LIGHTING APPLICATIONS

CREATE
THE
DIFFERENCE

alanod

LIGHTING

alanod

Your experts for coil coating processes

We have been market leaders in the production of semi-finished products for reflectors in the lighting industry for over 40 years now – but it doesn't stop there: our strengths now also include innovative solutions for light control, glare reduction and homogeneous light distribution. As a specialist in functional and decorative strip metals, we are the only company in the world to offer all processing techniques from a single source, from anodising and PVD coatings to custom-developed coating systems.

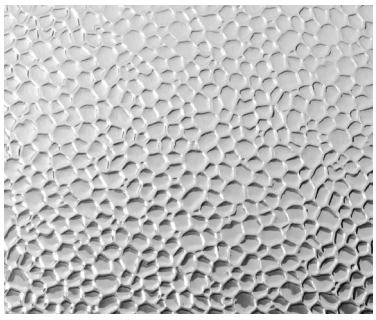
In addition to excellent material properties and a variety of design options, our surface finishes also offer significant economic benefits: using pre-treated strip metals or panel blanks allows significant cost savings in the manufacturing process. Our products are immediately ready for use and are suitable for printing, back-injection moulding with plastic or for use in the laminates industry.

Your partner for lighting technology surfaces

Whether at work, at home or out and about, light is a key factor in human well-being and productivity. The right light creates security and atmosphere. As a long-term partner for the lighting industry, we have evolved into specialists for highly reflective, durable and innovative surfaces.

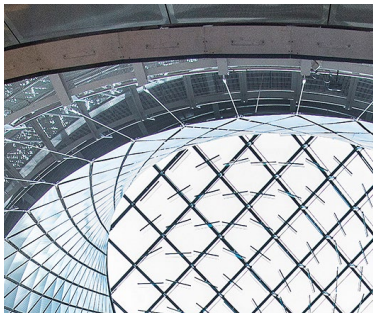
Be it precise light control for illumination and glare reduction, extremely homogeneous or even asymmetrical reflection, we have the perfect materials to ensure efficient solutions.

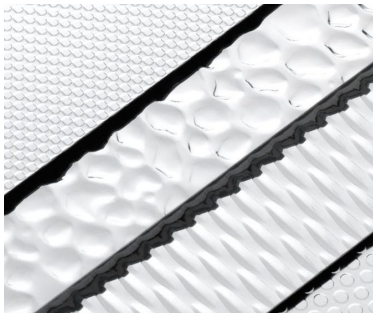
OUR TAILOR-MADE REFLECTIVE MATERIALS – YOUR BENEFITS



> Long-term stability that is equal to LED durability

v Glare limitation thanks to precise light control or reduction of high point luminance





^ Increased efficiency thanks to maximum total light reflection

^ Neutral colour reproduction thanks to excellent colour rendering index

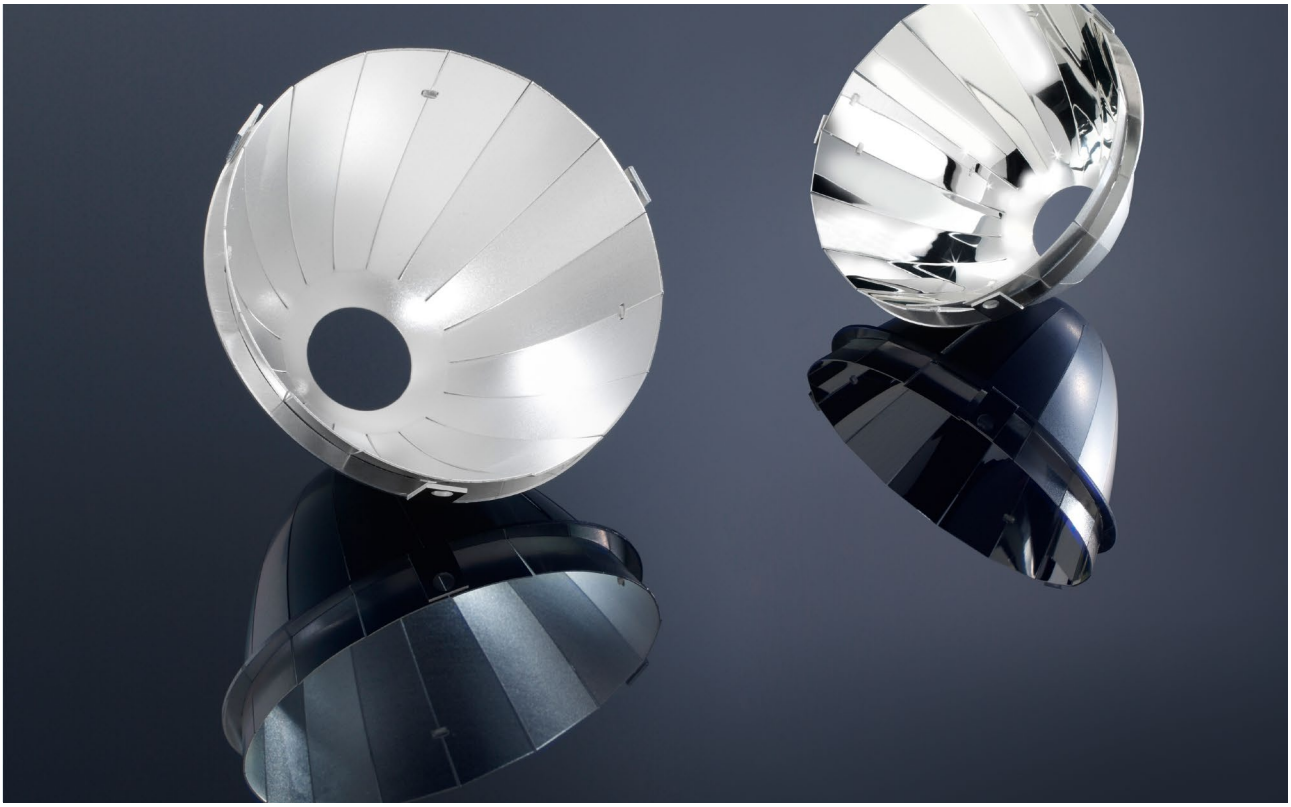
High-quality products > that start with the choice of materials

Light quality through durability

An LED bulb is designed to last 50,000 hours. The reflector material used in an LED lighting system should provide consistently high performance over such a long period without reflection loss or colour distortion.

This is often not the case with plastic materials: vaporised reflector systems and plastic lens systems are prone to signs of degradation, increasingly producing undesirable colour effects (chromatic aberration) over time.

The long-term stability of our reflector surfaces (MIRO® and MIRO-SILVER®) has been tested under the toughest conditions: a high-pressure discharge lamp was used to heat the surface of the reflector to over 100°C – a thermal load that is never attained in normal operation with low-heat LED bulbs. Even after 50,000 hours, our MIRO® and MIRO-SILVER® surfaces continued to show high reflective properties.



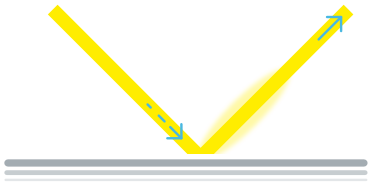
Light quality through light control

Light control is crucial to ensuring excellent light quality. Regardless of whether an application requires isotropic or anisotropic reflection characteristics, whether a darklight effect is desired or the reflector material needs to have an ergonomic self-luminance, our product range offers the ideal surface.

WE HAVE SURFACES FOR:

Directing light precisely – such as for downlights or spotlights in shop lighting, as well as for industrial lighting at great heights (e.g. MIRO® 27)

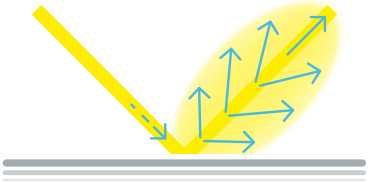
Reflection type optical mirror effect



MIRO® 27 dispersion characteristics

Directing light diffusely – such as for streetlights and industrial lighting at a lower height. Our materials allow individual LED light points to be dissipated, thus achieving smooth light distribution (e.g. MIRO® 20)

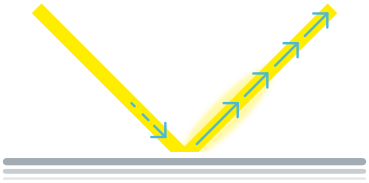
Reflection type controlled diffuse



MIRO® 20 dispersion characteristics

Distributing light linearly through one surface alone – the point becomes a line. At workstations in offices or industry, linear lights are far superior to rotationally symmetrical solutions in terms of ergonomic results (e.g. MIRO® 5/5013GP)

Reflection type directed/diffuse with strong preferential direction

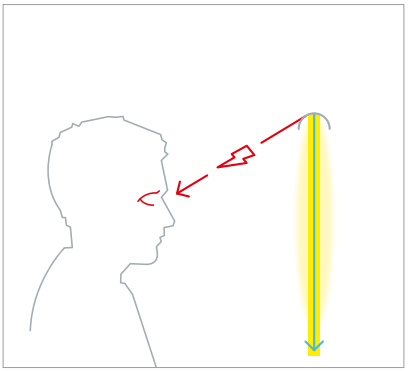


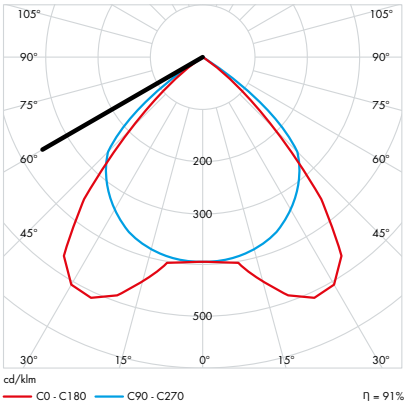
MIRO® 5 dispersion characteristics

Light quality through glare limitation

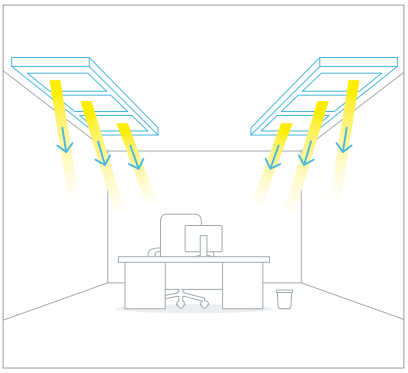
The high performance of modern LED technology has once again shifted developers' and users' focus onto the issue of glare. In order to avoid glare, diffuse emitting covers are sometimes fitted to a light source, but this creates disadvantages: optimal ergonomic lighting cannot be ensured in workplaces, and colour and detail recognition are negatively impacted in shop lighting.

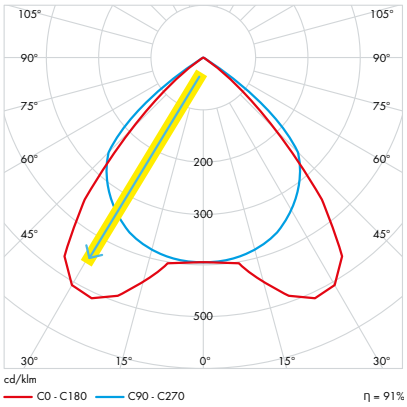
Precise light control can ensure that the focus is not drawn towards the high point luminance of a powerful LED, thus preventing direct glare.



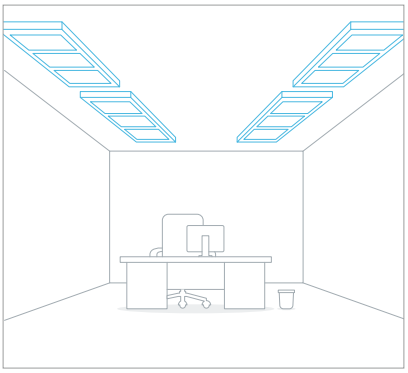


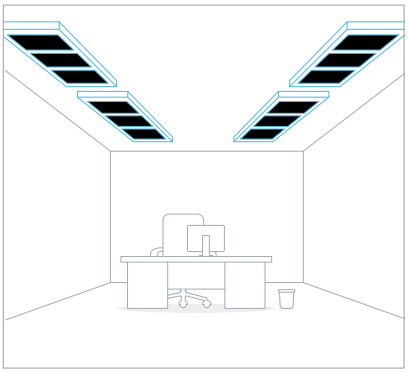
Correct light control through the reflector gives light a precise intensity distribution curve. A specialist planner can thus arrange a lighting system to ensure an optimised CRF (contrast rendering factor) for the illumination of workplaces.





A lighting concept with adapted self-luminance will blend in harmoniously with the surroundings and help avoid glare caused by excessively high differences in luminance.





Our lighting technology products

ANODISING – THE BASIS FOR OUR SURFACES

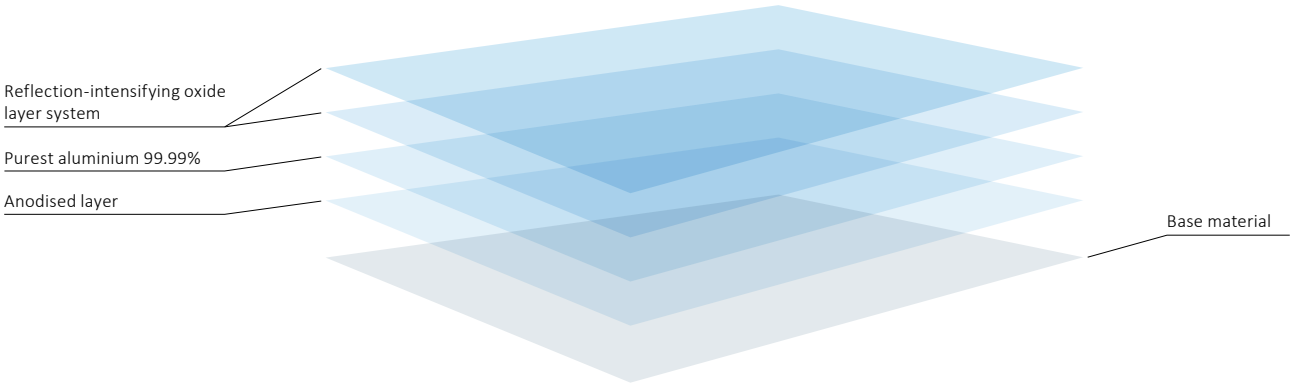
Based upon our core competence, we produce anodised aluminium strips using sulphuric acid in a direct current process known as anodising. This process has been used successfully in lighting technology for decades due to its stable basic qualities.

Thanks to the almost glass-hard oxide layer produced in the anodising process, Alanod's anodised qualities are optimally protected.

MIRO®

MIRO®, the material quality most commonly used in conjunction with all light sources including LEDs, combines a high total light reflection of 94 to 95% with excellent long-term stability. For over two decades, MIRO® has been synonymous with efficient lighting systems.

MIRO® LAYER STRUCTURE

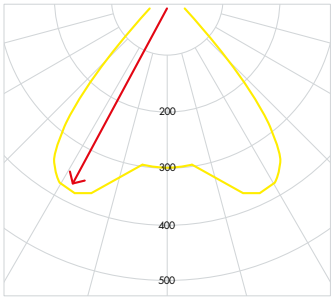


Neutral colour reproduction

The excellent colour reproduction of our MIRO® and MIRO-SILVER® qualities guarantees a neutral colour experience without the chromatic aberration seen in some lens systems.

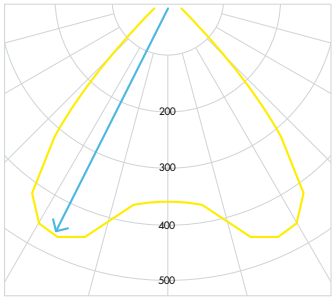
Efficiency

MIRO® increases efficiency by at least 20%, even in a standard, wide-angle reflector concept.



LOR (η) 69%

Standard anodised –
conventional material



LOR (η) 83% | +20%*

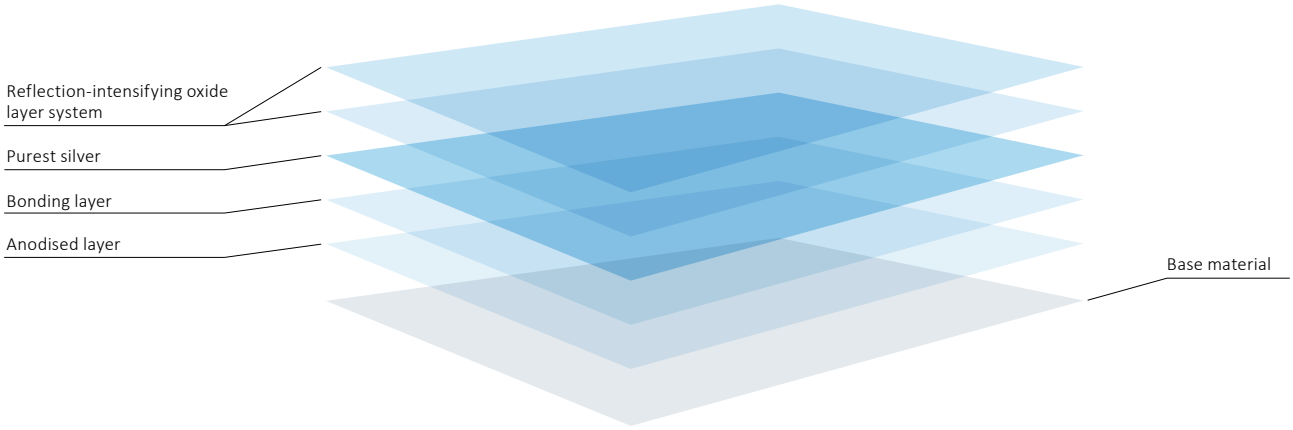
MIRO® –
optimised reflection

*Compared to anodised aluminium

MIRO-SILVER®

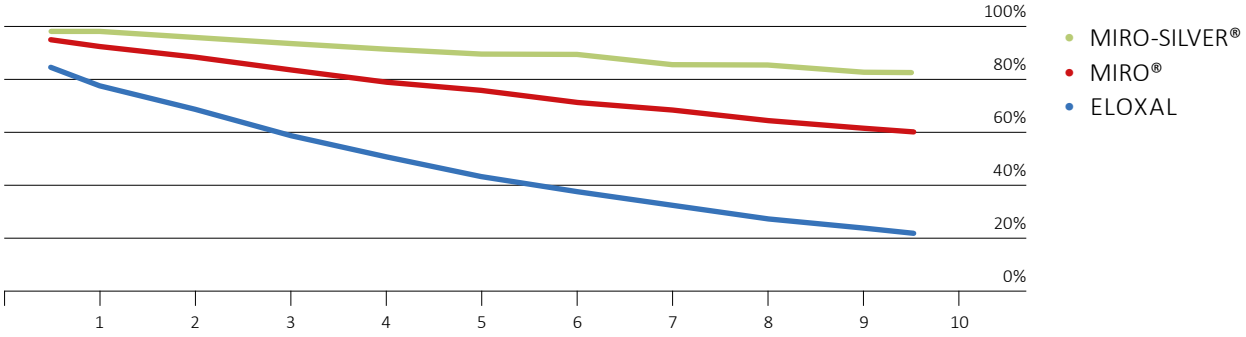
With a total light reflection of more than 98%, MIRO-SILVER® is a frontrunner when it comes to energy-efficient lighting solutions. MIRO-SILVER® quality further improves what is already possible with MIRO®.

MIRO-SILVER® LAYER STRUCTURE



Reflective properties

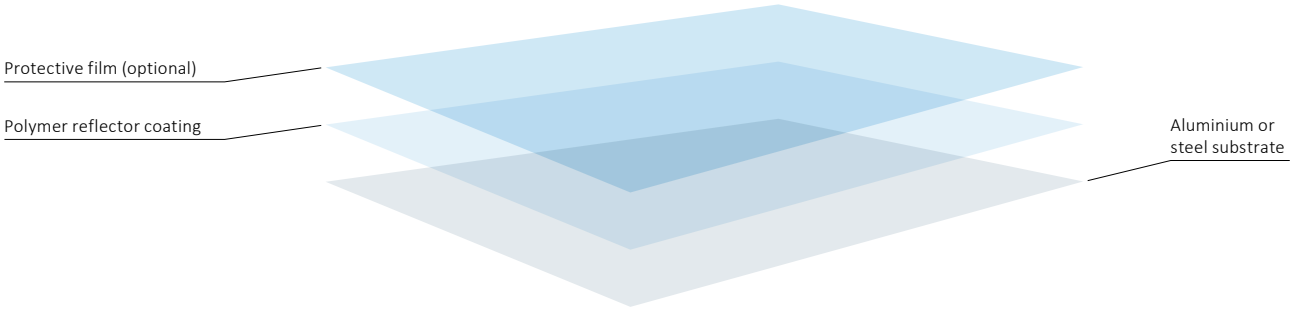
Some lighting solutions require multiple reflections, and this is where the strengths of MIRO-SILVER® lie: compared to the already highly reflective MIRO®, MIRO-SILVER® achieves an increase of 14% after five reflections and an increase of 27% after ten reflections. Thus, with narrow-angle spotlights such as those in shop lighting, the efficiency of the reflector design can be significantly optimised.



MIRO® WHITE

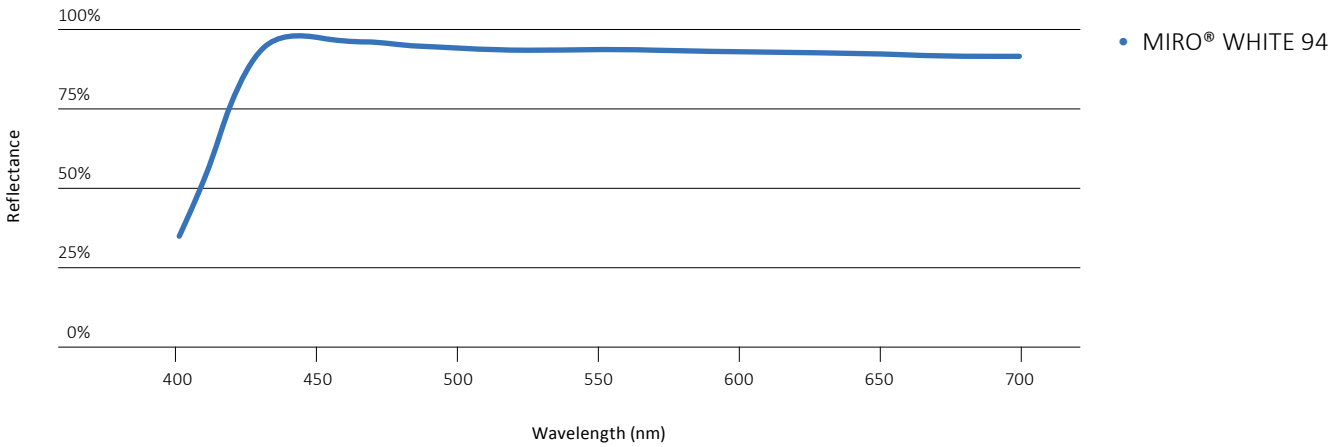
MIRO® WHITE is a highly reflective, matte white polymer material that acts as a functional layer guaranteeing uniform, diffuse reflection characteristics in all directions. Therefore, our MIRO® WHITE surfaces are particularly suitable for use as reflectors and light housings in the field of indirect lighting, with the aim of optimising uniform illumination. They offer total light reflection of 94% or even 98%.

MIRO® WHITE 94

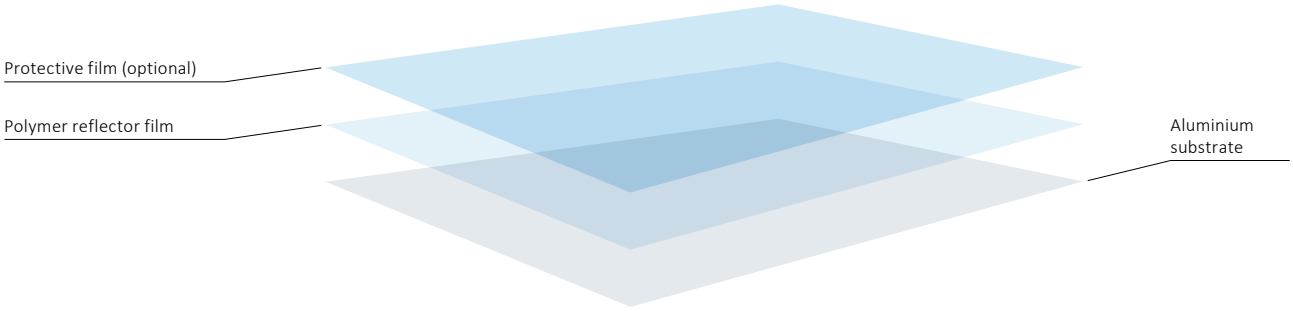


MIRO® WHITE 94 is a highly reflective white polymer that is applied to aluminium or steel substrates in an innovative coating process – for up to 94% total light reflection.

- UV-stable for most applications
- Continuous thermal stability up to 120˚C
- Stable in a humid environment
- Antistatic
- Abrasion-resistant
- Chemically resistant to most common cleaning solutions; not compatible with bleaches or alkalis.

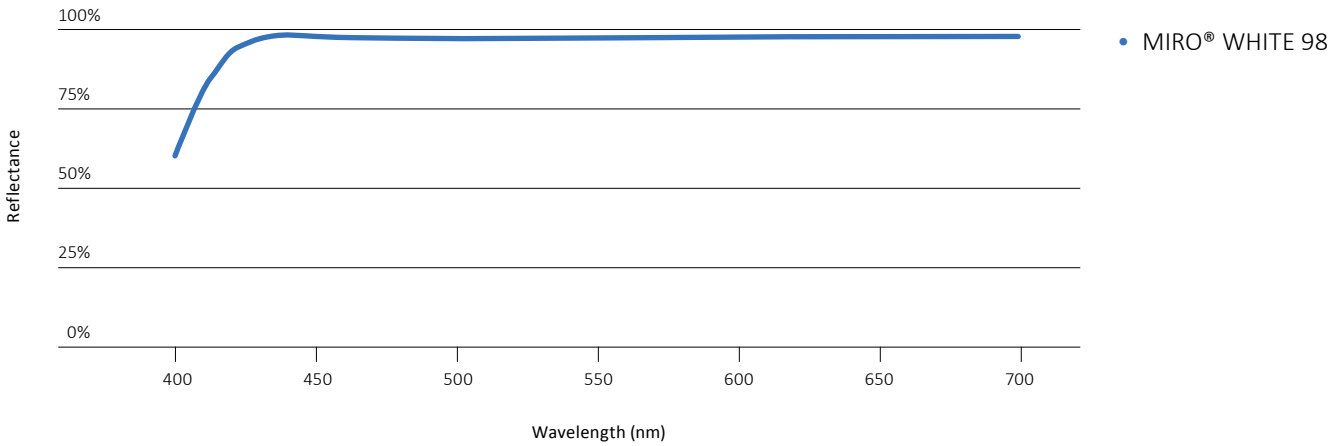


MIRO® WHITE 98



MIRO® WHITE 98 is a highly diffuse reflective metal composite with a matte finish that boasts an impressive total light reflection of 98%.

- UV-stable for most applications
- Continuous thermal stability up to 100˚C
- Stable in a humid environment
- Antistatic
- Abrasion-resistant
- Chemically resistant to most common cleaning solutions; not compatible with bleaches or alkalis.



Our solutions for extraordinary lighting concepts

HIGH-QUALITY LOOK

Our aluminium qualities stand out not only with their excellent reflective properties, but also with the high-quality appearance of their metallic surface. This gives modern light and reflector designs unique quality and value.

SIMPLE PROCESSING

Special lighting concepts require special reflector materials. Surfaces for lighting technology are more and more frequently being formed three-dimensionally using techniques such as pressing, deep drawing or hydroforming. These methods can also be combined with the segmentation of reflectors. We offer suitable qualities for this in terms of strength properties.

Here is an example of the adapted strength properties of a quality with almost identical lighting properties:

MECHANICAL PROPERTIES

Strength properties	Basic quality (hard)	3D forming quality (soft)
Yield strength Rp 0.2 [MPa]	130–165	30–60
Tensile strength Rm [MPa]	140–175	60–90
Strain A50 [%]	≥2	≥30

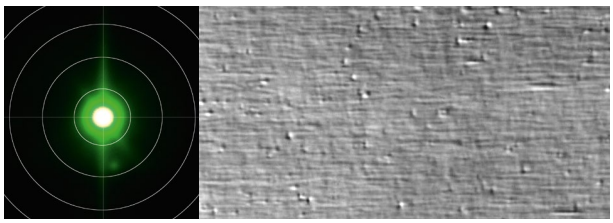
SURFACE DISPERSION CHARACTERISTICS

The following illustrates the dispersion characteristics of our surfaces for a light incidence below 45°, supplemented by topographic images of the surfaces. These representations allow an initial estimation of the reflective properties of our surfaces. Precise optical values can be found in the table on page 14.

You can request BRDF (bidirectional reflectance distribution function) data for the calculation of your reflector models for this and other surfaces from Ms Rauth via the email address: frauke.rauth@alanod.de.

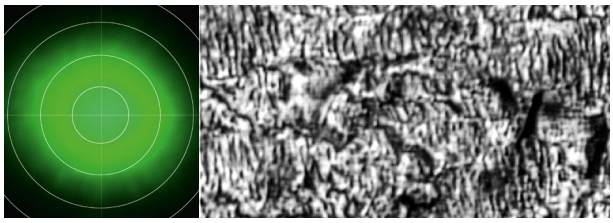
MIRO® 27 | 4270 GP

- High-gloss surface with low diffuse reflection <6%, minimal preferential direction
- Optical mirror effect
- High brightness



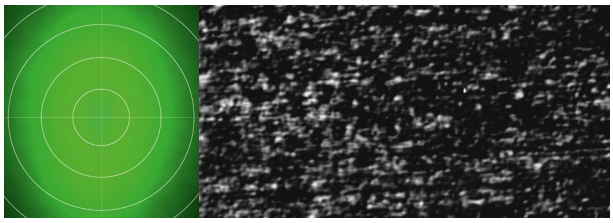
MIRO® 20 | 2000 GP

- Scattergloss surface with purely diffuse reflection, almost without preferential direction
- Increasing brightness at lower incident angles



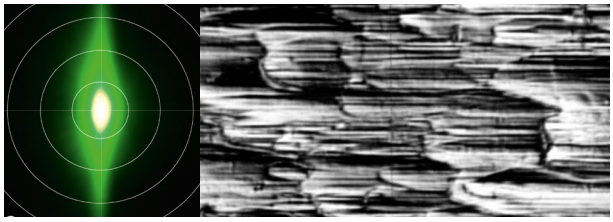
MIRO® 12 HD | 1200 GP HD

- Particularly isotropic, highly diffuse reflection surface due to special surface treatment
- Perfect light mixing
- Ideal for LED applications due to dissipation of light spots – glare reduction



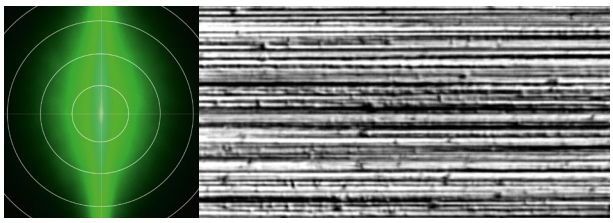
MIRO® 7 | 5000 GP

- Reflector matte surface, highly diffuse reflection rhod = 84–90%
- Preferential direction: also with and against the rolling direction



MIRO® 5 | 5013 GP

- Mill finish surface with strong preferential direction, almost purely diffuse reflection
- White appearance due to the magnesium content of the substrate



OPTICAL VALUES OF OUR PRODUCT QUALITIES

ALANOD® quality	Total light reflection [%] DIN 5036-3 ASTM-E1651	Diffuse reflection [%] DIN 5036-3	Brightness 60° lengthwise ISO 7668	Brightness 60° across ISO 7668	Maintained reflectance class DIN EN 16268
4270 AG (MIRO-SILVER®)	≥98	≤ 6	≥93	≥92	A+
4270 GP (MIRO®)	≥95	≤ 6	≥91	≥90	A
318 G2 (Eloxal)	≥87	≤ 8	≥83	≥82	C
5000 AG (MIRO-SILVER®)	≥97	84–94	75–85	65–75	A+
5000 GP (MIRO®)	≥94	84–90	72–78	55–65	A
1520 G3 (Eloxal)	≥86	70–75	65–70	50–62	C
5013 AG (MIRO-SILVER®)	≥97	≥95	40–60	10–30	A+
5013 GP (MIRO®)	≥94	≥93	35–55	10–30	A
1100 G (Eloxal)	≥84	80–84	30–55	10–25	C
2000 AG (MIRO-SILVER®)	≥97	≥97	18–28	23–33	A+
2000 GP (MIRO®)	≥94	≥94	15–25	20–30	A
2000 G (Eloxal)	≥87	≥87	5–20	10–30	C
1200 AG HD (MIRO-SILVER®)	≥96	≥96	5–15	5–15	A+
1200 GP HD (MIRO®)	≥93	≥93	5–15	5–15	A
1200 (Eloxal)	≥76	≥76	<10	<10	D
MIRO® WHITE 94	≥94	≥94	<1	<1	A
MIRO® WHITE 98	≥98	≥98	<1	<1	A+

Maintained reflectance class DIN EN 16268	Total reflection [%]	Maintained reflectance class DIN EN 16268	Total reflection [%]
A+	97.0–100.0	**E**	70.0–75.9
A	93.0–96.9	**F**	64.0–69.9
B	88.0–92.9	**G**	58.0–63.9
C	82.0–87.9	**H**	50.0–57.9
D	76.0–81.9		

CLIMATE-NEUTRAL COMPANY

Protecting the planet is one of the biggest challenges of our times. In light of this, we see it as our duty as a company to do everything we can to help ensure that international climate change targets are met. We had our CO2 emissions at the Ennepetal site and the product-related emissions of the automotive branch measured and will be compensating for these with carbon offsetting certificates in accordance with the UN CER standard in 2019 and 2020.

RECYCLING FROM THE START

Aluminium is perfectly suited to recycling. Because of this, our aluminium products are not only made of up to 90% recycled material (depending upon the desired surface quality), but can also be recycled with virtually no losses at the end of their life. This has both economic and ecological benefits: producing recycled aluminium takes up to 95% less energy, generates fewer emissions and helps protect natural bauxite reserves.

INNOVATIVE SURFACE SYSTEMS FOR A WIDE VARIETY OF REQUIREMENTS

In our system development, a broad-based team of experts works closely with long-standing industrial partners and international research institutions. Our aim: to use newly developed processes and interdisciplinary cooperation to create tailor-made products and solutions for our customers from a wide variety of industries. Talk to us so that we can work together to fulfil your wishes.

Would you like more information or a personal consultation?
Get in touch with us.

Frauke Rauth

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Lighting / E / 10.2019

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