SECTION 4

Contamination and pollution study...

The resistance of Superwool®, RCF and competitive AES fibre to pollution from elements which may be found in kilns operating at high temperature.

What does a contamination study involve?

The aim of this study was to evaluate the resistance of Superwool®, RCF and a competitor AES fibre to pollution from the elements which may be found in kilns operating at high temperature.

Examples are the firing of glazed ceramics and steel heat treatment. The pollutants are generally inorganic elements or oxides which can form a damaging eutectic reaction with the fibre. The result can be melting, crystallisation or powdering of the fibre.

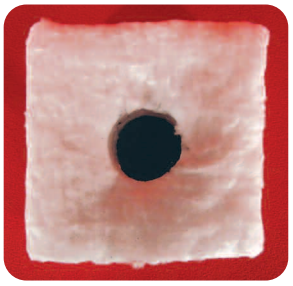
The products tested were:

- **Superwool® Plus**
- **Superwool® 607®HT™**
- **Cerablanket (RCF1260)**
- **A similar competitor AES 1260°C product**

Test method:

Three layers of blanket of 128kg/m^3 density and 25mm thick are overlaid. The mid layer has a hole at the middle so the pollutant powder (6g) can be inserted. This technique offers the advantage that the test can evaluate both contact reactivity in the bottom layer and also vapour reactivity in the top layer.

The 3 layers are heat treated for 6 hours at the following temperatures:
1000°C (1832°F)
1100°C (2012°F)
1150°C (2102°F)
After heat treatment the three layers are observed to evaluate potential powderiness, melting, discolouration or any signs of reaction.



Pollutants tested:
The pollutants tested were as follows:

Mo =	molybdenum / MoO_3	= molybdenum trioxide
Cu =	copper / copper (II) oxide	
Zn =	zinc / ZnO	= zinc oxide
Pb =	lead / PbO	= lead (II) oxide
V =	vanadium / V_2O_5	= vanadium pentoxide
Mn =	manganese / MnO	= manganese oxide
Ni =	nickel / NiO	= nickel (II) oxide
Cr =	chromium	
Sn =	tin / SnO_2	= tin (IV) oxide
Na_2CO_3 =	sodium carbonate	
K_2CO_3 =	potassium carbonate	
B_2O_3 =	boric oxide	
Bi_2O_3 =	bismuth trioxide	
P_2O_5 =	phosphorous pentoxide	

What were the test results?

Elements	SW607HT	RCF 1260	Competitor AES 1260°C	SW Plus
	Calcium Silicate	Alumino Silicate	Magnesium Silicate	Calcium/ Magnesium Silicate
Mo/MoO_3	800°C (1472°F)	800°C (1472°F)	800°C (1472°F)	800°C (1472°F)
Ni/NiO				
SnO_2				
Zn/ZnO				1000°C (1832°F)
Mn/MnO				
Cr				
Sn		1150°C (2102°F)		
Fe			1100°C (2012°F)	
Cu/CuO	1100°C (2012°F)	1100°C (2012°F)	1150°C (2102°F)	1000°C (1832°F)
B_2O_3	Start before 700°C	1100°C (2012°F)	800°C (1472°F)	700°C (1292°F)
K_2CO_3	900°C (1652°F)	900°C (1652°F)	900°C (1652°F)	900°C (1652°F)
Na_2CO_3	800°C (1472°F)	900°C (1652°F)	800°C (1472°F)	800°C (1472°F)
Pb/PbO	800°C (1472°F)	800°C (1472°F)	800°C (1472°F)	800°C (1472°F)
P_2O_5	Start before 700°C (1292°F)	700°C (1292°F)	Start before 700°C (1292°F)	Start before 700°C (1292°F)
V_2O_5	1100°C (2012°F)	1150°C (2102°F)	900°C (1652°F)	900°C (1652°F)
Bi_2O_3	1100°C (2012°F)	1150°C (2102°F)	900°C (1652°F)	900°C (1652°F)

Legend:

Reaction starts from this temperature

No reaction observed along its typical range of use (Continuous use temperature)

Conclusions / recommendations

- All fibre chemistries demonstrate varying degrees of reactivity with a majority of elements. In Superwool® 607 HT™ and Superwool® **Plus** applications, the following elements indicate a risk to product performance:

Mo/MoO_3
Alkali (such as K_2CO_3/K_2O, Na_2CO_3/Na_2O, B_2O_3)
Pb/PbO
P_2O_5

Elements reacting at very low temperature and should be avoided

V_2O_5 **Cu/CuO**
Bi_2O_3 **Zn/ZnO**

- A combination of contaminants will worsen the chemical attack
- From experience it is known that both sulphur and HF will produce a strong attack
- If an application does not contain these elements or are working at a lower temperature than the reaction starting temperature, Superwool® 607 HT® and Superwool® **Plus** will perform well in the application. Where contamination is anticipated which may cause a reaction with the fibre lining, it is recommended to discuss the best practical solution to lining design with your local Morgan Thermal Ceramics office.

Superwool® Plus

Insulating fibre

Features	Benefits
An engineered solution (unique)	Takes insulation beyond normal performance
Patented technology	**Proven chemical formulation**
High temperature insulating wools (Superwool® range of products) not classified according to European Regulation (EC) 1272/2008	Restrictions on use do not apply. No special requirements for dust control, can be supplied to the general public and considered as non-hazardous waste for disposal
Lower thermal conductivity	Improves insulation by 20%
Up to 30% more fibres	Efficient prevention of heat transfer and greater strength
Less shot	Cleaner workplace
High Fibre Index	Up to 20% reduction in thermal conductivity giving energy saving
Stronger with good handleability (no tearing)	Ease of installation saving time and waste
Improved handling	Operator satisfaction
Soft & smooth feel	Less mechanical skin irritation
Consistent use of pure raw materials	Higher classification temperature, low shrinkage and consistent quality
Lower density grade for the same result	Material weight savings up to 25%
Thinner lining for the same result	Create more working space within unit
Resistant to vibration	Allows long lifetime under vibration conditions where other products fail
An environmental solution	Potential savings on waste disposal
Worldwide production	Availability