

QUALITY SHINES.



Unlimited colors – Colorants for plastics

X **Macrolex**[®] X **Bayplast**[®]

QUALITY WORKS.

LANXESS
Energizing Chemistry

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Product Range – Macrolex® Dyes

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	Macrolex® Yellow 3G Solvent Yellow 93		Macrolex® Violet 3R Solvent Violet 36
	Macrolex® Yellow G Solvent Yellow 114		Macrolex® Violet B Solvent Violet 13
	Macrolex® Yellow E2R		Macrolex® Blue 3R
	Macrolex® Orange 3G Solvent Orange 60		Macrolex® Blue RR Solvent Blue 97
	Macrolex® Orange HT		Macrolex® Green 5B Solvent Green 3
	Macrolex® Orange R Solvent Orange 107		Macrolex® Green G Solvent Green 28
	Macrolex® Red E2G Solvent Red 179		Macrolex® Black 2B
	Macrolex® Red A		
	Macrolex® Red EG Solvent Red 135		Macrolex® Fluorescent Yel. 10GN Solvent Yellow 160:1
	Macrolex® Red B Solvent Red 195		Macrolex® Fluorescent Red G
	Macrolex® Red 5B Solvent Red 52		Macrolex® Fluorescent Red 4B Solvent Red 149

Shades may differ from the real color due to printing influence or monitor settings.



Colorant Additives business, which is part of the Polymer Additives Business Unit, offers customers all over the world high-quality colorants for a wide range of different applications. Outstanding product quality, long-standing technical expertise, and the fulfillment of wide-ranging regulatory requirements are the critical distinguishing features of the Colorant Additives business product range.

The following pages give technical information on LANXESS colorants used for plastics

- Macrolex® soluble dyestuffs are used for engineering plastics.
- Bayplast® organic pigments are used for standard plastics.

The Macrolex® product range includes dyestuffs which are classified as disperse or solvent dyes.

Some dyes have a high solubility in solvents like Macrolex® Yellow 6G, others like Macrolex® Red EG show very low solubility. In all cases Macrolex® dyes are fully soluble in hot engineering plastics.

In contrast to standard disperse dyes, Macrolex® dyes are extremely pure and have a very low amount of impurities.

As early as in the 1960s Macrolex® dyes were developed for the special needs of plastics coloration. Process conditions for engineering plastics like polystyrene, ABS, PC, PMMA, PA and others are quite severe. During extrusion and injection molding of PC, the dyes have to withstand temperatures up to over 350°C for some minutes. Only selected dyes show the chemical resistance necessary.

Chemical stability also leads to long lasting final products which have to withstand sunlight and weather. For example red car taillights will last as long as the car itself without losing their bright red color. To achieve this, the right transparent polymers and dyes have to be used.

Properties

Macrolex® dyes are suitable for coloring amorphous thermoplastics such as:

- PS, EPS, SB*, SAN*, ABS and their blends (*not block copolymers)
- PMMA, PC, PPO and their blends
- PVC-U, PET, (PBT)
- (PA-6, PA-12), CA, CAB

The **Macrolex®** range contains soluble dyes with following properties:

- High heat stability
- Good light fastness and weather resistance
- High color strength
- Outstanding brilliance
- High purity, safe to use for food and toys

In chemical terms, the dyes belong to various classes. For the coloring of plastics, the heat stability of the colorant is one of the key selection criteria. The data given in the tables on heat stability and light fastness are guide values and not physical constants. They are dependent on the relevant substrate and the concentration used and must be tested in each individual case.

Soluble dyes are not recommended for coloring crystalline systems such as:

- HDPE, LDPE, PP
- Thermoplastics containing plasticizers, e.g. flexible PVC and flexibilized cellulose esters

For these polymers **Bayplast® pigments are suitable.**

The transparent coloring of glass-clear plastics is only possible with soluble dyes. For opaque coloring, the **Macrolex®** dyes have to be combined with organic pigments such as:

- Titanium dioxide
- Iron oxide pigments
- **Bayplast®** pigments

Macrolex® dyes dissolve completely in the plastics melt at the respective processing temperatures of the thermoplastic. In practical application, this means:

- Maximum color yield
- High reproducibility of color formulations; irrespective of the dispersing speed of the equipment used

Macrolex® dyes are soluble in organic solvents, e.g. aromatics, esters, chlorinated hydrocarbons. They are insoluble in water and dilute aqueous solutions of acetic acid or alcohol. Not being soluble in water and alcohol is important for use in consumer goods, food packaging and children's toys made of colored plastics, because the dye cannot bleed into the respective media. Migration must be checked in each individual case whenever there may be contact with printing inks and coatings based on organic solvents.

Macrolex® dyes should be treated like organic pigments when coloring thermoplastics. Thorough mixing and dispersion plus high processing temperatures encourage the dissolving of the dyes.

Where dyes with low solubility and high melting point are used, e.g. **Macrolex® Red EG**, particular attention should be paid to thorough mixing and dispersion before the plastification stage.

Some dyes, e.g. **Macrolex® Orange 3G**, tend to sublime at high processing temperatures.

They can be replaced by other dyes with better fastness to sublimation, such as **Macrolex® Red EG**, **Macrolex® Red E2G** and **Macrolex® Orange R**. For electronic parts produced by two-component molding of polymers, dyes like **Macrolex® Yellow E2R** are recommended.

Macrolex® dyes comply with the current regulations worldwide concerning dyes for use in:

- Food packaging
- Food contact applications
- Children's toys made of plastic



WE HAVE REVOLUTIONIZED DYES: MACROLEX® GRAN



A new era in coloring plastics has begun with **Macrolex®**, one of the first microgranulated dyes ever. It is

- Efficient
- Cost-effective
- Easier to process than powder dyes and leads to very low dusting

The outstanding properties of **Macrolex®** have been combined with a granular form, making LANXESS one of the few manufacturers in the world to achieve an all-round improvement in the quality of high-grade dyes. Gran are hollow spheres with diameters of about 0.3 mm.

Outstanding properties

Thanks to its unique consistency **Macrolex®** saves both time and money. **Macrolex®** guarantees maximum color quality and outstanding properties.

Exact metering

Macrolex® has better flow properties than any powder dye and can therefore be metered more exactly. **Macrolex®** is the ideal dye for automatic weighing and continuous manufacturing processes.

Easier to process

Macrolex® has better solubility and is therefore easier to process. The microgranules are dispersed quickly, evenly and completely.

Safe

The high purity of **Macrolex®** dyes provides improved safety in children's toys and packaging for cosmetics and foods.

Virtually no residues

The microfine **Macrolex®** particles have very good flow properties that allow containers to be emptied almost completely before disposal. Production units are much easier to clean.

Very low dust formation

Macrolex® generates considerably less dust than powder dyes. Handling is therefore much cleaner and more environmentally friendly and has a lower impact on health.

Reduced capacities

On account of its lower volume, **Macrolex®** is more economic to store, transport and process.

High quality

Compared with most conventional powder dyes, **Macrolex®** dyes are characterized by their consistent high quality.



NOVEL MACROLEX® ORANGE HT

Hightech soluble dye for PA and other resins



Macrolex® Orange HT is an organic high-performance solvent dye perfect for the coloration of PA and other technically very demanding plastics in terms of high-temperature processing or application.

Properties

The bright and brilliant orange color of Macrolex® Orange HT meets RAL 2003. In terms of heat stability in PA or in terms of sublimation resistance, Macrolex® Orange HT exhibits advantageous properties. In general, Macrolex® Orange HT unites high fastness and fine coloristics.

- Very brilliant orange + high color strength
- Heat stability: 310°C in PA6, 300°C in PA6.6 (for PC, PET, BPT, PPS, see table below)
- Very high sublimation temperature (510°C)
- High migration stability
- High lightfastness

Applications

Macrolex® Orange HT can be used where many orange colorants fail due to thermal stress or unsuitability to PA.

E-vehicles are operated with up to 400V direct voltage in the battery circuit and up to 1,000 V alternating voltage in the motor circuit. Since this is considered to be potentially life-threatening, orange color is used as an identifying and safety feature for high-voltage cables and connection components in hybrid and electric cars. These high-

voltage components need to be recognizable over the entire lifetime of a vehicle. Other possible applications are power tool housings or gears. For such demanding applications, Macrolex® Orange HT is the perfect choice.

Furthermore, the dye can of course be used for coloration of all other high-quality plastic products, such as beverage bottles, electronic devices, car taillights, engineering plastics, and children's toys.

Benefits

While most traditional colorants are not suitable for PA, Macrolex® Orange HT is a robust dye exhibiting excellent thermal stability, migration fastness, lightfastness, and not only in PA but also in, e.g., PC or PPS. Furthermore, the color orange is especially sensitive to quality fluctuations. Macrolex® Orange HT exhibits the following key benefits:

- Particularly suitable for PA applications
- Expanded product life cycle
- Outstandingly consistent and exact coloristics (dE ≤ 0.7)
- Cost efficient due to high color strength
- Halogen-free

Table: Heat stability in °C at 1/3 standard depth with 1% TiO₂ (DIN EN 12877)

	PC	PA 6 6.6	PET	PBT	PPS
Orange HT	360	310 300	320	300	340



ECOLOGICAL STATUS

MACROLEX® DYES



Macrolex® dyes meet the high purity requirements of many application areas. These purity requirements are described below in detail.

Packaging

- Directive 94/62/EC
- The overall concentration of lead, cadmium, mercury or hexavalent chromium must not exceed 100 ppm by weight (0.01 %)

RoHS

- Restriction of the use of certain hazardous substances in electrical and electronic equipment
- Directive 2011/65/EU for Europe
- Similar regulations exist in Japan, the United States and China

Toys

- EN 71-3 (Safety of toys: Migration of certain elements)
- EN 71-9 (Safety of toys: Requirements of organic chemical compounds). Because of the chemical classification, Macrolex® Yellow 3G is not recommended

Food contact

Many national regulations for example:

- **Europe:** Resolution AP (89) 1. The purity requirements are met by all Macrolex® dyes. Because of the chemical classification, Macrolex® Yellow 3G and Macrolex® Black 2B are not recommended.

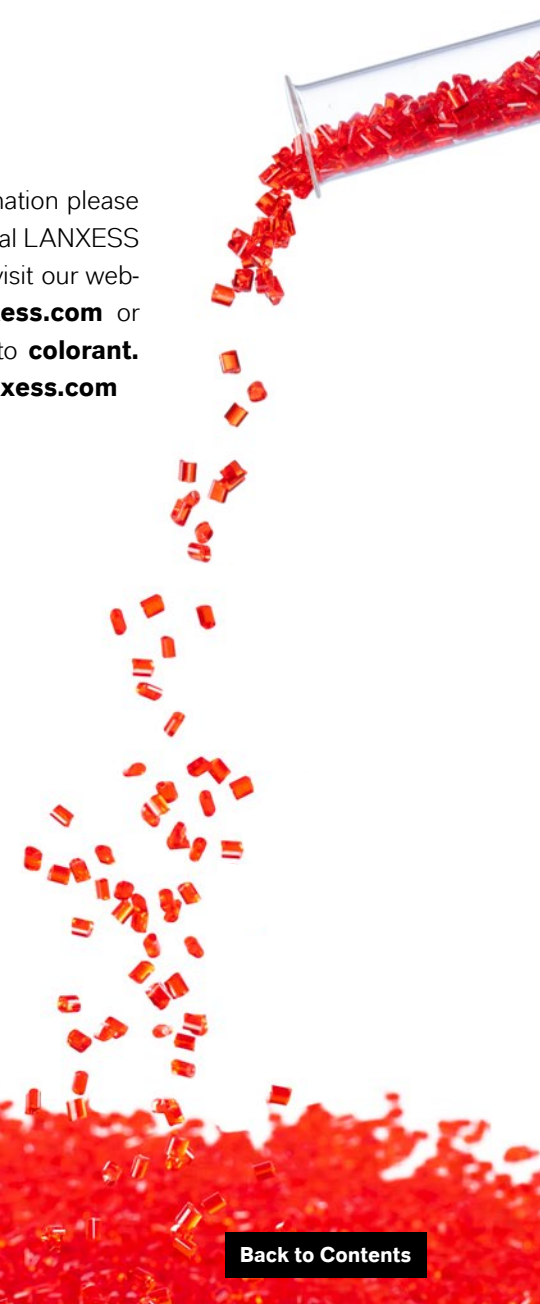
- **United States:** Nearly all Macrolex® dyes are approved for the coloring of PET in accordance with FDA regulations, at loadings of less than 0.20%.
- **Japan:** JCII (Japan Chemical Innovation and Inspection Institute). The prerequisite for the use of colorants in food contact applications is upon other terms a maximum of different heavy metals as specified by JCII. Since April 1, 2021 the Food Contact Materials Safety Center within JCII assumed JHOSPA's polymer and additive certification business.
- **Australia:** AS (Australian Standard) 2070.6 Plastic Materials for Food Contact Use: Limiting values for heavy metals and primary aromatic amines.
- **China:** GB9685 Hygienic Standards for Uses of Additives in Food Containers and Packaging Materials.

LANXESS Macrolex® grades fulfill these requirements and many other national regulations. Due to their high purity, they offer significant advantages to the end user.

REACH

All information with regards to REACH are available on our European safety data sheets.

For more information please contact your local LANXESS representative, visit our website www.lanxess.com or send an email to colorant.additives@lanxess.com



PRODUCT RANGE **MACROLEX®** DYES



 Click on the color for product details and find all information at a glance

	Macrolex® Yellow 6G Solvent Yellow 179		Macrolex® Red Violet R Solvent Violet 59
	Macrolex® Yellow 3G Solvent Yellow 93		Macrolex® Violet 3R Solvent Violet 36
	Macrolex® Yellow G Solvent Yellow 114		Macrolex® Violet B Solvent Violet 13
	Macrolex® Yellow E2R		Macrolex® Blue 3R
	Macrolex® Orange 3G Solvent Orange 60		Macrolex® Blue RR Solvent Blue 97
	Macrolex® Orange HT		Macrolex® Green 5B Solvent Green 3
	Macrolex® Orange R Solvent Orange 107		Macrolex® Green G Solvent Green 28
	Macrolex® Red E2G Solvent Red 179		Macrolex® Black 2B
	Macrolex® Red A		
	Macrolex® Red EG Solvent Red 135		Macrolex® Fluorescent Yel. 10GN Solvent Yellow 160:1
	Macrolex® Red B Solvent Red 195		Macrolex® Fluorescent Red G
	Macrolex® Red 5B Solvent Red 52		Macrolex® Fluorescent Red 4B Solvent Red 149



Shades may differ from the real color due to printing influence or monitor settings.

Macrolex® dyes are available as granulates (Gran), fine gran (FG) or powder. Powder and FG are recommended for liquid masterbatches. For an individual product Gran and/or powder and/or FG may be available. In all tables only one product name extension is given (e.g. GRAN) FG may be available (see product pages). SD (standard depth) refers to standardized coloration in opaque plastic using titanium dioxide. This allows comparison of dye efficiency for different colors. The SD concentration depends on the amount of titanium dioxide being used.

Macrolex® Yellow 6G



Color Index Part I: **Solvent Yellow 179**
 Color Index Part II: **-**
 Dyestuff type: **Methine**

Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 15 kg 10 kg 10 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	-	o	o
Heat Stability³⁾	300	300	260	280	300	350			300		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.070%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.360%	6-7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.070%	6-7
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	Tritan <100°C	PET Yes
BfR Yes	PET C-G (max 0.4%)	
FPL Yes		

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
115
Sublimation
340

Solubility⁶⁾

Organic Solvents			
Acetone	200	Styrene monomer	390
Benzyl alcohol	65	Xylene	130
Butyl acetate	90	MEK	350
Ethanol	2	Toluene	250
MMA	120	Paraffin 52/54	<1
Methylene chloride	550	Stearic acid	15

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	ACD	++			

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Yellow 3G

Color Index Part I: **Solvent Yellow 93**
 Color Index Part II: **48160**
 Dyestuff type: **Pyrazolone**

Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 25 kg 15 kg 25 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	-	+	+	+	+	+	+	-	-	o	-
Heat Stability³⁾	300	280	-	260	300	340			280		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.142%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.260%	6-7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.142%	6-7
Transparent	0.050%	8

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
187
Sublimation
310

Solubility⁶⁾

Organic Solvents			
Acetone	10	Styrene monomer	50
Benzyl alcohol	5	Xylene	25
Butyl acetate	8	MEK	21
Ethanol	0.6	Toluene	21
MMA	7	Paraffin 52/54	2
Methylene chloride	180	Stearic acid	12

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	CD	++	+	ABD	ACD	ACD	A		

*) Japan Chemical Innovation and Inspection Institute

1) + suitable o suitable with restrictions - not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Yellow G

Color Index Part I: **Solvent Yellow 114**
 Color Index Part II: **47020**
 Dyestuff type: **Quinophthalone**

Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 25 kg 15 kg 10 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	-	o	-
Heat Stability³⁾	300	300	300	300	300	340			300		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.065%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.120%	6-7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.065%	7
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PET C-G (max 0.2%)	PET Yes
BfR Yes		
FPL Yes		

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
264
Sublimation
320

Solubility⁶⁾

Organic Solvents			
Acetone	0.5	Styrene monomer	3
Benzyl alcohol	2	Xylene	1.5
Butyl acetate	0.5	MEK	*
Ethanol	0.1	Toluene	*
MMA	1	Paraffin 52/54	*
Methylene chloride	6	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	CD	++	+	++	CD	ACD			

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Yellow E2R

Color Index Part I: –

Color Index Part II: –

Dyestuff type: **Quinophthalone**

Availability Granulates (Gran)

Packaging 20 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	–	o	+
Heat Stability³⁾	300	300	300	300	300	340			320		–	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.070%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.140%	6-7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.070%	7
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PET C-G (max 0.2%)	PET Yes
BfR Yes		

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
212
Sublimation
380

Solubility⁶⁾

Organic Solvents			
Acetone	0.6	Styrene monomer	3.5
Benzyl alcohol	2.5	Xylene	1.6
Butyl acetate	0.5	MEK	*
Ethanol	<0.1	Toluene	*
MMA	1.5	Paraffin 52/54	*
Methylene chloride	10	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	++	++	++		

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request

Macrolex® Orange 3G



Color Index Part I: **Solvent Orange 60**
 Color Index Part II: **564100**
 Dyestuff type: **Perinone**

Availability Granulates (Gran) Fine gran (FG)
Packaging 15 kg 10 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	-
Heat Stability³⁾	300	300	300	300	300	350			320		300/300	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.155%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.280%	6
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.155%	6
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PET C-G (0.2%)	PET Yes
BfR Yes		
FPL Yes		

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
230
Sublimation
270

Solubility⁶⁾

Organic Solvents			
Acetone	1	Styrene monomer	7
Benzyl alcohol	4	Xylene	5
Butyl acetate	1.5	MEK	*
Ethanol	0.2	Toluene	*
MMA	3	Paraffin 52/54	*
Methylene chloride	10	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	++	+	ABD	ACD	++	C		

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Orange HT

Color Index Part I: –
 Color Index Part II: –
 Dyestuff type: **Perinone**

Availability Powder
Packaging 20kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	PPS	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	o	+	+	+	+	+	o	–
Heat Stability³⁾	300		320	320	300	360			320	340	310/300	300	–

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.180%	8
Transparent	0.050%	8
PA6		
1/3 SD Reduction 1.0% TiO ₂	0.180%	6
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.200%	7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.360%	7-8
Transparent	0.050%	8

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
280
Sublimation
510

Solubility⁶⁾

Organic Solvents			
Acetone	<0.1	Styrene monomer	*
Benzyl alcohol	*	Xylene	<0.1
Butyl acetate	*	MEK	*
Ethanol	<0.1	Toluene	<0.1
MMA	*	Paraffin 52/54	*
Methylene chloride	*	Stearic acid	*

*) data not available

Status⁷⁾

Europe	
AP(89)1	Yes
BfR	Yes
FPL	Yes

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

Macrolex® Orange R



Color Index Part I: **Solvent Orange 107**
 Color Index Part II: **–**
 Dyestuff type: **Methine**

Availability Granulates (Gran) Fine gran (FG)
Packaging 25 kg 15 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	–	o	–
Heat Stability³⁾	300	300	300	300	280	320			300		–	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.045%	5
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.090%	4
Transparent	0.050%	7
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.045%	3-4
Transparent	0.050%	7

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PS, EPS D-G	PET Yes
BfR Yes	Tritan <100°C	
FPL Yes	PET C-G (max 0.2%)	

- 1) + suitable o suitable with restrictions – not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
224
Sublimation
320

Solubility⁶⁾

Organic Solvents			
Acetone	3.5	Styrene monomer	5
Benzyl alcohol	65	Xylene	1
Butyl acetate	3	MEK	*
Ethanol	0.8	Toluene	*
MMA	1.5	Paraffin 52/54	1
Methylene chloride	60	Stearic acid	5

* data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	ACD	A	ACD		

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red E2G

Color Index Part I: **Solvent Red 179**

Color Index Part II: **564150**

Dyestuff type: **Perinone**

Availability Granulates (Gran) Fine gran (FG) Powder

Packaging 25 kg 10 kg 10 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	-
Heat Stability³⁾	300	300	300	300	300	350			320		300/300	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.160%	5
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.300%	4-5
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.160%	4
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	Tritan <100°C	PET Yes
BfR Yes	PET C-G (max 0.2%)	

1) + suitable o suitable with restrictions - not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
255
Sublimation
350

Solubility⁶⁾

Organic Solvents			
Acetone	0.5	Styrene monomer	4.5
Benzyl alcohol	20	Xylene	2.5
Butyl acetate	0.7	MEK	2
Ethanol	<0.1	Toluene	3
MMA	1.5	Paraffin 52/54	*
Methylene chloride	7	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	++	+	++	+	++		CD	

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red A

Color Index Part I: –
 Color Index Part II: –
 Dyestuff type: **Dyestuff mixture**

Availability Powder
Packaging 15 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	o	+		+	–	–	o	–
Heat Stability³⁾	300	280	280	300	280	300			300		–	–	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.060%	5
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.110%	4
Transparent	0.050%	7
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.060%	3-4
Transparent	0.050%	7

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
195
Sublimation
290

Solubility⁶⁾

Organic Solvents			
Acetone	0.4	Styrene monomer	4
Benzyl alcohol	1	Xylene	1
Butyl acetate	0.4	MEK	*
Ethanol	0.1	Toluene	*
MMA	1	Paraffin 52/54	*
Methylene chloride	45	Stearic acid	*

*) data not available

Status⁷⁾

Europe		USA	
AP(89)1	Yes	PET	C-G (max 0.1%)
BfR	Yes		

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red EG

Color Index Part I: **Solvent Red 135**
 Color Index Part II: **564120**
 Dyestuff type: **Perinone**



Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 25 kg 20 kg 20 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	-
Heat Stability³⁾	300	300	280	300	300	350			320		260/260	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.210%	7
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.400%	6
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.210%	7
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PS, EPS D-G	PET Yes
BfR Yes	PET A-H (0.6%)	
FPL Yes		

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
318
Sublimation
370

Solubility⁶⁾

Organic Solvents			
Acetone	<0.1	Styrene monomer	1
Benzyl alcohol	0.3	Xylene	0.7
Butyl acetate	<0.1	MEK	*
Ethanol	<0.1	Toluene	*
MMA	0.2	Paraffin 52/54	*
Methylene chloride	0.1	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	+	++	+		+

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red B

Color Index Part I: **Solvent Red 195**

Color Index Part II: **–**

Dyestuff type: **Azo**

Availability Powder

Packaging 10 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	–	+	–	–	o	–
Heat Stability³⁾	280	280	280	280	280	300			280		–	300	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.060%	8
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.120%	6
Transparent	0.050%	7-8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.060%	6-7
Transparent	0.050%	7-8

Status⁷⁾

Europe	USA
AP(89)1 Yes	PET C-G (max 0.4%)
BfR Yes	

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
210
Sublimation
310

Solubility⁶⁾

Organic Solvents			
Acetone	0.2	Styrene monomer	3.5
Benzyl alcohol	0.5	Xylene	0.5
Butyl acetate	0.2	MEK	*
Ethanol	<0.1	Toluene	*
MMA	0.5	Paraffin 52/54	*
Methylene chloride	40	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	CD	BD	++		++	+		

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red 5B

Color Index Part I: **Solvent Red 52**
 Color Index Part II: **68210**
 Dyestuff type: **Anthraquinone**



Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 20 kg 10 kg 10 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	-
Heat Stability³⁾	280	280	300	300	300	350			300		300/290	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.100%	4-5
Transparent	0.050%	7
PS		
1/3 SD Reduction 2.0% TiO ₂	0.195%	3-4
Transparent	0.050%	7
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.100%	4-5
Transparent	0.050%	7

Status⁷⁾

Europe	USA
AP(89)1 Yes	PET C-G (max 0.2%)
BfR Yes	
FPL Yes	

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
280
Sublimation
375

Solubility⁶⁾

Organic Solvents			
Acetone	0.3	Styrene monomer	3
Benzyl alcohol	5	Xylene	2
Butyl acetate	0.3	MEK	*
Ethanol	0.1	Toluene	*
MMA	0.5	Paraffin 52/54	1
Methylene chloride	35	Stearic acid	10

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	++	++	ACD	ACD	CD

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Red Violet R



Color Index Part I: **Solvent Violet 59**

Color Index Part II: **62025**

Dyestuff type: **Anthraquinone**

Availability Granulates (Gran) Fine gran (FG)

Packaging 25 kg 15 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	-	o	+	+	o	o	-	o	+
Heat Stability³⁾	300	300	280	300	-	300			260		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.105%	6-7
Transparent	0.050%	7-8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.200%	6
Transparent	0.050%	7-8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	-	-
Transparent	-	-

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PS, EPS D-G	PET Yes
BfR Yes	Tritan 100°C	
FPL Yes	PET C-G (max 0.6%)	

1) + suitable o suitable with restrictions - not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
186
Sublimation
330

Solubility⁶⁾

Organic Solvents			
Acetone	20	Styrene monomer	25
Benzyl alcohol	6	Xylene	12
Butyl acetate	20	MEK	1
Ethanol	0.7	Toluene	20
MMA	35	Paraffin 52/54	1
Methylene chloride	40	Stearic acid	20

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII [*]	++	++	+	++	++	++	ACD		+

* Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Violet 3R

Color Index Part I: **Solvent Violet 36**
 Color Index Part II: **–**
 Dyestuff type: **Anthraquinone**



Availability Granulates (Gran) Fine gran (FG)
Packaging 25 kg 15 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	–
Heat Stability³⁾	300	300	280	300	300	350			320		280/260	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.125%	6-7
Transparent	0.050%	7
PS		
1/3 SD Reduction 2.0% TiO ₂	0.220%	6
Transparent	0.050%	7
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.125%	6-7
Transparent	0.050%	7

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PET C-G (max 0.2%)	PET Yes
BfR Yes		
FPL Yes		

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
213
Sublimation
350

Solubility⁶⁾

Organic Solvents			
Acetone	2	Styrene monomer	30
Benzyl alcohol	5.5	Xylene	2.5
Butyl acetate	3	MEK	4
Ethanol	0.2	Toluene	2
MMA	8.5	Paraffin 52/54	<1
Methylene chloride	50	Stearic acid	10

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	++	+	++	++	++	++	CD	+

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)



Macrolex® Violet B

Color Index Part I: **Solvent Violet 13**
 Color Index Part II: **60725**
 Dyestuff type: **Anthraquinone**

Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 25 kg 15 kg 20 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	-	o	-
Heat Stability³⁾	300	300	280	300	300	350			290		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.090%	6-7
Transparent	0.050%	7-8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.180%	5-6
Transparent	0.050%	7-8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.090%	6-7
Transparent	0.050%	7-8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	Tritan <100°C	PET Yes
BfR Yes	PET D-G (max 0.2%)	
FPL Yes		

- 1) + suitable o suitable with restrictions - not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
189
Sublimation
315

Solubility⁶⁾

Organic Solvents			
Acetone	1.5	Styrene monomer	12
Benzyl alcohol	4	Xylene	8
Butyl acetate	3	MEK	2
Ethanol	0.1	Toluene	7
MMA	5.5	Paraffin 52/54	<1
Methylene chloride	30	Stearic acid	20

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	++	+	++	++	++	++		+

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Blue 3R

Color Index Part I: –
 Color Index Part II: –
 Dyestuff type: **Anthraquinone**

Availability Powder
Packaging 15 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	o
Heat Stability³⁾	300	300	300	300	300	340			300		280/270	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.110%	6
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.210%	6
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.110%	6
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PS, EPS D-G	PET Yes
BfR Yes	Tritan <100°C	PET A-H (max 0.6%)

- 1) + suitable o suitable with restrictions – not recommended
 2) Not suitable for styrene-butadiene block copolymers
 3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
167
Sublimation
325

Solubility⁶⁾

Organic Solvents			
Acetone	20	Styrene monomer	100
Benzyl alcohol	100	Xylene	150
Butyl acetate	60	MEK	*
Ethanol	1.5	Toluene	*
MMA	90	Paraffin 52/54	*
Methylene chloride	250	Stearic acid	*

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	+	++	+	++	++	++			

*) Japan Chemical Innovation and Inspection Institute

- 4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)
 5) Melting and Sublimation (more details see overview 40)
 6) Solubility according to DIN EN ISO 7579 (more details see overview 39)
 7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Blue RR

Color Index Part I: **Solvent Blue 97**

Color Index Part II: **615290**

Dyestuff type: **Anthraquinone**



Availability Granulates (Gran) Fine gran (FG) Powder

Packaging 20 kg 10 kg 15 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	o
Heat Stability³⁾	300	300	300	300	300	340			300		300/280	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.125%	6
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.230%	6
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.125%	6
Transparent	0.050%	8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	Tritan <100°C	PET Yes
BfR Yes	PET C-G (max 0.2%)	
FPL Yes		

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

Melting and Sublimation⁵⁾

Temperature (°C)

Melting

200

Sublimation

350

Solubility⁶⁾

Organic Solvents

Acetone	3	Styrene monomer	55
Benzyl alcohol	5	Xylene	120
Butyl acetate	11	MEK	13
Ethanol	0.3	Toluene	125
MMA	20	Paraffin 52/54	2
Methylene chloride	240	Stearic acid	5

*) data not available

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	++	++	++	++	++		+

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request



Macrolex® Green 5B

Color Index Part I: **Solvent Green 3**
 Color Index Part II: **61565**
 Dyestuff type: **Anthraquinone**



Availability Granulates (Gran) Fine gran (FG) Powder
Packaging 20 kg 10 kg 10 kg

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	o
Heat Stability³⁾	300	300	300	300	300	350			310		280/260	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.105%	6
Transparent	0.050%	7-8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.200%	5-6
Transparent	0.050%	7-8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.105%	6
Transparent	0.050%	7-8

Status⁷⁾

Europe	USA	China
AP(89)1 Yes	PS, EPS D-G	PET Yes
BfR Yes	Tritan <100°C	
FPL Yes	PET C-G (max 0.6%)	

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
213
Sublimation
360

Solubility⁶⁾

Organic Solvents			
Acetone	1	Styrene monomer	12
Benzyl alcohol	3.5	Xylene	17
Butyl acetate	3	MEK	2
Ethanol	0.1	Toluene	20
MMA	4.5	Paraffin 52/54	1
Methylene chloride	20	Stearic acid	10

JCII listing in Japan

	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
JCII ^{*)}	++	++	+	++	++	++	++		CD

*) Japan Chemical Innovation and Inspection Institute

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

7) More details of regulations concerning Macrolex® can be provided on request

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)



Macrolex® Green G

Color Index Part I: **Solvent Green 28**
 Color Index Part II: **625580**
 Dyestuff type: **Anthraquinone**

Availability Powder
Packaging 15 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	-	o	+
Heat Stability³⁾	300	300	300	300	300	350			300		-	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.150%	7-8
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.300%	7
Transparent	0.050%	8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.070%	6-7
Transparent	0.050%	8

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
245
Sublimation
390

Solubility⁶⁾

Organic Solvents			
Acetone	2	Styrene monomer	25
Benzyl alcohol	4	Xylene	30
Butyl acetate	4.5	MEK	*
Ethanol	0.1	Toluene	*
MMA	10	Paraffin 52/54	1
Methylene chloride	55	Stearic acid	10

*) data not available

1) + suitable o suitable with restrictions - not recommended

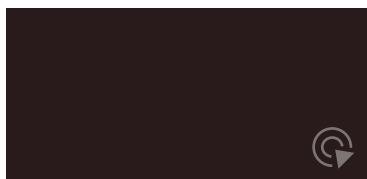
2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)



Macrolex® Black 2B

Color Index Part I: –
 Color Index Part II: –
 Dyestuff type: **Dyestuff mixture**

Availability Powder
Packaging 20 kg



	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	–	–	+	+	+	+	+	+	–	–	o	–
Heat Stability³⁾	300	–	–	280	300	340			300		–	300	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.100%	7-8
Transparent	0.050%	8
PS		
1/3 SD Reduction 2.0% TiO ₂	0.180%	6
Transparent	0.050%	7-8
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.100%	6
Transparent	0.050%	7

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
180
Sublimation
294

Solubility⁶⁾

Organic Solvents			
Acetone	1.5	Styrene monomer	12
Benzyl alcohol	4.0	Xylene	8
Butyl acetate	3.0	MEK	*
Ethanol	0.1	Toluene	*
MMA	5.5	Paraffin 52/54	*
Methylene chloride	30	Stearic acid	*

*) data not available

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)



Macrolex® Fluorescent Yellow 10GN



Color Index Part I: **Solvent Yellow 160:1** **Availability** Powder
 Color Index Part II: **-** **Packaging** 15 kg
 Dyestuff type: **Coumarin**

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	o	o	-
Heat Stability³⁾	300	300	260	300	300	350			280		240/240	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.100%	5
Transparent	0.050%	6-7
PS		
1/3 SD Reduction 2.0% TiO ₂	0.200%	3-4
Transparent	0.050%	6
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.100%	4
Transparent	0.050%	6

Melting and Sublimation⁵⁾

Temperature (°C)
Melting
209
Sublimation
340

Solubility⁶⁾

Organic Solvents			
Acetone	2.5	Styrene monomer	4.5
Benzyl alcohol	12	Xylene	1.5
Butyl acetate	1.5	MEK	*
Ethanol	0.4	Toluene	*
MMA	2	Paraffin 52/54	*
Methylene chloride	70	Stearic acid	*

*) data not available

1) + suitable o suitable with restrictions - not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)



Macrolex® Fluorescent Red G



Color Index Part I: –

Availability Powder

Color Index Part II: –

Packaging 15 kg

Dyestuff type: **Coumarin**

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	–	o	–
Heat Stability³⁾	300	260	240	300	300	350			300		–	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.100%	5
Transparent	0.050%	7
PS		
1/3 SD Reduction 2.0% TiO ₂	0.200%	4
Transparent	0.050%	7
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.100%	3-4
Transparent	0.050%	7

Melting and Sublimation⁵⁾

Temperature (°C)	
Melting	
254	
Sublimation	
320	

Solubility⁶⁾

Organic Solvents			
Acetone	0.3	Styrene monomer	1
Benzyl alcohol	0.5	Xylene	0.4
Butyl acetate	0.2	MEK	*
Ethanol	<0.1	Toluene	*
MMA	0.4	Paraffin 52/54	<1
Methylene chloride	8	Stearic acid	1

*) data not available

1) + suitable o suitable with restrictions – not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)



Macrolex® Fluorescent Red 4B



Color Index Part I: **Solvent Red 149**

Availability Powder

Color Index Part II: **674700**

Packaging 15 kg

Dyestuff type: **Anthraquinone**

	PS	SB ²⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA6/PA6.6	PBT	PES fibers
Suitability¹⁾	+	+	+	+	+	+	+	+	+	o	+	o	-
Heat Stability³⁾	300	-	280	380	300	350			290		280/260	280	

Light Fastness⁴⁾

	Dye content	Blue wool scale
PC		
1/3 SD Reduction 1.0% TiO ₂	0.100%	2
Transparent	0.050%	3-4
PS		
1/3 SD Reduction 2.0% TiO ₂	0.180%	1-2
Transparent	0.050%	2-3
PMMA		
1/3 SD Reduction 1.0% TiO ₂	0.100%	2
Transparent	0.050%	7-8

Melting and Sublimation⁵⁾

Temperature (°C)	
Melting	
268	
Sublimation	
336	

Solubility⁶⁾

Organic Solvents			
Acetone	0.1	Styrene monomer	*
Benzyl alcohol	*	Xylene	1.4
Butyl acetate	*	MEK	*
Ethanol	0.1	Toluene	*
MMA	*	Paraffin 52/54	*
Methylene chloride	*	Stearic acid	*

*) data not available

1) + suitable o suitable with restrictions - not recommended

2) Not suitable for styrene-butadiene block copolymers

3) Heat stability (°C) in Plastics according to DIN EN 12877-2 (more details see overview 37)

4) Light Fastness according to DIN EN ISO 4892-2 (more details see overview 38)

5) Melting and Sublimation (more details see overview 40)

6) Solubility according to DIN EN ISO 7579 (more details see overview 39)

In addition to our range of **Macrolex®** solvent dyes, LANXESS offers **Bayplast®** organic pigments:



Bayplast® Yellow G and **Bayplast® Yellow 5GN**. These brilliant pigments show excellent heat stability, light fastness and weatherability and are suitable for the coloration of most engineering thermoplastics including PA 6 and PA 6.6, polyolefins and PVC.

In contrast to **Macrolex®** dyes these pigments are also suitable for polyolefins like polypropylene.



Bayplast® Yellow G is formulated in a unique microgranular form, which offers the following advantages:

- Lower dust formation
- Easier to process than conventional powders
- Excellent handling and flow properties
- More precise metering
- Improved dispersion characteristics
- Higher bulk density
- Less residue remains when package is emptied

Heat stability of Bayplast® pigments in polypropylene (transparent / 1% TiO₂ 1/3 standard depth)

Pigment		HD-PE	PP	PS	ABS	PBT	PET	PA 6	PA 6.6
	Full shade	300	300	300	280	270	280	260	–
Bayplast® Yellow G	Reduction with white	300	300	300	280	270	280	260	–
	Full shade	300	300	300	280	270	300	280	270
Bayplast® Yellow 5GN01	Reduction with white	300	300	300	280	270	300	280	270

Light fastness of Bayplast® pigments

Pigment		HD-PE	PP	PS	ABS	PBT	PET	PA 6	PA 6.6
	Full shade	8	8	8	8	7	8	8	–
Bayplast® Yellow G	Reduction with white	8	8	8	8	7	8	6-7	–
	Full shade	8	8	8	6-7	8	8	8	8
Bayplast® Yellow 5GN01	Reduction with white	8	8	8	8	8	8	8	8

Shades may differ from the real color due to printing influence or monitor settings.

Materials ¹⁾ and concentrations ²⁾ used for testing of heat stability and light fastness:

¹⁾ HD-PE: SABIC Sabic® M8003	PP: PIO Kunststoffe Stamyln® P	PS: BASF Polystyrene 143E
ABS: DOW Magnum 3453	PBT: LANXESS Pocan® B1505	PET: VORIDIAN Voridian® 9921 W
PA 6: LANXESS Durethan® B30S	PA 6.6: LANXESS Durethan® A30H 1.0	TiO ₂ : Kronos 2233

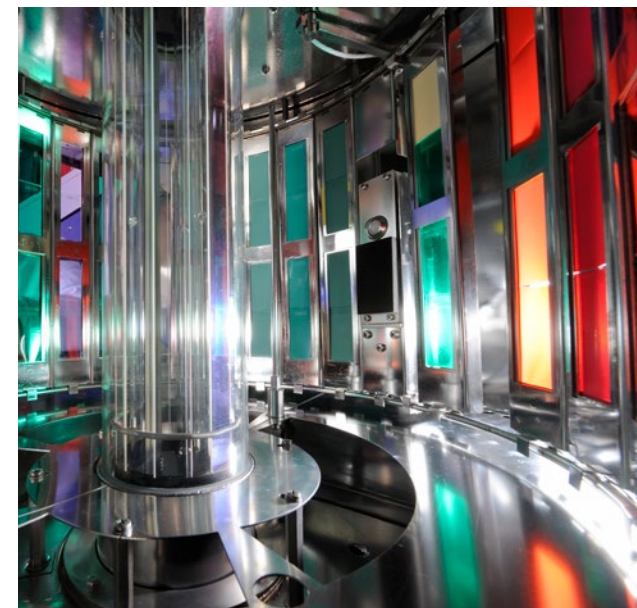
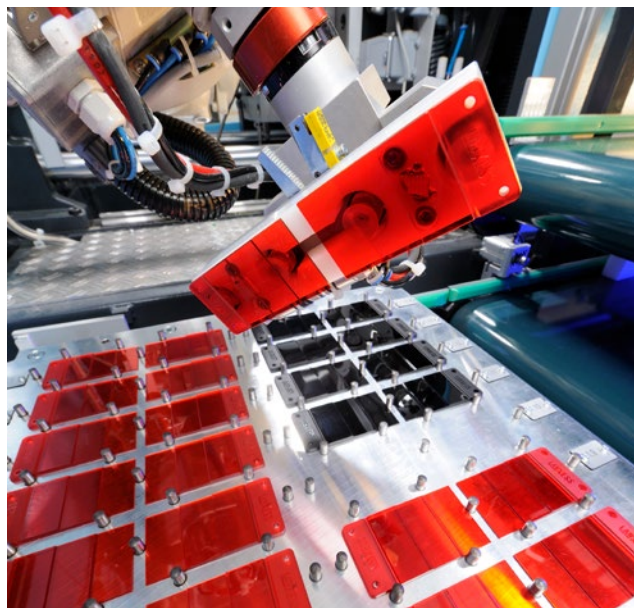
²⁾ 0.1 % pigment + 1 % TiO₂

– not recommended

The test results were evaluated under the above mentioned conditions and using the listed materials.

For other polymers, polymer grades, TiO₂ grades and pigment concentrations, the results may be different from the values above.

TECHNICAL SERVICE CENTER



As a diversified supplier of high-quality colorants it is our goal to provide our customers with solutions for all color-related questions at a global and regional level. Our laboratories can assist with technical support. In this regard our technical service units are able to support our customers with a wide range of different test methods, such as color matching, light fastness and weather resistance as well as heat stability tests. A fully equipped plastics laboratory allows for customer-oriented development

solutions and can be used for all technical service issues. Powerful analytical laboratories for chemical and physical test methods such as particle size determination, specific surface, trace analytics for metal ions or organic contamination complement our service portfolio.

Test results for all our dyes and pigments in all relevant amorphous and semi-crystalline thermoplastics have been categorized and are available in both full color and

white blend. Based on this we are in a position to provide color matching services based on customer requests at short notice. Details with regard to application area, fastness requirements or used additives can help us achieve the precise match. For optimal results the provision of the customer compound is ideal. Furthermore, we can provide additional services in connection with light fastness, weather resistance and heat stability in customer systems.



Control

It is a critical step on our path to success to verify the quality of our raw materials at a very early stage of the process. This means, that effective quality control begins before start of the production process.

We exclusively use materials from approved suppliers. Combined with the analysis of samples at external partners, an independent validation of the approved supplier can be ensured. Once the selected lots arrive at the plant, an inspection specially tailored to the respective raw

material takes place. Should any doubts arise during this inspection, further tests are carried out on each lot.

Benefits of application tests

A special quality feature of colorants is that they match the correct color shade (dE) with little deviation of the CIELAB values. Impurities can influence the color shade, even if all impurities are in-spec. Therefore only the application test can show whether the color shade matches the internal standard.

Based on a comprehensive pre-shipment sampling process, LANXESS conducts application tests for raw materials used for the chemical synthesis of our Macrolex® dyes.

Quality criteria

The analysis includes a wide range of parameters such as heavy metals, color strength, color shade, content of residue, critical substances based on chemical structures, organic impurities, solvents, water content, food regulatory parameters and many more.

OVERVIEW OF TECHNICAL DATA MACROLEX® DYES



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OVERVIEW OF TECHNICAL DATA

Suitability



	Color Index Part I	PS	SB ¹⁾	ABS	SAN	PMMA	PC	PVC-U	PPO	PET	POM	PA 6/ PA 6.6	PBT	PES fibres
Macrolex® Yellow 6G Gran	Solvent Yellow 179	+	+	+	+	+	+	+	+	+	o	–	o	o
Macrolex® Yellow 3G Gran	Solvent Yellow 93	+	+	–	+	+	+	+	+	+	–	–	o	–
Macrolex® Yellow G Gran	Solvent Yellow 114	+	+	+	+	+	+	+	+	+	o	–	o	–
Macrolex® Yellow E2R Gran	–	+	+	+	+	+	+	+	+	+	o	–	o	+
Macrolex® Orange HT	–	+	+	+	+	+	+	+	+	+	o	–	o	–
Macrolex® Orange 3G Gran	Solvent Orange 60	+	+	+	+	+	+	+	+	+	o	+ ²⁾	o	–
Macrolex® Orange R Gran	Solvent Orange 107	+	+	+	+	+	+	+	+	+	o	–	o	–
Macrolex® Red E2G Gran	Solvent Red 179	+	+	+	+	+	+	+	+	+	o	+	o	–
Macrolex® Red A	–	+	+	+	+	+	o	+	–	+	–	–	o	–
Macrolex® Red EG Gran	Solvent Red 135	+	+	+	+	+	+	+	+	+	o	+	o	+
Macrolex® Red B	Solvent Red 195	+	+	+	+	+	+	+	–	+	–	–	o	–
Macrolex® Red 5B Gran	Solvent Red 52	+	+	+	+	+	+	+	+	+	o	+	o	–
Macrolex® Red Violet R Gran	Solvent Violet 59	+	+	+	+	–	o	+	+	o	o	–	o	+
Macrolex® Violet 3R Gran	Solvent Violet 36	+	+	+	+	+	+	+	+	+	o	+	o	–
Macrolex® Violet B Gran	Solvent Violet 13	+	+	+	+	+	+	+	+	+	o	–	o	–
Macrolex® Blue 3R	–	+	+	+	+	+	+	+	+	+	o	+	o	o
Macrolex® Blue RR Gran	Solvent Blue 97	+	+	+	+	+	+	+	+	+	o	+	o	o
Macrolex® Green 5B Gran	Solvent Green 3	+	+	+	+	+	+	+	+	+	o	+	o	o
Macrolex® Green G	Solvent Green 28	+	+	+	+	+	+	+	+	+	o	–	o	+
Macrolex® Black 2B	–	+	–	–	+	+	+	+	+	+	–	–	o	–
Macrolex® Fluorescent Yel. 10GN	Solvent Yellow 160:1	+	+	+	+	+	+	+	+	+	o	o	o	–
Macrolex® Fluorescent Red G	–	+	+	+	+	+	+	+	+	+	o	–	o	–
Macrolex® Fluorescent Red 4B	Solvent Red 149	+	+	+	+	+	+	+	+	+	o	+	o	–

1) not suitable for styrene-butadiene block copolymers

2) limited usage in PA due to sublimation

+ suitable

o suitable with restrictions

– not recommended

OVERVIEW OF TECHNICAL DATA

Heat stability of **Macrolex®** dyes (°C) in plastics



according to DIN EN 12877-2

	PS	SB	ABS	SAN	PMMA	PC	PA 6	PA 6.6	PET	PBT
Macrolex® Yellow 6G Gran	300	300	260	280	300	350	–	–	300	280
Macrolex® Yellow 3G Gran	300	280	–	260	300	340	–	–	280	280
Macrolex® Yellow G Gran	300	300	300	300	300	340	–	–	300	280
Macrolex® Yellow E2R Gran	300	300	300	300	300	340	–	–	320	280
Macrolex® Orange HT	300	300	300	300	300	350	310	300	320	300
Macrolex® Orange 3G Gran	300	300	300	300	300	350	300	300	320	280
Macrolex® Orange R Gran	300	300	300	300	280	320	–	–	300	280
Macrolex® Red E2G Gran	300	300	300	300	300	350	300	300	320	280
Macrolex® Red A	300	280	280	300	280	300	–	–	300	–
Macrolex® Red EG Gran	300	300	280	300	300	350	260	260	320	280
Macrolex® Red B	280	280	280	280	280	300	–	–	280	300
Macrolex® Red 5B Gran	280	280	300	300	300	350	300	290	300	280
Macrolex® Red Violet R Gran	300	300	280	300	–	300	–	–	260	280
Macrolex® Violet 3R Gran	300	300	280	300	300	350	280	260	320	280
Macrolex® Violet B Gran	300	300	280	300	300	350	–	–	290	280
Macrolex® Blue 3R	300	300	300	300	300	340	280	270	300	280
Macrolex® Blue RR Gran	300	300	300	300	300	340	300	280	300	280
Macrolex® Green 5B Gran	300	300	300	300	300	350	280	260	310	280
Macrolex® Green G	300	300	300	300	300	350	–	–	300	280
Macrolex® Black 2B	300	–	–	280	300	340	–	–	300	300
Macrolex® Fluorescent Yel. 10GN	300	300	260	300	300	350	240	240	280	280
Macrolex® Fluorescent Red G	300	260	240	300	300	350	–	–	300	280
Macrolex® Fluorescent Red 4B	300	–	280	380	300	350	280	260	290	280

– not recommended
1/3 standard depth with 1 % TiO₂
(ABS 4% TiO₂, PS 2% TiO₂)

Plastics and TiO₂ used for testing:

PS: BASF Polystyrene 143E
SB: BASF Polystyrene 472C
ABS: Styrolution Novodur P2X
SAN: BASF Luran® 368R

PMMA: Evonik Plexiglas® 7H
PC: Covestro Makrolon® 2800
PA 6: LANXESS Durethan® B30S
PA 6.6: LANXESS Durethan® A30H 1.0

PET: Voridian® 9921 W
PBT: LANXESS Pocan® B1505
TiO₂: Kronos 2233

The test results were evaluated under the above mentioned conditions and using the listed polymers. For other polymers, polymer grades, TiO₂ grades and dyes concentrations, the heat stability may be different from the values above.

OVERVIEW OF TECHNICAL DATA

Light fastness of **Macrolex®** dyes



according to DIN EN ISO 4892-2

	PC			PS			PMMA		
	1/3 SD Reduction 1.0% TiO ₂		Transparent 0.05% dye	1/3 SD Reduction 2.0% TiO ₂		Transparent 0.05% dye	1/3 SD Reduction 1.0% TiO ₂		Transparent 0.05% dye
	Dye content in %	Blue Wool Scale	Blue Wool Scale	Dye content in %	Blue Wool Scale	Blue Wool Scale	Dye content in %	Blue Wool Scale	Blue Wool Scale
Macrolex® Yellow 6G Gran	0.070	7	8	0.360	6-7	8	0.070	6-7	8
Macrolex® Yellow 3G Gran	0.142	7	8	0.260	6-7	8	0.142	6-7	8
Macrolex® Yellow G Gran	0.065	7	8	0.120	6-7	8	0.065	7	8
Macrolex® Yellow E2R Gran	0.070	7	8	0.140	6-7	8	0.070	7	8
Macrolex® Orange HT	0.180	8	8	Tests results for PA6 see product page of Macrolex Orange HT					
Macrolex® Orange 3G Gran	0.155	7	8	0.280	6	8	0.155	6	8
Macrolex® Orange R Gran	0.045	5	8	0.090	4	7	0.045	3-4	7
Macrolex® Red E2G Gran	0.160	5	8	0.300	4-5	8	0.160	4	8
Macrolex® Red A	0.060	5	8	0.110	4	7	0.060	3-4	7
Macrolex® Red EG Gran	0.210	7	8	0.400	6	8	0.210	7	8
Macrolex® Red B	0.060	8	8	0.120	6	7-8	0.060	6-7	7-8
Macrolex® Red 5B Gran	0.100	4-5	7	0.195	3-4	7	0.100	4-5	7
Macrolex® Red Violet R Gran	0.105	6-7	7-8	0.200	6	7-8	–	–	–
Macrolex® Violet 3R Gran	0.125	6-7	7	0.220	6	7	0.125	6-7	7
Macrolex® Violet B Gran	0.090	6-7	7-8	0.180	5-6	7-8	0.090	6-7	7-8
Macrolex® Blue 3R	0.110	6	8	0.210	6	8	0.110	6	8
Macrolex® Blue RR Gran	0.125	6	8	0.230	6	8	0.125	6	8
Macrolex® Green 5B Gran	0.105	6	7-8	0.200	5-6	7-8	0.105	6	7-8
Macrolex® Green G	0.150	7-8	8	0.300	7	8	0.150	7	8
Macrolex® Black 2B	0.100	7-8	8	0.180	6	7-8	0.100	6	7
Macrolex® Fluorescent Yel. 10GN	0.100	5	6-7	0.200	3-4	6	0.100	4	6
Macrolex® Fluorescent Red G	0.100	5	7	0.200	4	7	0.100	3-4	7
Macrolex® Fluorescent Red 4B	0.100	2	3-4	0.180	1-2	2-3	0.100	2	7-8

– not recommended

Plastics and TiO₂ used for testing:

PC: Covestro Makrolon® 2800
 PS: BASF Polystyrene® 143E
 PMMA: Evonik Plexiglas® 7H
 TiO₂: Kronos 2233

The test results were evaluated under the above mentioned conditions and using the listed polymers. For other polymers, polymer grades, TiO₂ grades and dye concentrations, the light fastness may be different from the values above.

The results were evaluated against the 8-step blue wool scale. Fastness at step 8 indicates very good light fastness and at step 1 poor light fastness. The dye concentration to achieve a 1/3 SD (33% of standard density) coloration depends on the amount of TiO₂.

Most SD in PC and PMMA are identical (1% TiO₂) while SD for PS is almost 2x higher due to the increased amount of TiO₂ (2%).

Lower TiO₂ would allow a standard coloration with less dye.

OVERVIEW OF TECHNICAL DATA

Solubility of Macrolex® dyes



according to DIN EN ISO 7579

	Acetone	Benzyl alcohol	Butyl acetate	Ethanol	MMA	Methylene chloride	Styrene monomer	Xylene	MEK	Toluene	Paraffin 52/54	Stearic acid
Macrolex® Yellow 6G Gran	200	65	90	2	120	550	390	130	350	250	<1	15
Macrolex® Yellow 3G Gran	10	5	8	0.6	7	180	50	25	21	21	2	12
Macrolex® Yellow G Gran	0.5	2	0.5	0.1	1	6	3	1.5	*	*	*	*
Macrolex® Yellow E2R Gran	0.6	2.5	0.5	<0.1	1.5	10	3.5	1.6	*	*	*	*
Macrolex® Orange HT	<0.1	*	*	<0.1	*	*	*	<0.1	*	<0.1	*	*
Macrolex® Orange 3G Gran	1	4	1.5	0.2	3	10	7	5	*	*	*	*
Macrolex® Orange R Gran	3.5	65	3	0.8	1.5	60	5	1	*	*	1	5
Macrolex® Red E2G Gran	0.5	20	0.7	<0.1	1.5	7	4.5	2.5	2	3	*	*
Macrolex® Red A	0.4	1	0.4	0.1	1	45	4	1	*	*	*	*
Macrolex® Red EG Gran	<0.1	0.3	<0.1	<0.1	0.2	0.1	1	0.7	*	*	*	*
Macrolex® Red B	0.2	0.5	0.2	<0.1	0.5	40	3.5	0.5	*	*	*	*
Macrolex® Red 5B Gran	0.3	5	0.3	0.1	0.5	35	3	2	*	*	1	10
Macrolex® Red Violet R Gran	20	6	20	0.7	35	40	25	12	1	20	1	20
Macrolex® Violet 3R Gran	2	5.5	3	0.2	8.5	50	30	2.5	4	2	<1	10
Macrolex® Violet B Gran	1.5	4	3	0.1	5.5	30	12	8	2	7	<1	20
Macrolex® Blue 3R	20	100	60	1.5	90	250	100	150	*	*	*	*
Macrolex® Blue RR Gran	3	5	11	0.3	20	240	55	120	13	125	2	5
Macrolex® Green 5B Gran	1	3.5	3	0.1	4.5	20	12	17	2	20	1	10
Macrolex® Green G	2	4	4.5	<0.1	10	55	25	30	*	*	1	10
Macrolex® Black 2B	1.5	4.0	3.0	0.1	5.5	30	12	8	*	*	*	*
Macrolex® Fluorescent Yel. 10GN	2.5	12	1.5	0.4	2	70	4.5	1.5	*	*	*	*
Macrolex® Fluorescent Red G	0.3	0.5	0.2	<0.1	0.4	8	1	0.4	*	*	<1	1
Macrolex® Fluorescent Red 4B	0.1	*	*	0.1	*	*	*	1.4	*	*	*	*

* data not available

Solvent solubility is measured in g/l at room temperature (23°C/73°F)

OVERVIEW OF TECHNICAL DATA

Melting and Sublimation temperature of **Macrolex®** dyes



	Melt [°C]	Smp [°C]
Macrolex® Yellow 6G Gran	115	340
Macrolex® Yellow 3G Gran	187	310
Macrolex® Yellow G Gran	264	320
Macrolex® Yellow E2R Gran	212	380
Macrolex® Orange HT	280	510
Macrolex® Orange 3G Gran	230	270
Macrolex® Orange R Gran	224	320
Macrolex® Red E2G Gran	255	350
Macrolex® Red A	195	290
Macrolex® Red EG Gran	318	370
Macrolex® Red B	210	310
Macrolex® Red 5B Gran	280	375

	Melt [°C]	Smp [°C]
Macrolex® Red Violet R Gran	186	330
Macrolex® Violet 3R Gran	213	350
Macrolex® Violet B Gran	189	315
Macrolex® Blue 3R	167	325
Macrolex® Blue RR Gran	200	350
Macrolex® Green 5B Gran	213	360
Macrolex® Green G	245	390
Macrolex® Black 2B	180	294
Macrolex® Fluorescent Yel. 10GN	209	340
Macrolex® Fluorescent Red G	254	320
Macrolex® Fluorescent Red 4B	268	336

Melt = melting temperature in °C

Sublimation temperature (Smp) has been determined by heating the dyes 10°C per minute starting at 20°C.

Temperature resulting in 5 % loss of mass is given as Smp.

Low Smp may result in some sublimation during the injection molding process which could result in dye building up on the tools.



OVERVIEW OF TECHNICAL DATA

Status of Macrolex® in Europe, America and China

	Europe			USA				China
	AP (89)1	BfR	FPL	PS, EPS	Tritan	PET	max. %	PET
Macrolex® Yellow 6G Gran	Yes	Yes	Yes		<100°C	C-G	0.4	Yes
Macrolex® Yellow G Gran	Yes	Yes	Yes			C-G	0.2	Yes
Macrolex® Yellow E2R Gran	Yes	Yes				C-G	0.2	Yes
Macrolex® Orange HT	Yes	Yes	Yes					
Macrolex® Orange 3G Gran	Yes	Yes	Yes			C-G	0.2	Yes
Macrolex® Orange R Gran	Yes	Yes	Yes	D-G	<100°C	C-G	0.2	Yes
Macrolex® Red E2G Gran	Yes	Yes			<100°C	C-G	0.2	Yes
Macrolex® Red A	Yes	Yes				C-G	0.1	
Macrolex® Red EG Gran	Yes	Yes	Yes	D-G		A-H	0.6	Yes
Macrolex® Red B	Yes	Yes				C-G	0.4	
Macrolex® Red 5B Gran	Yes	Yes	Yes			C-G	0.2	
Macrolex® Red Violet R Gran	Yes	Yes	Yes	D-G	<100°C	C-G	0.6	Yes
Macrolex® Violet 3R Gran	Yes	Yes	Yes			C-G	0.2	Yes
Macrolex® Violet B Gran	Yes	Yes	Yes		<100°C	D-G	0.2	Yes
Macrolex® Blue 3R	Yes	Yes		D-G	<100°C	A-H	0.6	Yes
Macrolex® Blue RR Gran	Yes	Yes	Yes		<100°C	C-G	0.2	Yes
Macrolex® Green 5B Gran	Yes	Yes	Yes	D-G	<100°C	C-G	0.6	Yes

Germany: BfR, AP(89)1: use of colorants in plastic materials coming into contact with food.

EN71-3: Safety of toys EN71/3 (all Yes: Macrolex® good according to regulation).

Europe: Directive 94/62/EC and CONEG: sum of lead, cadmium, hexavalent chromium and mercury is lower than 100 ppm (all Yes).

RoHS: Restriction on the use of certain hazardous substances in electrical and electronic equipment (all Yes).

FPL: French Circular 176 (positive list).

USA FDA: Contact with aqueous, acid, low alcohol content (up to 15% ethanol) and dry foods, conditions under 21 CFR §176.170; available are opinion letters from Keller and Heckman; PS, EPS data met for 0.2% concentration.

Tritan (Eastman) <100°C: repeat-use articles at temperatures of 100°C and below.

PET maximum level of concentration is met.

CHINA: GB9685; mostly given for concentration of 0.2%; other polymers like PS, ABS, PC, PA also met.

More details of regulations concerning Macrolex® can be provided on request.



OVERVIEW OF TECHNICAL DATA

JCII*) listing for Macrolex®



	ABS	AS	PS	PC	PMMA	PET	PBT	PA	PPE
Macrolex® Yellow 6G Gran	++	++	+	++	ACD	++			
Macrolex® Yellow 3G Gran	CD	++	+	ABD	ACD	ACD	A		
Macrolex® Yellow G Gran	CD	++	+	++	CD	ACD			
Macrolex® Yellow E2R Gran	++	++	+	++	++	++	++		
Macrolex® Orange 3G Gran	+	++	+	ABD	ACD	++	C		
Macrolex® Orange R Gran	++	++	+	++	ACD	A	ACD		
Macrolex® Red E2G Gran	+	++	+	++	+	++		CD	
Macrolex® Red EG Gran	++	++	+	++	+	++	+		+
Macrolex® Red B	+	CD	BD	++		++	+		
Macrolex® Red 5B Gran	++	++	+	++	++	++	ACD	ACD	CD
Macrolex® Red Violet R Gran	++	++	+	++	++	++	ACD		+
Macrolex® Violet 3R Gran	+	++	+	++	++	++	++	CD	+
Macrolex® Violet B Gran	+	++	+	++	++	++	++		+
Macrolex® Blue 3R	+	++	+	++	++	++			
Macrolex® Blue RR Gran	++	++	++	++	++	++	++		+
Macrolex® Green 5B Gran	++	++	+	++	++	++	++		CD
Macrolex® Green G	++	++	+	++	++	++			

AS (acrylonitrile-styrene) is a different term for SAN (Styreneacrylonitrile)

Applications

- A: Oil and fat, fatty foods
- B: Alcoholic foods
- C: Neutral foods (pH>5)
- D: Acid foods (pH<5)

Marks in sheet

- ++ approved for ABCD
- + approved for BCD
- ACD approved for ACD

Self-restrictive requirements on food-contacting articles made of polyolefins and certain polymers. The JCII*) list shows powder, FG and Gran. Only one value is given above. Approval of Macrolex® dyes depends on the polymer and field of application.

*) Japan Chemical Innovation and Inspection Institute



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