HH-13.1. Occupational scenario for preparing and applying refractory mixes

Systematic title based on use descriptor	PROCs	
	7	Industrial spraying.
	19	Hand-mixing with intimate contact and only PPR available.

HH-13.2 Controlling worker exposure

Product characteristics		Refractory mixes may be supplied as dry or wet products containing between 0.08 – 1.1% boron.
Amounts used		A few kg for repairs to several hundred kg for complete linings.
Frequency and duration of use		Specialists can do this daily.
Human factors not influenced by risk management		None
Other given operational conditions affecting workers exposure		Activities take place indoors. Sometimes in a confined space inside kilns/furnaces. Hot gunning repairs at high temperature.
Technical conditions and measures at process level (source) to prevent release		None
Technical conditions and measures to control dispersion from source towards the worker		Sometimes supplied in a wet, ready to use form. If spraying, the mixture is wet.
Organisational measures to prevent /limit releases, dispersion and exposure		Appropriate training. Regular testing and maintenance of equipment. Confined space entry precautions should be implemented if required.
Conditions and measures related to personal protection, hygiene and health evaluation	**Clothing**	Standard work clothes.
	Gloves	Not required for normal industrial exposure.
	Eye protection	Required where good hygiene practice or substance classification demands it.
	RPE	P2/P3 required where exposure is above the DNEL. Full-face, powered respirator required when spraying inside a kiln/furnace.

HH-13.3. Exposure estimation

Human Health Exposure Estimations

INHALATION

	Activity	Source/ Parameters	RMM	Value 8h TWA mg B/m^3	RCR DNEL = 1.45 mg B/m3
Modelled (ART)	Mixing and spraying of refractory coatings	Coarse dust, Dry product, Falling powders, Transferring 10-100kg/minute, Routine transfer, Open process, General housekeeping practices in place, Indoors, Any size workroom, No controls, Good natural ventilation	RPE not taken into account	0.012	0.008

DERMAL

	Activity	Source/ Parameters		RMM	Value mg B/day	RCR DNEL = 4800 mg B/day
Modelled (MEASE)	Mixing and spraying of refractory coatings	**Physical form**	high dustiness	-	0.42	<0.001
		Content	1-5 % boron			
		PROC	7 + 19			
		Duration	15-60 min			
		Use pattern	non dispersive			
		Handling	direct			
		Contact level	intermittent			
	Hand application of wet refractory material	**Physical form**	aqueous solution	-	2.4	<0.001
		Content	< 1% boron			
		PROC	19			
		Duration	> 240 min			
		Use pattern	non dispersive			
		Handling	direct			
		Contact level	extensive			

HH-13.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

If the parameters used in the MEASE model outlined above do not reflect conditions at the DU facility, the DU can use MEASE and input the parameters that do reflect conditions at the DU facility to check whether the DU works inside the boundaries set by the ES. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16).