Polyurethanes based on polyesterols are usually produced using polyesterols obtained by polycondensation of C4-C6-dicarboxylic acids with polyfunctional alcohols. However, these polyurethanes have the disadvantage that they have only unsatisfactory hydrolysis stability. To improve the hydrolysis stability of polyurethanes based on polyesterols, these C4-C6-dicarboxylic acids are, for example, replaced by more hydrophobic dicarboxylic acids. Thus, US 2005124711 describes microcellular polyester polyurethanes which are obtained from polyesterols obtained from dimeric fatty acids. Nevertheless the approach as disclosed in US 2005124711 does not lead to a major improvement of hydrolysis stability.

WO 2004/050735 describes the use of polyesterols based on a combination of orthophthalic acid and a dicarboxylic acid having 8-12 carbon atoms in order to improve the hydrolysis stability.

A disadvantage of these polyesters having improved hydrolysis stability is that the raw materials used are expensive. Furthermore, the mechanical properties are poorer compared to polyurethanes based on classical polyesterols which are obtained by polycondensation of C4-C6-dicarboxyliac acids with polyfunctional alcohols.

US 20020120027 discloses a process in which esters of monobasic or polybasic carboxylic acids are utilized in substoichiometric ratios to the amine catalyst used in order to improve the hydrolysis stability. A disadvantage of the process disclosed here is that the improvement in the hydrolysis stability lasts for only a short time (about 9 days at 70°C and 95% r.H.).

It was an object of the embodiments disclosed herein to provide polyurethanes which are based on polyesterols and have improved hydrolysis stability and excellent mechanical properties. It was further object of the embodiments disclosed herein to provide polyurethane mouldings that pass the hydrolysis testing using SATRA TM344 (storing at 70 °C and 95 % relative humidity) for at least 28 days with tensile strength retention of more than 80 % of the initial value. Further it was an object of the embodiments disclosed herein to provide polyurethane mouldings that are suitable as sole material for army boots.

There is provided a polyurethane molding which can be produced by a process, in which (a) organic polyisocyanates are mixed with (b) polyol comprising polyesterols, (c) optionally blowing agents, (d) chain extenders and/or crosslinkers, (e) amine catalyst, (f) carbodiimide of the general formula Z-N=C=N-Z, where Z is an organic radical and the nitrogen atom of the carbodiimide group -N=C=N- is bound either to a tertiary carbon atom or to a carbon atom of an aromatic system which on the ring positions adjacent to the C-N bond in the aromatic system bears an organic radical bound via a secondary or tertiary carbon atom to the aromatic system, (g) at least one member selected from the group consisting of (i) an ester of a monobasic carboxylic acid, and (ii) an

ester of a polybasic carboxylic acid, the (first) dissociation constant (pK) of each acid being 0.5 to 5, and optionally (h) other auxiliaries and/or additives, to form a reaction mixture, the mixture is introduced into a mold and allowed to react to form a polyurethane molding, wherein the polyesterols comprise a polyesterol (b1) obtainable by esterification of an aliphatic dicarboxylic acid having 2 to 10, carbon atoms and at least one higher functional alcohol having 5 to 20 carbon atoms and optionally one higher functional alcohol having 2 to 4 carbon atoms wherein at least 20 wt.-% of higher functional alcohol is a higher functional alcohol having 5 or more carbon atoms, based on the total amount of the higher functional alcohol in component (b1), and optionally a polyesterol (b2) obtainable by esterification of an aliphatic or aromatic dicarboxylic acid having 2 to 10 carbon atoms and at least one higher functional alcohol having 2 to 4 carbon atoms and less than 20 wt.-% of at least one higher functional alcohol having 5 or more carbon atoms, based on the total amount of the higher functional alcohol in component (b2), and optionally a further polyesterol (b3) wherein the acid component comprises at least one dimer acid.

In an aspect, there is provided a process for producing polyurethane moldings, wherein

a) organic polyisocyanates are mixed with
b) polyol comprising polyesterols,
c) optionally blowing agents,
d) chain extenders and/or crosslinkers,
e) amine catalyst
f) carbodiimide of the general formula Z-N=C=N-Z, where Z is an organic radical and the nitrogen atom of the carbodiimide group -N=C=N- is bound either to a tertiary carbon atom or to a carbon atom of an aromatic system which on the ring positions adjacent to the C-N bond in the aromatic system bears an organic radical bound via a secondary or tertiary carbon atom to the aromatic system,
g) at least one member selected from the group consisting of (i) an ester of a monobasic carboxylic acid, and (ii) an ester of a polybasic carboxylic acid, the (first) dissociation constant (pK) of each acid being 0.5 to 5, and optionally
h) other auxiliaries and/or additives,

to form a reaction mixture, the mixture is introduced into a mold and allowed to react to form a polyurethane molding,

wherein the total weight of polyesterols (b1), (b2) and (b3) comprise

15 to 60 % by weight of a polyesterol (b1) obtainable by esterification of an aliphatic dicarboxylic acid having 2 to 10, carbon atoms and at least one higher functional alcohol having 5 to 20 carbon atoms and optionally one higher functional alcohol having 2 to 4 carbon atoms wherein at least 20 wt.-% of higher functional alcohol is a higher functional alcohol having 5 or more carbon atoms, based on the total amount of the higher functional alcohol in component (b1) and

20 to 80 % by weight of a polyesterol (b2) obtainable by esterification of an aliphatic or aromatic dicarboxylic acid having 2 to 10 carbon atoms and at least one higher functional alcohol having 2 to 4 carbon atoms and less than 20 wt.-% of at least one higher functional alcohol having 5 or more carbon atoms, based on the total amount of the higher functional alcohol in component (b2), and

5 to 20 % by weight of a further polyesterol (b3) wherein the acid component comprises at least one dimer acid.

In another aspect, there is provided a polyurethane moulding obtainable by a process as defined above.

In another aspect, there is provided the use of a polyurethane molding as defined above as shoe sole.

In particular, the polyurethane moldings of the invention are elastomers. These comprise compact polyurethane elastomers, also referred to as cast resins, and elastomeric polyurethane foams, preferably integral polyurethane foams. For the purposes of the present invention, the term elastomeric polyurethane foam refers to polyurethane foams in accordance with DIN 7726 which after brief deformation by 50% of the thickness in accordance with DIN 53 577 have no remaining deformation of more than 2% of their initial thickness after 10 minutes. For the purposes of the invention, integral polyurethane foams are polyurethane foams in accordance with DIN 7726 having an outer zone which, due to the shaping process, has a higher density than the core. The overall foam density averaged over the core and the outer zone is preferably from > 150 g/l to 850 g/l, preferably from 180 g/l to 750 g/l, more preferably from 200 g/l to 650 g/l. The density of compact polyurethane elastomers is from > 850 g/l to 1400 g/l, preferably from 900 to 1300 g/l and in particular from 950 to 1200 g/l.

The organic and/or modified polyisocyanates (a) used for producing the polyurethane moldings of the invention comprise the aliphatic, cycloaliphatic and aromatic bifunctional or polyfunctional isocyanates known from the prior art (constituent a-1) and also any mixtures thereof. Examples are monomeric diphenylmethane diisocyanate (MDI), e.g. diphenylmethane 4,4´-diisocyanate, diphenylmethane 2,4´-diisocyanate, the mixtures of monomeric diphenylmethane diisocyanates and homologues of diphenylmethane diisocyanate having more than two rings (polymeric MDI), tetramethylene diisocyanate, hexamethylene diisocyanate (HDI), isophorone diisocyanate (IPDI), tolylene 2,4- or 2,6-diisocyanate (TDI) or mixtures of the isocyanates mentioned.

Preference is given to using 4,4'-MDI. The 4,4'-MDI which is preferably used can comprise from 0 to 20% by weight of 2,4'-MDI and small amounts, up to about 10% by