

C l a i m s

1. A method for processing water treatment residuals, or other amorphous aluminium oxide
or aluminium hydroxide rich waste residuals, for use in the manufacture of hydraulic
5 binders, comprising heating the residuals to remove water and oxidise organic material
contained therein, wherein the temperature of the residuals is controlled during heating
such that they are heated to a temperature no higher than 800°C.
2. A method as claimed in claim 1,
10 comprising controlling the temperature of the residuals such that they are heated to a
temperature no higher than 700°C, more preferably no higher than 650°C.
3. A method as claimed in claim 1,
comprising controlling the temperature of the residuals such that they are heated to a
15 temperature between 350°C and 650°C.
4. A method as claimed in claim 1,
comprising controlling the temperature of the residuals such that they are heated to a
temperature between 400°C and 500°C.
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5. A method as claimed in any preceding claim,
wherein the temperature of the residuals is controlled during heating such that
amorphous aluminium oxide and/or aluminium hydroxide present in the residuals
remains in its amorphous state.
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6. A method as claimed in any preceding claim,
wherein the residuals are heated in a heating chamber, the temperature of the residuals
being controlled by the addition of air and/or water to the chamber and/or by controlling a
supply of heat to the heating chamber.
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7. A method as claimed in claim 6,
wherein air is added to the heating chamber at a rate adapted to ensure that all organic
material or substantially all organic material in the residuals is oxidised.
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8. A method as claimed in claim 6 or claim 7,
wherein the residuals within the heating chamber are heated indirectly by heating an
exterior of the heating chamber.
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9. A method as claimed in claim 8,
wherein the exterior of the heating chamber is heated by means of burners acting directly
on the exterior of the heating chamber.
10. A method as claimed in claim 8,
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- wherein the heating chamber is located within a heating jacket receiving hot gases from
a burner.
11. A method as claimed in any preceding claim,
wherein the residuals are at least partially dewatered prior to heating.
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12. A method as claimed in claim 11,
wherein the residuals are dewatered via a mechanical process.
13. A method as claimed in claim 12,
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- wherein the residuals are dewatered in a belt dryer or rotary dryer.
14. A method as claimed in any of claims 11 to 13,
wherein the residuals are dewatered to have a water content of between 20% and 40%.
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15. A method as claimed in any preceding claim,
wherein the residuals are milled or ground after heating to a particle size of 40 microns or
approximately 40 microns.

16. A method as claimed in any preceding claim,
wherein residuals are hydrated after heating to convert amorphous aluminium oxide to amorphous aluminium hydroxide.
- 5 17. A method as claimed in any preceding claim,
wherein the residuals are mixed with a source of calcium ions and a source of sulphate ions in the presence of water to form ettringite.
- 10 18. A method as claimed in claim 17,
wherein the residuals are mixed with Portland cement, hydrated lime and calcium sulphate in the presence of water.
- 15 19. A method as claimed in any of claims 1 to 16,
wherein the residuals are mixed with a source of calcium ions in the presence of water.
- 20 20. An apparatus for processing water treatment residuals or other amorphous aluminium oxide or aluminium hydroxide rich waste residuals for use in the manufacture of hydraulic binders, comprising a heating chamber within which the residuals can be heated, means for heating the heating chamber and means for controlling the temperature therein.
- 25 21. An apparatus as claimed in claim 20,
wherein the heating chamber is heated by burners acting against an outer wall of the heating chamber.
- 30 22. An apparatus as claimed in claim 20,
wherein the heating chamber is heated by ducting hot gases from a combustion chamber into a heating jacket surrounding the heating chamber.
23. An apparatus as claimed in any of claims 20 to 22,
wherein means are provided for adding air to the heating chamber.

24. An apparatus as claimed in claim 22,
wherein combustion gases from the heating means are used to pre-heat the air added to
the heating chamber.
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25. An apparatus as claimed in any of claims 19 to 23,
wherein the heating chamber is adapted to be rotated during heating.
26. An apparatus as claimed in claim 23,
10 wherein the heating chamber comprises a tubular drum mounted for rotation about a
longitudinal axis and having an inlet at one end and an outlet and an opposite end.
27. An apparatus as claimed in any of claims 20 to 26,
further comprising a dewatering means upstream of the heating chamber for reducing the
15 water content of the water treatment residuals.
28. An apparatus as claimed in any of claims 20 to 27,
further comprising a milling and/or grinding means downstream of the heating chamber
for reducing the particle size of the water treatment residuals after heating.
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29. An apparatus as claimed in any of claims 20 to 28,
wherein the temperature control means is adapted to limit the temperature of the water
treatment residuals to no more than 700°C.
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30. An apparatus as claimed in any of claims 20 to 28,
wherein the temperature control means is adapted to limit the temperature of the water
treatment residuals to no more than 650°C.
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31. An apparatus as claimed in any of claims 20 to 30,
wherein the temperature control means is adapted to control the temperature of the
water treatment residuals in the heating chamber to between 350°C and 650°C.

32. An apparatus as claimed in any of claims 20 to 31,
wherein the temperature control means is adapted to control the temperature of the
water treatment residuals in the heating chamber to between 400°C and 500°C.

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33. An apparatus according to any of the previous claims 20 to 32,
wherein the apparatus is configured to perform the method according to any of the
previous claims 1 to 19.

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