

Day Group



Advances in the Processing and Use of Incinerator Bottom Ash

- UK availability
- Overview of IBA
- The treatment of IBA to separate metals to create an aggregate (IBAA)
- IBAA properties
- Standards and specifications for IBAA in Concrete



Existing and Planned IBA sites



Source – UK without incineration

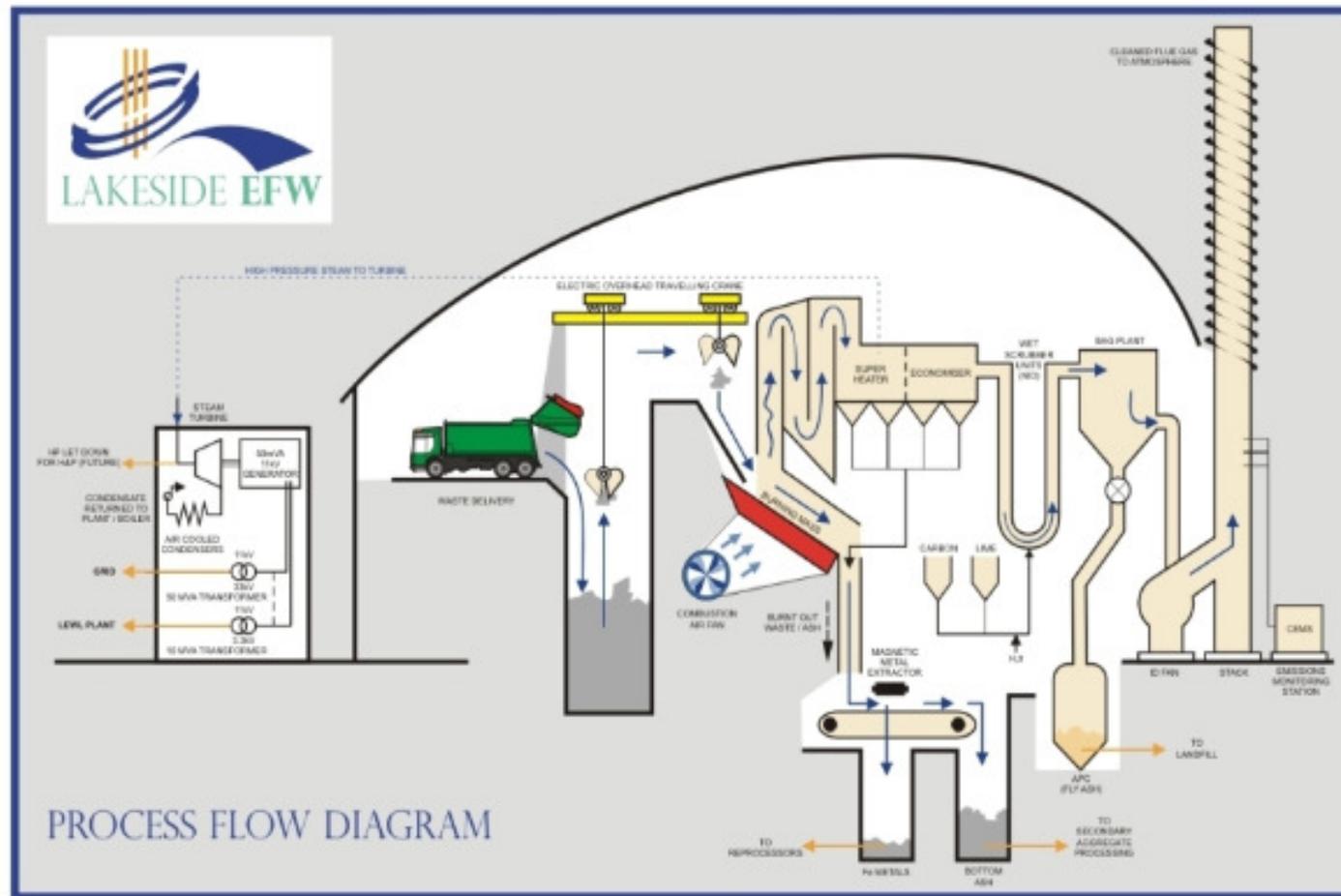
Existing and Planned IBA sites

- The UK currently recovers approximately 1.1 million tonnes per year of IBAA from energy from waste facilities (EfW's).
- This is predicted to increase to some **2.4 million tonnes by 2020** as new facilities linked to long term waste disposal contracts come on stream.
- This presents a constant supply of consistent quality IBAA to aggregate users.
- EfW's can be found where there is not normally a regular supply of recycled aggregates

An energy from waste plant

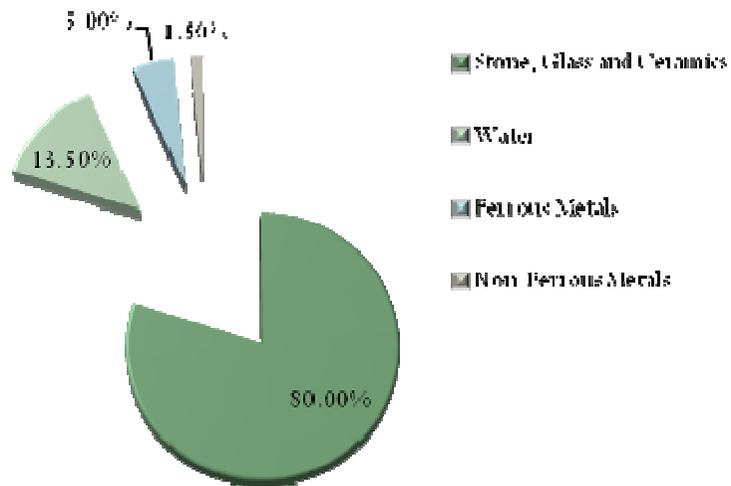


The workings of energy from waste plant



Properties of IBA

It is a heterogeneous material that may contain varying proportions of glass, ceramics, brick and concrete in addition to clinker and ash



Overview of processing plant

- Raw IBA after 3 weeks storage (maturation period)



Overview of processing plant

- The site at Brentford



Overview of processing plant

- Non ferrous magnet



Overview of processing plant

- Ferrous removal



Overview of processing plant

- NF after eddy seperators



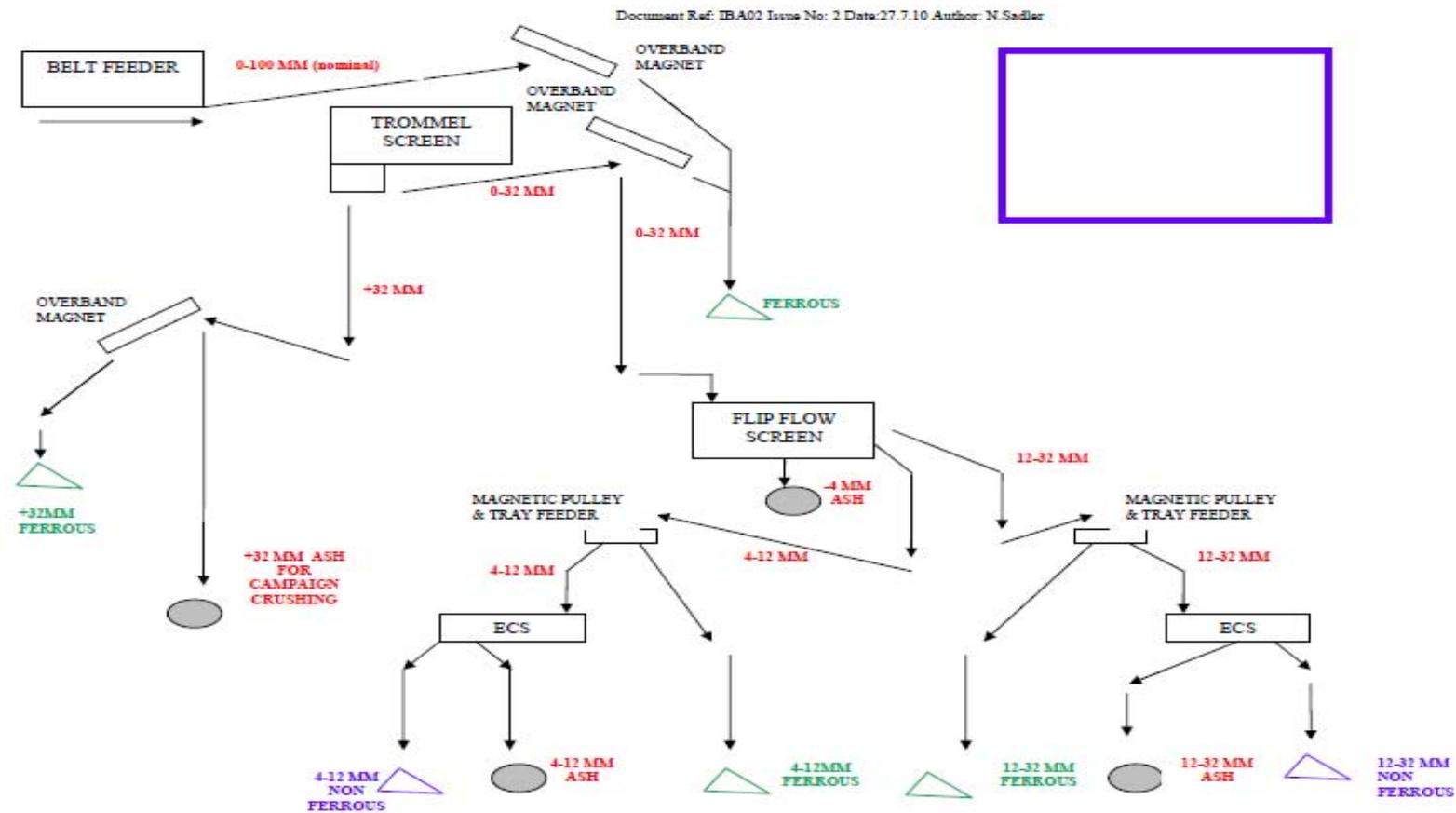
Overview of processing plant

- 0/4mm de-metaled



Overview of processing plant

- The process flow



Overview of processing plant

- 0/4mm de-metaled



Current Uses of IBAA

- **Backfill to Structures**
- **Capping**
- **Sub-Base**
- **Aggregate replacement in Hydraulically Bound Mixtures**
- **Aggregate replacement in Asphalt**

HBM – typically 5%-8% PC content

- Products are made to EN 14227 standards and generally we look to use recycled aggregates as the base aggregates where possible.
- The binders we use are OPC, lime and conditioned PFA is also used.
- Material stability is demonstrated by immersed strength tests



WRAP Website – a useful guide to using IBAA

The screenshot displays the WRAP website interface. At the top left is the WRAP logo with the tagline "Working together for a world without waste". To the right is a search bar with the text "SEARCH Enter keywords" and a search button. Below the search bar are links for "AggRegain" and "All WRAP". A navigation menu on the left lists various categories such as Geosystems, Opportunities, Specifier, Supplier Directory, Case Studies, Planning, Recycling Infrastructure, Quality, Waste Management Regulations, Demolition, Procurement, Sustainability, and Utilities. The main content area features the "AggRegain" heading and several promotional tiles: "Welcome to AggRegain..", "Sustainable Aggregates", "Opportunities", "Zero Waste Scotland Recycled Aggregates Directory", "CO₂ Emissions Estimator Tool", "REACH Aggregates Pre-registration Information", "Materials Resource Efficiency in Regeneration Projects", and "recycled loads". At the bottom, there is a footer with contact information: "© WRAP 2010 | Privacy policy | Terms & conditions" on the left, and "Helpline 0808 100 2040 Office 01295 819900" on the right, along with a "Sign up for E-newsletter" button and a "Contact WRAP" link.

wrap Working together for a world without waste

SEARCH Enter keywords

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AggRegain

Welcome to AggRegain..
Your complete online guide to sustainable aggregates ...

Sustainable Aggregates
What are they and why use them...?

Opportunities
Find out where recycled and secondary aggregates can be used in a variety of construction applications...

the quality protocol
now with checklists

Zero Waste Scotland Recycled Aggregates Directory
Find producers in Scotland that comply with the Quality Protocol ...

CO₂ Emissions Estimator Tool
Find out more and download the tool...

REACH
Aggregates Pre-registration Information

Materials Resource Efficiency in Regeneration Projects

recycled loads Find out more...

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Potential Use in Concrete Products - EN 12620 Aggregates for Concrete

- **BS EN 12620 will give a classification code of B1**
 - **IBAA has history of use**
 - **There are no Special requirements in the standard**
 - **Additional requirements identified for inclusion**

Potential Use in Concrete Products - major concerns

- **Al and Zn content**
 - **BS EN 1744-8:2012**
Tests for chemical properties of aggregates. Sorting test to determine metal content of Municipal Incinerator Bottom Ash (MIBA) Aggregates
- **Alkali Content**
- **Chlorides**
- **ASR**

Products specification/EU Declaration of Conformity		8 June 2012
AEC-Granulate 0-10mm as coarse aggregate for concrete in accordance with NEN-EN 12620 and CUR recommendation 116		
	Production location: Heros Sluiskil B.V. Oostkade 5 4541 HH SLUIISKIL (NL) Telephone: 0115-471258 Fax: 0115-472775 E-mail address: info@heros.nl	

article	subject	specification
4.2	Aggregate size	0/10
4.3	Grading	All-in G _{A90} see also appendix
4.4	Shape of coarse aggregate	
	- Flakiness index	F ₁₅
	- Shape index	S ₁₀
4.5	Shell content of coarse aggregate	SC ₄₀
4.6	Fines content	f _r
4.7	Fines quality	B- not harmful
	Methylene blue value 0/2 mm MBT	0.1 g/kg
5.2	- resistance to fragmentation	N _{FD}
	- resistance to impact	SZ ₁₀
5.3	Resistance to wear	M ₀₂ NR
5.4.1	Resistance to polishing	PSV ₄₀
5.4.2	Resistance to surface abrasion	AAV ₄₀
5.4.3	Resistance to abrasion from studded tyres	A ₁₀ NR
5.5	- Particle density (0-10mm)	2,133 Mg/m ³
	- Water absorption 24 hours	WA ₂₄ 9,5 – 10 %
5.6	Bulk density (loosely poured)	1,074 Mg/m ³
5.7.1	Freeze/thaw resistance	F ₁₀₀ / MS ₁₀₀
5.7.2	Volume stability – drying shrinkage	0,041 %
5.7.3	Alkali-silica reactivity	Potential ASR-reactive
6.2	Chlorides	< 0,4 % m/m
6.3.1	Acid-soluble sulphate (SO ₃)	AS _{1,3}
6.3.2	Total Sulphur	S _T (0,45% m/m)
6.4.1	Constituents that alter the rate of setting and hardening of concrete	A ₁₀

Other information

AEC granulate is AVI ash that is made suitable for application as an additive for concrete by means of additional processing. This additional processing consists of sieving and separating ferrous and non-ferrous components.

Emission of anorganic components	Meets the requirements in appendix A, table 1 of the Soil Quality Regulation for IBC building materials.
Composition organic components	Meets the requirements in appendix A, table 2 of the Soil Quality Regulation
Eural:	Non Hazardous Waste – Eural code 19 01 12

Alkali content (Na ₂ O- _{eq})	0,4 – 0,6
Metallic Al + Zn content	≤ 1 % m/m
Loss due to burning	≤ 3%

Due to the increased alkali content of the coarse aggregate it must be ensured that the alkali content of the eventual concrete mixture meets the requirements as stipulated in CUR recommendation 89.
Due to the increased value of Sulphate dissolvable in acid, the manufacturer of the concrete mixture to which the coarse aggregate is added must select a sulphate resistant cement.

EU Declaration of Conformity

On behalf of Heros Sluiskil B.V. in Sluiskil, the undersigned declares that the AEC granulate specified in this product specification sheet from the refinement installation at Oostkade 5 in Sluiskil meets the requirements of Annex ZA of NEN-EN 12620 on the grounds of the Building Products Directive (89/106/EU) if it is applied in accordance with the application conditions stated on the product specification sheet.

Date: 8 June 2012
name: Mr. P.E.C. Aerts
function: Team Leader Back Office
signature:

ANNEX Product specification/EU Declaration of Conformity		8 June 2012
AEC-Granulate 0-10mm as coarse aggregate for concrete in accordance with NEN-EN 12620 and CUR recommendation 116		
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article subject

4.3. Grading

specification

Sieve size (mm)	Min (% m/m)	Max (% m/m)	Average	Requirement
22.4	100	100	100	
20	100	100	100	
16	100	100	100	
14	100	100	100	
12.5	100	100	100	
11.2	99	100	100	
10	95	100	98	
8	85	96	91	
6.3	73	82	78	
5.6	67	73	70	
5	60	64	62	
4	48	49	49	
2	24	27	26	
1	15	16	16	
0.5	12	12	12	
0.25	9	10	10	
0.125	7	7	7	
0.063	4,7	5,5	5,1	
Fines	4,5	6,1	5,3	

EU declaration of conformity

On behalf of Heros Sluiskil B.V. in Sluiskil, the undersigned declares that the AEC granulate specified in this product specification sheet from the refinement installation at Oostkade 5 in Sluiskil meets the requirements of Annex ZA of NEN-EN 12620 on the grounds of the Building Products Directive (89/106/EU) if it is applied in accordance with the application conditions stated on the product specification sheet.

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Conclusions

- **IBAA is already recognised as unbound aggregate in the UK**
- **Improved processing machinery results in less NF content in the fine fraction IBAA**
- **EN Standards now set test methods and declaration levels to enable a specification to be agreed between the supply and user**
- **The commercial benefit of using IBAA should justify the costs associated with approving it as aggregate replacement in concrete products**