The invention relates to hot melt compositions comprising polyolefin waxes prepared using metallocene catalysts, having a melting point or ring & ball softening point of between 80 and 165°C, having a melt viscosity, measured at a temperature of 170°C, of between 20 and 40,000 mPa·s, and having a glass transition temperature of not more than −10°C and also to their use as hot melt adhesives and as binders for producing roadmarkings.
USE OF POLYOLEFIN WAXES IN HOT MELT COMPOSITIONS

[0001] The present invention is described in the German priority application No. 102004048536.4, filed Jun. 10, 2004, which is hereby incorporated by reference as is fully disclosed herein.

[0002] The invention relates to hot melt compositions comprising polyolefin waxes which have been prepared using metallocene catalysts.

[0003] Hot melt compositions or hot melts are thermoplastic materials which are solid at ambient temperature and in the liquid melt state are applied layerwise to suitable substrate surfaces where, following solidification, they exert different functions. They are constructed preferably on the basis of resins, waxes, thermoplastics, and elastomers, and may include additions of fillers, pigments, and additives such as stabilizers, etc.

[0004] By way of example, hot melt compositions can be used as solvent-free adhesives for bonding. On account of their multifarious advantages, hot melt adhesives of this kind are increasingly being used in industries including those of packaging, furniture, textiles, and footwear as an economic and environment friendly alternative to conventional, solvent-based adhesives. Constituents of common hot melt adhesive formulas are polar or apolar polymers, generally ethylene-vinyl acetate copolymers, resins, and waxes.

[0005] The polar or apolar polymers serve as scaffold material. They ensure the cohesion of the adhesive and at the same time contribute to adhesion to the substrate. The resin addition enhances the adhesion and may exert a compatibilizing effect on the various components of the adhesive. Waxes are used for modification in fractions, based on the hot melt adhesive compositions, of generally less than 10% by weight. They regulate important physical properties of the adhesives, such as hardness, melt viscosity, and softening point, and, in their effect on open time, adhesion, cohesion, etc., they decisively influence the performance characteristics. Wax used in amounts of more than 10% by weight has generally been found to date to be accompanied by a deterioration in the properties, particularly a reduction in the bond strength of the hot melt adhesive.

[0006] Hot melt compositions are also used in road construction as thermoplastic binders for producing visual traffic guidance marks, such as “zebra stripes” at pedestrian crossings, center lines or boundary lines, or other signal indications for controlling traffic flow. Besides waxes, the binders employed for this purpose may comprise thermoplastics, resins, and plasticizers. For roadmarking application these binders are generally blended with fillers such as sand or lime, pigments such as titanium dioxide, and light-reflecting additions, e.g., glass beads.

[0007] Waxes used to date in hot melt compositions have included microcrystalline and microcrystalline paraffin waxes, Fischer-Tropsch waxes, and polyolefin waxes. By polyolefin waxes here are meant low molecular mass polyolefins in the molar mass range between about 500 and 20 000 g/mol (number-average molar mass M_n) with MFR values, measured in accordance with ASTM D 1238-01, of more than 3000 g/10 min.

[0008] Polyolefin waxes can be produced by thermal degradation of branched polyolefin high polymers or by direct polymerization of olefins. Suitable polymerization processes include, for example, high-pressure technologies, in which the olefins, generally ethylene, are reacted free-radically under high pressures and temperatures to form branched waxes, and also low-pressure or Ziegler processes, in which ethylene and/or higher 1-olefins are polymerized using organometallic catalysts under temperatures and pressures which are lower by comparison.

[0009] A variant of the low-pressure process which has been disclosed more recently is a procedure in which the organometallic catalysts used are metallocene compounds. These compounds contain titanium, zirconium or hafnium atoms as active species and are generally employed in combination with cocatalysts, examples being organoaluminum compounds or boron compounds, preferably aluminooxane compounds. Polymerization takes place where necessary in the presence of hydrogen as a molar mass regulator. A feature of metallocene processes is that, in comparison to the older Ziegler technology, it is possible to obtain waxes having a narrower molar mass distribution, more uniform incorporation of comonomer, lower melting points, and higher catalyst efficiency.

[0010] Surprisingly it has now been found that hot melt compositions comprising polyolefin waxes which have been prepared using metallocene catalysts, have a dropping point or ring & ball softening point of between 80 and 165° C., have a melt viscosity, measured at a temperature of 170° C., of between 20 and 40 000 mPa·s, and have a glass transition temperature of not more than –10° C., are suitable with particular advantage as hot melt adhesives. Hot melt adhesives of this kind display outstanding properties in respect of bond strength (substrate adhesion) and low-temperature flexibility.

[0011] Additionally it has been found that the stated hot melt compositions are outstandingly suitable as a constituent of roadmarking materials. Marking materials of this kind possess, in particular, improved adhesion to the road.

[0012] The invention accordingly provides hot melt compositions comprising one or more polyolefin waxes which have been prepared using metallocene catalysts, have a dropping point or ring & ball softening point of between 80 and 165° C., have a melt viscosity, measured at a temperature of 170° C., of between 20 and 40 000 mPa·s, and have a glass transition temperature of not more than –10° C.

[0013] The polyolefin waxes present in the hot melt compositions of the invention preferably have a dropping point or ring & ball softening point of between 90 and 160° C., a melt viscosity, measured at a temperature of 170° C., of between 50 and 30 000 mPa·s, and a glass transition temperature of not more than –20° C.

[0014] The polyolefin waxes present in the hot melt compositions of the invention preferably have a number-average molar mass M_n of between 500 and 20 000 g/mol, more preferably between 800 and 10 000 g/mol, and with particular preference between 1000 and 5000 g/mol, and preferably a weight-average molar mass M_w of between 1000 and 40 000 g/mol, more preferably between 1600 and 30 000 g/mol, and with particular preference between 2000 and 20 000 g/mol.

[0015] Examples of suitable polyolefin waxes present in the hot melt compositions of the invention include
homopolymers of propylene or of higher 1-olefins or copolymers of propylene with ethylene or with higher 1-olefins, or copolymers thereof with one another. Higher 1-olefins used are preferably linear or branched olefins having 4 to 20 carbon atoms and preferably having 4 to 6 carbon atoms. These olefins may have an aromatic substitution which is in conjugation with the olefinic double bond. Examples thereof are 1-butene, 1-hexene, 1-octene or 1-octadecene, and styrene. The copolymers are composed preferably of 70% to 99.9% and more preferably of 80% to 99% by weight of one kind of olefin. Preference is additionally given to copolymers of propylene with 0.1% to 30%, preferably 1% to 20%, by weight of ethylene.

[0016] In one preferred embodiment of the invention the polyolefin waxes present in the hot melt compositions are propylene homopolymer waxes.

[0017] In a further preferred embodiment of the invention the polyolefin waxes present in the hot melt compositions are copolymer waxes of propylene and one or more further monomers selected from ethylene and branched or unbranched 1-alkenes having 4 to 20 carbon atoms, the amount of structural units originating from propylene in the copolymer waxes being from 70% to 99.9% by weight. To prepare these copolymer waxes it is also possible to use a variety of the 1-alkenes stated.

[0018] In another preferred embodiment of the invention the polyolefin waxes present in the hot melt compositions are copolymer waxes of ethylene and at least one branched or unbranched 1-alkene having 3 to 20 carbon atoms, the amount of structural units originating from the one or more 1-alkenes in the copolymer waxes being from 0.1% to 30% by weight.

[0019] In yet another preferred embodiment of the invention the polyolefin waxes present in the hot melt compositions are copolymer waxes of propylene and one or more further monomers selected from ethylene and branched or unbranched 1-alkenes having 4 to 20 carbon atoms, the amount of structural units originating from ethylene in the copolymer waxes being from 0.1% to 30% by weight and the amount of structural units originating from the one or more 1-alkenes in the copolymer waxes being from 0.1% to 50% by weight.

[0020] The olefin homopolymer and copolymer waxes used in the hot melt compositions may have undergone polar modification.

[0021] The hot melt compositions of the invention may further comprise polyolefin polymers, resins, waxes, plasticizers, polar or apolar polymers, pigments, fillers, stabilizers and/or antioxidants.

[0022] The polyolefin waxes used in accordance with the invention are prepared using metallocene compounds of the formula I.

\[
\text{(I)} \quad \text{M}^1 \quad \text{R}^1 \quad \text{M}^2 \quad \text{R}^2
\]

This formula also embraces compounds of the formula Ia

\[
\text{(Ia)}
\]

[0023] of the formula Ib

\[
\text{(Ib)}
\]

[0024] and of the formula Ic

\[
\text{(Ic)}
\]

[0025] In formulae I, Ia and Ib, M¹ is a metal from group IVb, Vb or VIb of the periodic system, examples being titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum, and tungsten, preferably titanium, zirconium or hafnium.

[0026] R¹ and R² are identical or different and are a hydrogen atom, a C₁⁻C₁₀ alkyl group, especially preferably C₃⁻C₅ alkyl group, or a C₁⁻C₁₀ aryloxy group, a C₆⁻C₁₀ alkyloxy group, a C₂⁻C₁₀ arylalkyl group, a C₁⁻C₁₀ alkenyl group, a C₇⁻C₁₀ aryalkyl group, a C₁⁻C₄ alkyl group, a C₁⁻C₁₀ aryalkyl group, a
C7-C40, preferably C7-C12 alkylaryl group, a C8-C40, preferably C8-C12 arylalkenyl group, or a halogen atom, preferably chlorine atom.

[0028] R3 and R4 are identical or different and are a mononuclear or polynuclear hydrocarbon radical which together with the central atom M may form a sandwich structure. Preferably R3 and R4 are cyclopentadienyl, indenyl, tetrahydroindenyl, benzoinenyl or fluorenyl, it being possible for the parent structures to carry additional substituents or to be bridged with one another. It is also possible for one of the radicals R3 and R4 to be a substituted nitrogen atom, with R3 as having the definition of R17 and being preferably methyl, tert-butyl or cyclohexyl.

[0029] R5, R6, R7, R8, R9, and R10 are identical or different and are a hydrocarbon, a halogen, a heteroatom, a C5-C10, preferably C5-C6 alkyl group, a C5-C10, preferably C5-C6 aryl group, a C5-C10, preferably C5-C6 alkyl group, a radical 

NR16, SR16, OSR16, SiR16 or Pr16, in which R16 is a C1-C10, preferably C1-C5 alkyl group or C6-C10, preferably C6-C8 aryl group or else, in the case of radicals containing Si or P, is a halogen atom, preferably chlorine atom, or pairs of adjacent radicals R5, R6, R7, R8, R9, or R10 form a ring with the carbon atoms connecting them. Particularly preferred ligands are the substituted compounds of the parent structures cyclopentadienyl, indenyl, tetrahydroindenyl, benzoinenyl or fluorenyl.

[0030] R17 is

```
<table>
<thead>
<tr>
<th>R17</th>
<th>M2</th>
<th>M2</th>
<th>R18</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
```

[0031] =BR17, =AR17, =GeR17, =SnR17, =O-, =S-, =SO2, =SO-, =NR17, =CO, =PR17 or =P(O)R17, R17, R18 and R19 being identical or different and being a hydrocarbon, a halogen atom, preferably a fluorine, chlorine or bromine atom, a C1-C10, preferably C1-C5 alkyl, preferably methyl group, a C1-C10 fluoroalkyl, preferably CF3 group, a C1-C10 fluoroaryl, preferably pentafluorophenyl group, a C5-C10, preferably C5-C8 aryl group, a C1-C10, preferably C1-C5 alkyl, preferably methoxy group, a C2-C10, preferably C2-C5 alkyl group, a C7-C40, preferably C7-C20 aralkyl group, a C8-C40, preferably C8-C20 arylalkenyl group or a C8-C40, preferably C8-C20 arylalkenyl group or R17 and R18, or R17 and R19, each form a ring together with the atoms connecting them.

[0032] M2 is silicon, germanium or tin, preferably silicon and germanium. R13 is preferably =CR15R14, =SiR17R18, =GeR13R14, =O-, =S-, =SO, =PR17 or =P(O)R17.

[0033] R11 and R12 are identical or different and have the definition stated for R17, m and n are identical or different and denote zero, 1 or 2, preferably zero or 1, with m plus n being zero, 1 or 2, preferably zero or 1.

[0034] R14 and R15 have the definition of R17 and R18.

[0035] Examples of suitable metallocones are:

[0036] bis(1,2,3-trimethylcyclopentadienyl)zirconium dichloride,

[0037] bis(1,2,4-trimethylcyclopentadienyl)zirconium dichloride,

[0038] bis(1,2-dimethylcyclopentadienyl)zirconium dichloride,

[0039] bis(1,3-dimethylcyclopentadienyl)zirconium dichloride,

[0040] bis(1-methylindenyl)zirconium dichloride,

[0041] bis(1-n-butyl-3-methylcyclopentadienyl)zirconium dichloride,

[0042] bis(2-methyl-4,6-disopropylindenyl)zirconium dichloride,

[0043] bis(2-methylindenyl)zirconium dichloride,

[0044] bis(4-methylindenyl)zirconium dichloride,

[0045] bis(5-methylindenyl)zirconium dichloride,

[0046] bis(alkylcyclopentadienyl)zirconium dichloride,

[0047] bis(alkylindenyl)zirconium dichloride,

[0048] bis(cyclopentadienyl)zirconium dichloride,

[0049] bis(indenyl)zirconium dichloride,

[0050] bis(methylcyclopentadienyl)zirconium dichloride,

[0051] bis(n-butylcyclopentadienyl)zirconium dichloride,

[0052] bis(octadecyloctadienyl)zirconium dichloride,

[0053] bis(pentamethylcyclohexadienyl)zirconium dichloride,

[0054] bis(trimethylsilylcyclopentadienyl)zirconium dichloride,

[0055] bis(cyclopentadienylzirconium dibenzyl,

[0056] bis(cyclopentadienylzirconium dimethyldenedyldienyl)zirconium dichloride,

[0057] bis(tetrahydroindendienyl)zirconium dichloride,

[0058] dimethylsilyl-9-fluorenylcylopentadienylzirconium dichloride,

[0059] dimethylsilyl-1-(2,3,5-trimethylcylopentadienyl)zirconium dichloride,

[0060] dimethylsilyl-1-(2,4-dimethylcylopentadienyl)zirconium dichloride,

[0061] dimethylsilyl-1-(2-methyl-4,5-benzoindenyl)zirconium dichloride,

[0062] dimethylsilyl-1-(2-methyl-4-ethylindenyl)zirconium dichloride,

[0063] dimethylsilyl-1-(2-methyl-4-isopropylindenyl)zirconium dichloride,

[0064] dimethylsilyl-1-(2-methyl-4-phenylindenyl)zirconium dichloride,
dimethylsilylbis-1-(2-methylindenyl)zirconium dichloride,
dimethylsilylbis-1-(2-methyltetrahydroindenyl)zirconium dichloride,
dimethylsilylbis-1-indenylzirconium dichloride,
dimethylsilylbis-1-indenylzirconium dimethyl,
dimethylsilylbis-1-tetrahydroindenylzirconium dichloride,

diphenylmethylen-9-fluorenylcyclopentadieny1zirconium dichloride,
diphenylsilylbis-1-indenylzirconium dichloride,
ethylenebis-1-(2-methyl-4,5-benzoindeny1)zirconium dichloride,
ethylenebis-1-(2-methyl-4-phenylindeny1)zirconium dichloride,
ethylenbis-1-(2-methyltetrahydroindenyl)zirconium dichloride,
ethylenebis-1-(4,7-dimethylindenyl)zirconium dichloride,
ethylenebis-1-indenylzirconium dichloride,
ethylenebis-1-tetrahydroindenylzirconium dichloride,

dicyclopentadieny1zirconium dichloride iso-
propy1idene(1-indeny1)(cyclopentadieny1)zirconium dichloride,
isopropy1idene(9-fluoreny1)(cyclopentadieny1)zirconium dichloride,
phenylmethylsilylbis-1-(2-methylindeny1)zir-
conium dichloride,

and the alkyl or aryl derivatives of each of these
metalocene dichlorides.

The single-center catalyst systems are activated
using suitable cocatalysts. Suitable cocatalysts for met-
allocenes of the formula 1 are organoaluminum compounds,
especially aluminoxanes or else aluminum-free systems
such as R\textsuperscript{2}NH\textsubscript{2n}BR\textsubscript{2n+1}, R\textsuperscript{2}PH\textsubscript{2n}BR\textsubscript{2n+1}, R\textsuperscript{2}N\textsubscript{2}CBR\textsubscript{2n} or
BR\textsubscript{2n+1}. In these formulæ x is a number from 1 to 4, the
radicals R\textsuperscript{2} are identical or different, preferably identical,
and are \textsubscript{C\textsubscript{1}-C\textsubscript{10}} alkyl or \textsubscript{C\textsubscript{6}-C\textsubscript{12}} aryl, or two radicals R\textsuperscript{2} form
a ring together with the atom connecting them, and the
radicals R\textsuperscript{2} are identical or different, preferably identical,
and are \textsubscript{C\textsubscript{1}-C\textsubscript{10}} aryl which may be substituted by
alkyl, haloalkyl or fluorene. In particular R\textsuperscript{2} is ethyl, propyl, butyl or
phenyl and R\textsuperscript{2} is phenyl, pentfluorophenyl, 3,5-bistrifu-
oro-methoxyphenyl, mesityl, xylyl or tolyl.

Additionally a third component is often necessary in
order to maintain protection against polar catalyst poi-
sions. Suitable for this purpose are organoaluminum comp-
ounds such as triethylaluminum, tributylaluminum, etc.,
and also mixtures.

Depending on process it is also possible for sup-
ported single-center catalysts to be used. Preference is given
to catalyst systems in which the residues of support material
and cocatalyst do not exceed a concentration of 100 ppm in
the product.

To prepare the hot melt compositions of the invention
it is possible to use polyolefin metalloocene waxes in
unmodified form or in polar-modified form. Polar-modified
waxes are prepared in conventional manner from a polar raw
materials by oxidation with oxygenous gases, air for
example, or by free-radical grafting reaction with polar
monomers, examples being \alpha,\beta-unsaturated carboxylic
acids or derivatives thereof, such as acrylic acid, maleic acid
or maleic anhydride, or unsaturated organosilane comp-
ounds such as trialkoxyvinylsilanes. The polar modifica-
tion of metalloocene polyolefin waxes by oxidation with air
is described for example in EP 0 890 583, modification by
grafting for example in U.S. Pat. No. 5,998,547 or JP
54-145785.

The invention further provides for the use of the
hot melt compositions of the invention as hot melt
adhesives.

In the hot melt compositions used as hot melt
adhesives the polyolefin waxes are present preferably with
a weight fraction of greater than or equal to 50%, more
preferably between 50% and 99%, and with particular
preference between 60% and 90% by weight. Further possible
constituents are resins, waxes, and apolar or polar
polymers such as ethylene-vinyl acetate copolymers, atactic
poly-\alpha-olefins (APAO), polyisobutylene, styrene-butadiene-
butadiene block polymers or styrene-isoprene-butadiene block
polymers, and, for particularly heavy-duty bonds, poly-
mides or polyesters. Examples of resin components which
may be present include resins and their derivatives or
hydrocarbon resins, while possible waxes are hydrocarbon
waxes such as Fischer-Tropsch paraffins, and polyolefin
waxes not prepared using metalloocene catalysts, it being
possible for said waxes to have undergone apolar or polar
modification, by means, for example, of oxidation or of
grafting with polar monomers such as maleic anhydride. The
hot melt adhesive compositions may further comprise fillers
or auxiliaries such as plasticizers, pigments, and stabilizers
such as antioxidants or light stabilizers.

The invention further provides for the use of the
hot melt compositions of the invention as binders for pro-
ducing roadmarkings.

In the hot melt compositions used as binders for
roadmarking the polyolefin waxes are present preferably
with a weight fraction of between 5% and 99% by weight.

In one particularly preferred embodiment of the
invention, the polyolefin waxes are present in the hot melt
compositions used as binders for roadmarking with a weight
fraction of between 20% and 90% by weight.

In a further particularly preferred embodiment of the
invention, the polyolefin waxes are present in the hot
melt compositions used as binders for roadmarking with a
weight fraction of between 50% and 99% by weight.

In the hot melt compositions used as binders for
roadmarking the polyolefin waxes are present very prefer-
able with a weight fraction of between 60% and 99% by
weight.

Further possible constituents are apolar or polar
polymers, resins, and waxes of the type described above,
and also plasticizers, such as liquid paraffin, and antioxidants.
For roadmarking use the binder is generally blended with
The melt viscosities were determined in accordance with DIN 53019 using a rotational viscometer, the dropping points in accordance with DIN 51801/2, the ring & ball softening points in accordance with DIN EN 1427, and the glass transition temperatures by means of differential thermoanalysis in accordance with DIN 51700. The weight-average molar mass \( M_w \), the number-average molar mass \( M_n \), and the resulting quotient \( M_w / M_n \) were determined by gel permeation chromatography at 135\(^\circ\) C. in 1,2-dichlorobenzene.

The metallocene polyolefin waxes used in accordance with the invention and listed in Table 1 were prepared by the process specified in EP-A-0 571 882.

<table>
<thead>
<tr>
<th>Example</th>
<th>Wax 1 [parts by weight]</th>
<th>Wax 2 [parts by weight]</th>
<th>Elvax ( \mathbb{R} ) 220 [parts by weight]</th>
<th>Licowax ( \mathbb{R} ) PP 220 [parts by weight]</th>
<th>Regalite ( \mathbb{R} ) 1140 [parts by weight]</th>
<th>Melting point [(^\circ) C.]</th>
<th>Melt viscosity [m Pas]</th>
<th>Glass transition temperature [(^\circ) C.]</th>
<th>Low-temperature flexibility [N/mm²]</th>
<th>Cohesion [N/mm²]</th>
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</tbody>
</table>

Elvax \( \mathbb{R} \) 220: ethylene-vinyl acetate copolymer, manufacturer: DuPont AG
Licowax \( \mathbb{R} \) PP 220: polypropylene wax from Ziegler synthesis, manufacturer: Clariant AG
Regalite \( \mathbb{R} \) 1140: hydrocarbon resin, manufacturer: Eastman
Example 11 (Inventive)

[0106] A melt mixture homogenized at 180° C and composed of 39 parts by weight of the wax 1 specified in Table 1 and 9 parts by weight of the wax 2 specified in Table 1, 40 parts by weight of Regalite® 1125 and 12 parts by weight of Licowax® PP 230 was used to produce a test coat in the manner described in Example 10. The coated plate was again stored at −15° C for 24 h.

[0107] After the end of low-temperature storage, the plates were removed from the refrigeration cabinet. From an attempt to detach the test coat by hand from the substrate it was apparent that the mixture from Example 11 exhibited significantly better adhesion than the comparative mixture from Example 10.

1. A hot melt composition comprising one or more polyolefin waxes prepared using metalloocene catalysts, have a dropping point or ring & ball softening point of between 80 and 165° C, have a melt viscosity, measured at a temperature of 170° C, of between 20 and 40 000 mPa-s, and have a glass transition temperature of not more than −10° C.

2. The hot melt composition as claimed in claim 1, wherein the one or more polyolefin waxes have a dropping point or ring & ball softening point of between 90 and 160° C, a melt viscosity, measured at a temperature of 170° C, of between 50 and 30 000 mPa-s, and a glass transition temperature of not more than −20° C.

3. The hot melt composition as claimed in claim 1, wherein the one or more polyolefin waxes have a number-average molar mass $M_n$ of between 500 and 20 000 g/mol, and a weight-average molar mass $M_w$ of between 1000 and 40 000 g/mol.

4. The hot melt composition as claimed in claim 1, wherein the one or more polyolefin waxes are propylene homopolymers.

5. The hot melt composition as claimed in claim 1, wherein the one or more polyolefin waxes are copolymer waxes of propylene and one or more further monomers selected from the group consisting of ethylene and branched or unbranched 1-alkenes having 4 to 20 carbon atoms and the amount of structural units originating from propylene in the copolymer waxes is from 70 to 99.9% by weight.

6. The hot melt composition as claimed in claim 1, wherein the one or more polyolefin waxes are copolymer waxes of ethylene and at least one branched or unbranched 1-alkene having 3 to 20 carbon atoms and the amount of structural units originating from the one or more 1-alkenes in the copolymer waxes is from 0.1% to 30% by weight.

7. The hot melt composition as claimed in claim 4, wherein the propylene homopolymer waxes have undergone polar modification.

8. The hot melt composition as claimed in claim 1, further comprising one or more substances selected from the group consisting of polyolefin polymers, resins, waxes, plasticizers, polar or apolar polymers, pigments, fillers, stabilizers, and antioxidants.

9. A hot melt adhesive comprising the hot melt composition as claimed in claim 1.

10. The hot melt adhesive as claimed in claim 9, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 50% and 99% by weight.

11. The hot melt adhesive as claimed in claim 9, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 50% and 99% by weight.

12. A binder for producing roadmarks comprising a hot melt composition as claimed in claim 1.

13. The binder as claimed in claim 12, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 5% and 99% by weight.

14. The binder as claimed in claim 12, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 20% and 90% by weight.

15. The binder as claimed in claim 12, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 50% and 99% by weight.

16. The binder as claimed in claim 1, wherein the one or more polyolefin waxes are present in the hot melt composition in fractions of between 60% and 90% by weight.

17. The hot melt composition as claimed in claim 5, wherein the copolymer waxes of propylene and one or more further monomers selected from the group consisting of ethylene and branched or unbranched 1-alkenes having 4 to 20 carbon atoms waxes have undergone polar modification.

18. The hot melt composition as claimed in claim 6, wherein the copolymer waxes of ethylene and at least one branched or unbranched 1-alkene having 3 to 20 carbon atoms waxes have undergone polar modification.

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