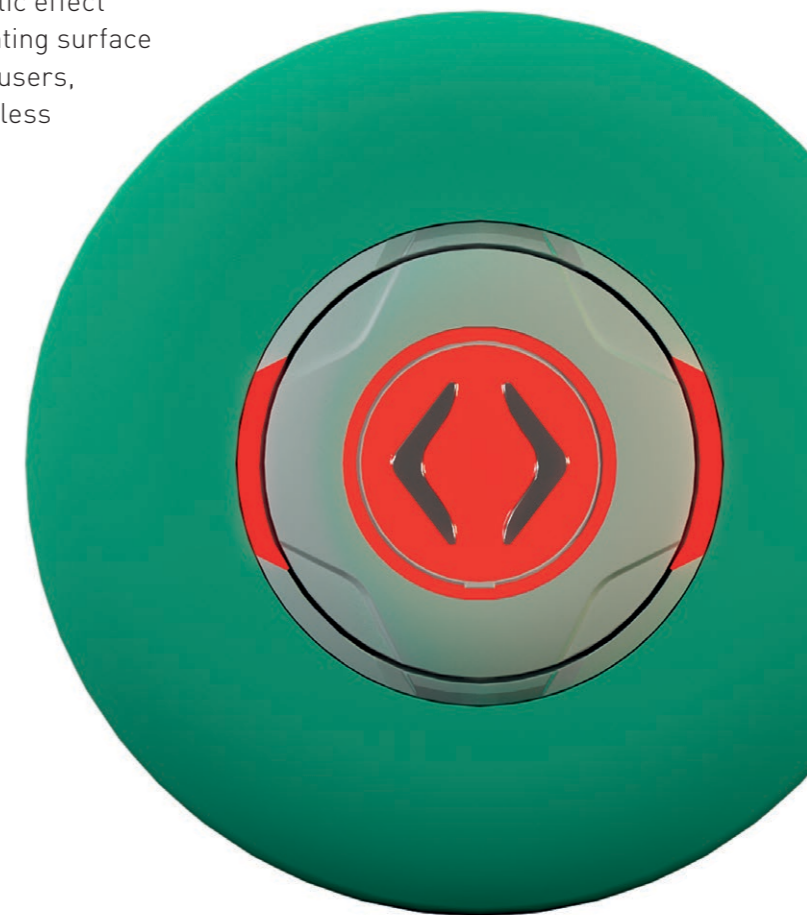
M-DOOR SERIES

HAPTIC TOUCH AND HIGH VISIBILITY

MAFELEC's M-Door range of push buttons offers a haptic effect combined with a mechanical actuation stroke and a lighting surface that is unmatched on the market in order to provide all users, including people with reduced mobility (PRM), with flawless feedback. Its reliable and robust design, compliant with international rail and bus standards such as TSI PRM, ECE R107, EN 1658x-x, EN 14752, EN 16683, ECE R10, EN 50155, EN 45545, ECE R118, NFPA130, allows it to meet the requirements of door, toilet, request for help, request for stop, PRM access, information panel, highway emergency bollard.

The different shape and mounting variants, as well as the infinite number of customizations created over the past 15 years, give the M-Door series a foolproof adaptability so that customers can find the most suitable solution.

- Large lighting zones
- Mechanical actuating stroke with haptic feedback
- Numerous mounting variants
- Sustainable and robust
- Wide range of customization: shapes, materials, colors, pictograms
- M-Safe option (for M-Door GM): antimicrobial actuator and/or touchless activation



For any application case, there is a M-Door solution providing haptic feedback.

Ideal for glass doors, as no drilling is required.

M-DOOR GM

GLASS MOUNTING WITHOUT DRILLING

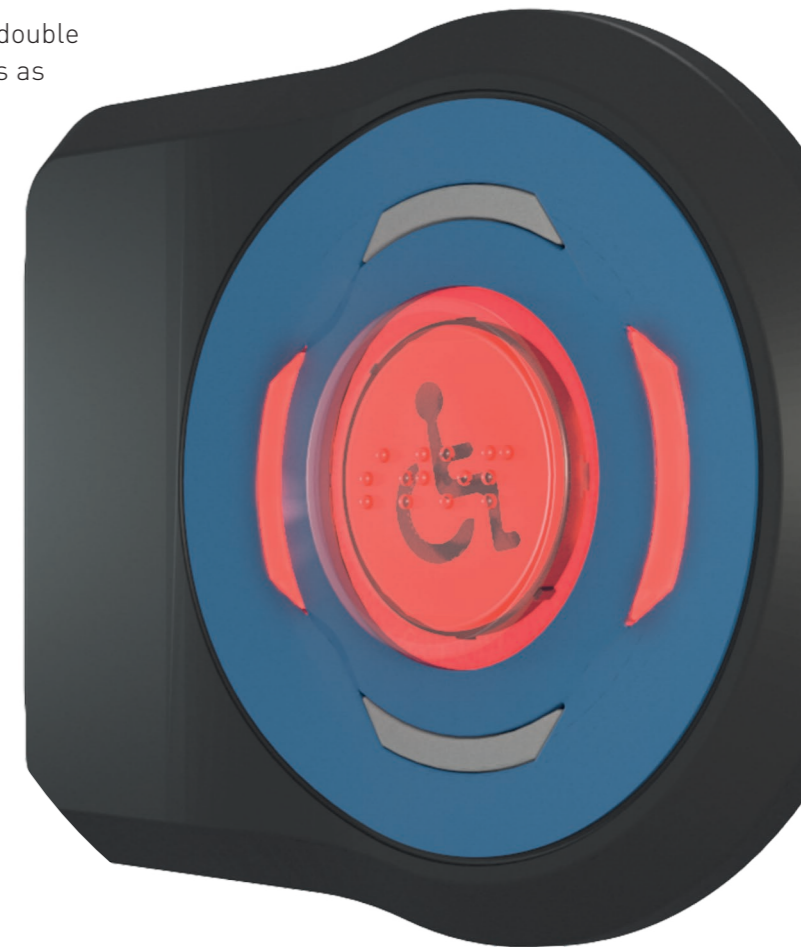
The M-Door GM is designed to be mounted on single or double glazing without drilling, while offering the same features as the wall-mounted M-Door push button, including haptic feedback actuation and large light zones to meet rail and bus standards such as TSI PRM, EN 1658x-x and EN 14752, ECE R107 for persons with reduced mobility (PRM).

Thanks to its patented technology of energy transmission and communication through the glass, only the internal button, is connected by a cable hidden in the door frame. It automatically powers and synchronizes (without pairing) the external wireless button, whatever the thickness of the glass from 3 to 20 millimeters.

The M-Safe hygienic options of antimicrobial surface and touchless activation enhance the already extensive functionality of the range.

- Mounting on glass from 3 to 20 mm without drilling
- Single or double button
- Mechanical actuation stroke with haptic feedback
- Zone/color change for color-blinds
- Large lighting zones and independent configuration of each lighting zone
- Auto-synchronization of interior and exterior buttons (no pairing)
- M-Safe options: antimicrobial actuator and touchless

Best-in-class offering for glass-mounted control buttons.



VARIETY OF M-DOOR GM

OVERVIEW OF VARIANT TYPES

M-Door GM push buttons are available in three application variants: single interior, single exterior or double. They are quick and easy to install thanks to the high-performance VHB adhesive and the positioning/gluing tool, which offers an unbreakable hold.

M-Door GM push buttons can be mounted on glazing curved up to ten meters. Moreover, they are compatible with heat treated glass.

M-DOOR GM/DS



- Control button on each side of the door
- Automatic synchronization (no pairing)
- Synchronous or asynchronous operation
- Adaptation to frame profiles (standard 90°)
- M-Safe antimicrobial push button option (ISO 22196)
- M-Safe touchless activation option (4-16 mm glazing thick)

M-DOOR GM/SI



- Control button on the inside of the door
- Adaptation to frame profiles (standard 90°)
- M-Safe antimicrobial push button option (ISO 22196)
- M-Safe touchless activation option (4-16 mm glazing thick)

M-DOOR GM/SO



- Control button on the outside of the door
- Communicating base without button on the inside
- Adaptation to frame profiles (standard 90°)
- M-Safe antimicrobial push button option (ISO 22196)
- M-Safe touchless activation option (4-16 mm glazing thick)

Nominal voltage	12 ... 24 VDC
Nominal current	145 mA @ 24 VDC
Switching current	max. 200 mA
Lifetime	3 million cycles
Operating temperature	-40 ... +85 °C
Degree of protection	IP65 (outside), IP44 (inside)

Large possibilities of customizations.

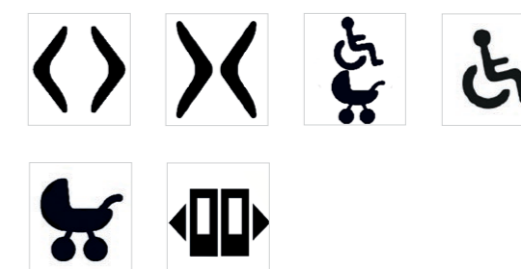
CUSTOMIZE YOUR M-DOOR GM SELECTION OF COLORS AND PICTOGRAMS

The width of our offer will allow you to have a wide choice among different existing configurations or to define according to your needs. The variety of available colors, pictograms, relief, braille or electrical schematics allows you to define solutions that meet regulatory requirements such as TSI PRM, EN 14752 or ECE R107 needs. New variants can be created on demand. Details of all existing customizations and possibility of configurations are available in our Product Configuration.

BEZEL COLORS



ACTUATOR PICTOGRAMS



ACTUATOR RELIEF



ACTUATOR BRAILLE



M-DOOR VG

VERTICAL GREEN (VG) DESIGN

The M-Door VG is a panel mounted push button designed to meet the accessibility requirements of EN 14752 and the TSI PRM Directive and its associated EN 1658x-x series of standards.

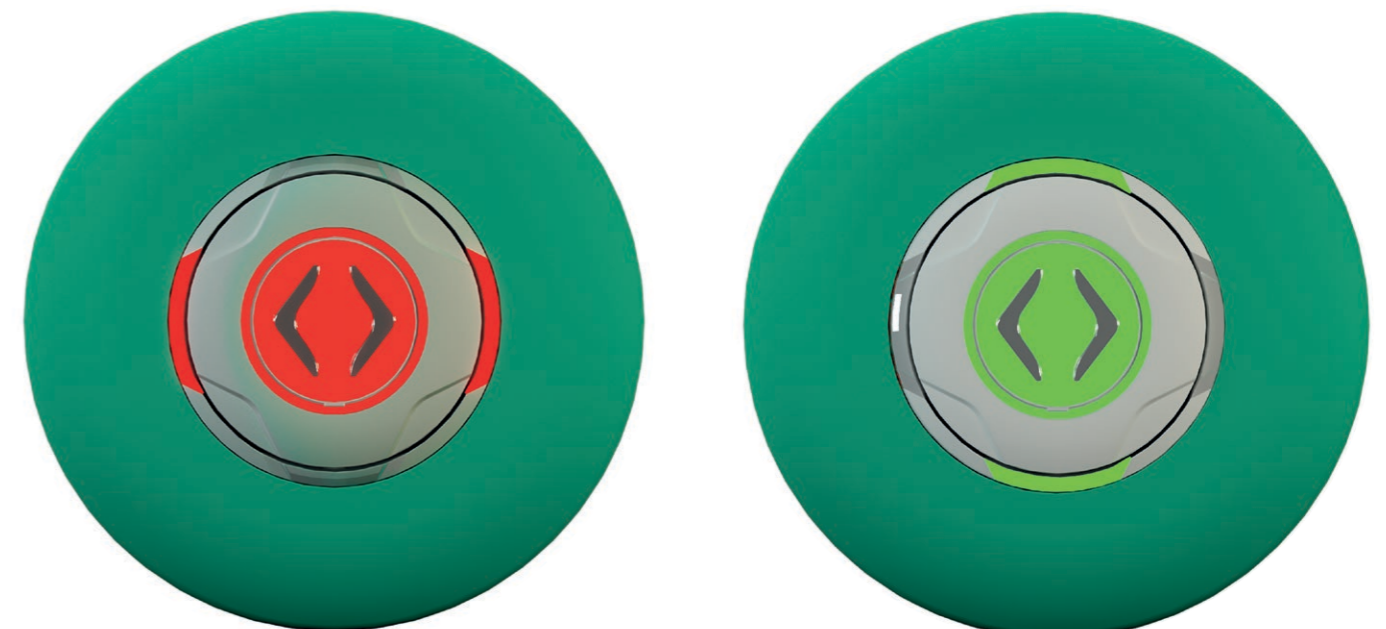
The M-Door VG is perfectly visible from the front or side thanks to its backlit three millimeter raised push button. The four surrounding light zones create the Vertical Green aesthetic which indicates the status of the doors through an intuitive color change. This

can be understood by all users, including color blind passengers.

Its endurance of three million operations and its resistance to numerous detergents or anti-graffiti agents give it a reliability and robustness that guarantee an operation adapted to the mission profiles of operators. The M-Door VG complies with international rail and bus standards (EN 50155, ECE R10, EN 45545, ECE R118, NFPA130, EN 60529, CEI62262, EN 61373, EN 60068).

- Standard panel mounting with three screws
- Large backlit three millimeters raised actuator
- Mechanical actuating stroke with haptic feedback
- Luminous aesthetic Vertical Green detectable by color blind people
- Pictograms 15 millimeters high and one millimeter raised
- Resistant to many detergents and anti-graffiti agents
- Customization of actuator, bezel and electrical features
- Side cable output, length and connector customizable
- Bezel available with embossed or braille text

Nominal voltage	12, 24, 36, 72 or 110 VDC
Nominal current	20 mA @ 24 VDC
Switching current	max. 200 mA
Operating temperature	-40 ... +70 °C
Degree of protection	IP65

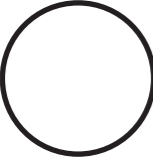


INDIVIDUAL CHOICES FOR M-DOOR VG BEZEL AND ACTUATOR CONFIGURATION

Here is a short overview of our large bezel configurability, forms, material, colors, which can be associated with actuator selection of pictograms and relief/braille. For the complete details, please ask for our Product Configuration and create your own product.

BEZEL FORMS/MATERIAL

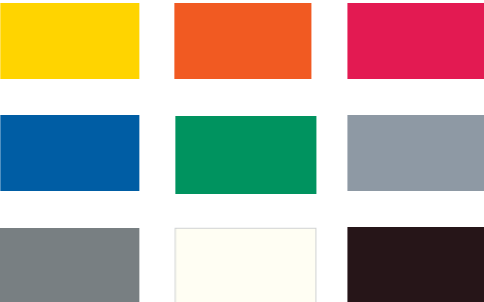
- Round – plastic or metal/ available with text in relief or braille
- Triangle with SOS text and braille – only plastic



- Square – only metal



BEZEL COLORS



- Decorative Chrome (metal bezel only)

ACTUATOR PICTOGRAMS AND RELIEF



Round, square or triangular bezels are available in different colors.

M-DOOR

HIGH VERSATILITY

Originally designed to control train or bus doors, the single M-Door push button for standard panel mounting has been strongly developed over the last 15 years to offer a wide range of robust and reliable buttons adapted to new applications (toilets, help request, information terminals.). The backlighting of the push button and a surrounding ring give it a very good visibility.

Its numerous customization options allow it to meet accessibility standards for all passengers and in particular for people with reduced mobility (PRM) such as the PRM TSI Directive, its associated EN 1658x-x series of standards or the ECER107.

Compliant with international rail and bus standards (EN 50155, ECE R10, EN 45545, ECE R118, NFPA130, EN 60529, CEI62262, EN 61373, EN 60068), its endurance of three million operations and its resistance to numerous detergent or antigraffiti agents give it a reliability and robustness that guarantee an operation adapted to the operators' mission profiles

In order to meet the varied integration needs of customers, the M-Door push button range has evolved and is now available in a variety of shapes and mounting types. The original standard front panel mounting with bezel or rear panel mounting has led to the creation of new versions such as glass mounting with drilling or more compact shapes solutions (see page 16).

Nominal voltage	12, 24, 36, 72 or 110 VDC
Nominal current	20 mA @ 24 VDC
Switching current	max. 200 mA
Operating temperature	-40 ... +85 °C
Degree of protection	IP67/IP65 front, IP65 rear

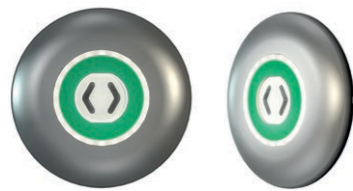
- Large lighting areas
- Mechanical actuating stroke with haptic feedback
- Numerous mounting variants and shapes
- Sustainable and robust
- Wide choice of electrical configurations
- Wide customization: shapes, materials, colors, pictograms
- Resistant to many detergents and antigraffiti agents



MULTIPLE VARIANTS OF M-DOOR

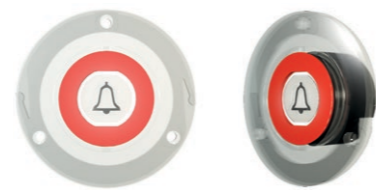
OVERVIEW OF MOUNTING TYPES

M-DOOR SINGLE/FM



- Standard front mounting (with bezel)
- Max panel thickness 5 mm
- Optional sound function with plastic actuator
- Side cable output, length and connector customizable
- Dimensions: Ø87 mm

M-DOOR SINGLE/RM



- Standard rear mounting (no bezel)
- Panel thickness from 2.5 to 4 mm
- Optional sound function with plastic actuator
- Side cable output, length and connector customizable
- Dimensions: Ø45 mm

M-DOOR SLIM/W



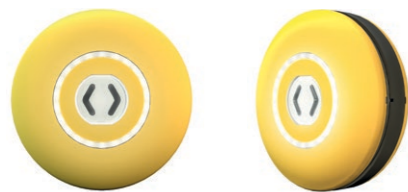
- Slim oval shape housing
- Wall front mounting with two vandalproof screws
- Vertical or horizontal orientation
- Optional sound function with plastic actuator
- Dimensions: 48 x 78 mm

M-DOOR SLIM/P



- Slim oval shape housing
- Pole mounting Ø30 to Ø35 mm with vandalproof screws
- Optional sound function with plastic actuator
- Side cable output, length and connector customizable
- Dimensions: 50 x 114 mm

M-DOOR DOUBLE



- Double push button, voltage 12 to 36 VDC
- 4 to 6 mm glass mounting with drilling
- Automatic thickness adaptation and fixation system
- Single cable output on the side, length and connector customizable
- Dimensions: Ø87 mm

M-DOOR SINGLE/RMS



- Compact rear mounting (no bezel)
- Rectangular housing shape 49 x 66 mm
- Panel thickness from 2.5 to 4 mm
- Optional sound function with plastic actuator
- Side cable output, length and connector customizable
- Dimensions: Ø45 mm

M-DOOR MINITYPE



- Compact 3 mm flush round button
- Ø52 mm stainless steel housing
- Front mounting with M27 rear nut
- Axial cable output, length and connector customizable
- Dimensions: Ø52 mm



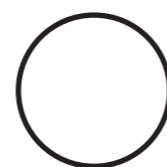
Variety of symbols and braille on plastic or metal actuator.

M-DOOR FULLY CONFIGURABLE

Here is a short overview of our large bezel configurability, forms, material, colors, which can be associated with actuator selection of pictograms and relief/braille. For the complete details, please ask for our Product Configuration and create your own product.

BEZEL FORMS/MATERIAL

- Round – plastic or metal/ available with text in relief or braille
- Triangle with SOS text and braille – only plastic



- Square – only metal



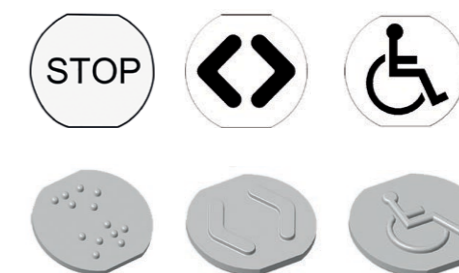
BEZEL COLORS



- Decorative Chrome (metal bezel only)

PLASTIC ACTUATOR

Customization of color, pictogram and relief/braille.



METAL ACTUATOR

Customization of color, pictogram and relief/braille.



TSL-ESCHA and MAFELEC offer customers a wide range of different push buttons.

MAFELEC TEAM LARGE VARIETY OF PUSH BUTTONS

The numerous possible combinations within the push button series results in an almost infinite variety of solutions for TSL-ESCHA and MAFELEC customers. Push buttons of the MAFELEC TEAM can be found everywhere on buses, trams, metros or trains. Whether on the exterior, interior or in the lavatories.

- Intuitive operation and clear recognition, even for passengers with limited capabilities, thanks to touch surfaces and acoustic signals
- Designed for railway and bus applications and accordingly conceived for harsh environments
- Developed to meet the market requirements of transport companies and the expectations of their passengers

TSL-ESCHA AND MAFELEC

OVERVIEW PUSH BUTTON SERIES

PK52



- Large active touch surface (Ø52 mm) with plane or tactile, protection cap; tactile switching feel
- Invisible fastening elements, enhanced protection against manipulation by unauthorized persons
- Solid stainless steel or alternatively plastic bezel
- Versatile and individual parameter setting
- One- and double-sided function, suitable for glass doors (4-14 mm glass thickness)

PK



- Possibility of different switching functions, touch surfaces, mounting rings, LED colors and pictograms
- Eight construction types
- Hermetically sealed due to one-piece housing design
- Space-saving installation
- One- and double-sided function

M-DOOR VG



- Modern intuitive aesthetic lighting (VG = Vertical Green) for visually impaired people
- Haptic feedback
- Standard panel front mounting
- Large customization, plastic or metal bezel, plastic actuator, several schematics
- Good resistance to anti-graffiti removers

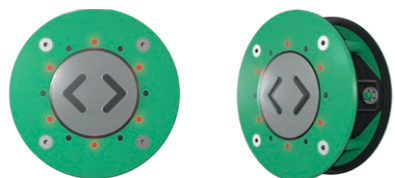
M-DOOR GM



PATENTED PRODUCT

- No glass drilling, 3 to 20 mm glass thickness compatible
- Single or double-sided mounting
- No pairing, inside/outside buttons auto-synchronization
- Each LED area individually configurable
- M-Safe option in progress: touchless/antimicrobial surface

CK



- Particularly flat design
- Seven construction types allow versatile use
- Robust stainless steel front panel
- Complies with durability of contrast of pictogram and front panel
- Tactile switching feel
- One- and double-sided function

MP



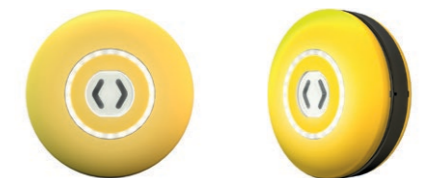
- Sealed, one-piece push button
- Smallest push button series of TSL-ESCHA
- Switches wear-free and withstands extreme conditions
- Selection of different colors for the inside ring and LED
- Often used in high speed trains

M-DOOR SINGLE

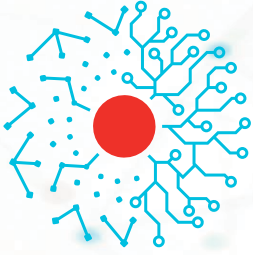


- Large illuminated area
- Haptic feedback
- Standard panel front or rear mounting
- Large customization, plastic or metal bezel and actuators, several schematics
- Orientation or confirmation tone function

M-DOOR DOUBLE



- Large illuminated area
- Single or double sided push buttons
- Easy and fast tool-free mounting
- Automatic glass thickness adaptation from 4 to 6 mm
- Large customization, plastic or metal bezel and actuators, several schematics



MAFELEC TEAM

CREATING SMART AND SUSTAINABLE INTERFACES

HMI INTERIOR AND EXTERIOR

- DOOR EQUIPMENT
- PASSENGER COMFORT
- SANITARIES
- DRIVER DESK
- SAFETY SOLUTIONS

DETECTION & PROTECTION

- VOLTAGE & CURRENT SENSORS
- CIRCUIT BREAKERS
- INSULATORS AND BUSHINGS
- POWER SWITCHES

LIGHTING INTERIOR AND EXTERIOR

- FRONT LIGHTING
- INTERIOR LIGHTING
- EXTERIOR LIGHT SIGNATURE



MAFELEC
471, Route de la Cuisinière | 38490 Chimilin | France
T +33 4 763 207 33 | contact@mafelec.com
www.mafelec.com



TSL-ESCHA GmbH
Elberfelder Straße 1 | 58553 Halver | Germany
T +49 2353 66796-0 | info@tsl-escha.com
www.tsl-escha.com

MEMBERS OF THE MAFELEC TEAM

