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Revision nr : 5

Datum : 2/6/2014 Ersetzt : 19/3/2013

BORAX DECAHYDRAT

Code : 11010

Α	ABSCHNITT 1. Bezeichnung des Stoffs bzw. des Gemischs und des Unternehmens			
	1.1. Produktidentifikator			
	Chemischer Name	: Borax decahydrat , Dinatriumtetraborat dekahydrat , Natriumborat dekahydrat .		
	Art der Produktes	: Reiner Produkt .		
	Reach Registrierungnummer	: 01-2119490790-32		
	1.2. Relevante identifizierte Verwe	endungen des Stoffs oder Gemischs und Verwendungen von denen		
	abgeraten wird			
*	Identifizierte(n) Verwendung(en)	: Siehe Tabelle auf der ersten Seite des Anhangs.		
*	Verwendung(en) von denen abgeraten wird	 Dieses Produkt ist nicht für irgendeiner anderen industriellen, gewerblichen Verwendung oder Verwendung durch den Verbraucher als in der Tabelle auf der ersten Seite des Anhangs empfohlen. Nicht für die Verwendung in Dekorationsgegenständen, in Scherzspielen und in Spielen (gemäß Anhang XVII der Verordnung (EG) Nr. 1907/2006) (3. Flüssige Stoffe oder Gemische, die nach den Definitionen in der Richtlinie 67/548/EWG und der Richtlinie 1999/45/EG als gefährlich gelten). Nicht für die Verwendung als Stoffe, als Bestandteile anderer Stoffe oder in Gemischen die zum Verkauf an die breite Öffentlichkeit bestimmt sind (gemäß Anhang XVII der Verordnung (EG) Nr. 1907/2006) (30. Stoffe in Anhang VI Teil 3 der Verordnung (EG) Nr. 1272/2008, die als fortpflanzungsgefährdend der Kategorie 1A oder 1B (Tabelle 3.1) oder als fortpflanzungsgefährdend der Kategorie 1 oder 2 (Tabelle 3.2) eingestuft). 		
	1.3. Einzelheiten zum Lieferanten	<u>, der das Sicherheitsdatenblatt bereitstellt</u>		
*	Firmenidentifizierung	: BRENNTAG N.V Nijverheidslaan 38 - BE-8540 DEERLIJK TEL: +32(0)56/77.69.44 - FAX: +32(0)56/77.57.11 E-MAIL: info@brenntag.be - Website: www.brenntag.be		
		BRENNTAG Nederland B.V Donker Duyvisweg 44 - NL-3316 BM DORDRECHT TEL: +31(0)78/65.44.944 - FAX: +31(0)78/65.44.919 E-MAIL: info@brenntag.nl - Website: www.brenntag.nl		
	<u>1.4. Notrufnummer</u>			
*	Notrufnummer	: Belgien : Antigifzentrum - Brüssel TEL: +32(0)70/245.245		
		Die Niederlande : National Vergiftungen Information Zentrum - Bilthoven TEL: +31(0)30/274.88.88 (Ausschließlich zum Zwecke der Unterrichtung medizinisches Personal bei akuten Intoxikationen)		

ABSCHNITT 2. Mögliche Gefahren

2.1. Einstufung des Stoffs oder Gemischs

Einstufung gemäß der Richtlinie 67/548/EEG oder 1999/45/EG

Reizend (Xi; R36) Giftig für die Fortpflanzung (Repr. Cat. 2; R60-61)

Einstufung gemäß der Verordnung (EG) Nr. 1272/2008

Augenreizung - Kategorie 2 - Achtung (Eye Irrit. 2; H319) Reproduktionstoxizität - Fertilität - Kind im Mutterleib - Kategorie 1B - Gefahr (Repr. 1B; H360FD)

2.2. Kennzeichnungselemente

Kennzeichnung gemäß der Verordnung (EG) Nr. 1272/2008

Gefährliches Bestandteil(en)
 Borax decahydrat



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ABSCHNITT 2. Mögliche Gefahren (Fortsetzung)			
• Gefahren Piktogramm(e)			
• Signalwort	: Gefahr		
Gefahrenhinweise	: H319 - Verursacht schwere Augenreizung. H360FD - Kann die Fortpflanzungsfähigkeit beeinträchtigen. Kann das Kind im Mutterleib schädigen.		
 Sicherheitshinweise 			
- Prävention	: P201 - Vor Gebrauch besondere Anweisungen einholen. P202 - Vor Handhabung sämtliche Sicherheitsratschläge lesen und verstehen. P264 - Nach Gebrauch Haut gründlich waschen. P281 - Vorgeschriebene persönliche Schutzausrüstung verwenden.		
- Reaktion	: P305+P351+P338 - BEI BERÜHRUNG MIT DEN AUGEN : Einige Minuten lang vorsichtig mit Wasser ausspülen. Evtl. vorhandene Kontaktlinsen entfernen, sofern leicht möglich. Weiter ausspülen. P308+P313 - Bei Exposition oder Betroffenheit : Ärztlichen Rat einholen. P337+P313 - Bei anhaltender Augenreizung : Ärztlichen Rat einholen.		
- Lagerung	: P405 - Unter Verschluß aufbewahren.		
- Hinweise zur Entsorgung	: P501 - Diesen Produkt und seinen Behälter der Problemabfallentsorgung zuführen.		
2.3. Sonstige Gefahren			
Physikalishe/chemische Gefahren	: Die Substanz zersetzt sich bei einem Brand oder eine heiße Oberfläche, in Bildung von giftiger, ätzender un metallischer Dämpfe.		
Gefahren für die Gesundheid	Dinatriumtetraborat wird in die Kandidatenliste aufgenommen (SVHC). Diese Produkte verdunstet praktisch nicht bei 20°C; als Pulver beim Sprühen gibt es schnell eine gefährliche Konzentration in der Luft.		
Gefahren für die Umwelt	 Produkt verursacht eine Steigerung des pH-Werts von Wasser und Boden. Dieses Produkt ist kein Substance oder enthält keine PBT oder vPvB (gemäß Anhang XIII). 		
Gefahren für die Sicherheit	: Keine bedeutende Gefahr.		

ABSCHNITT 3. Zusammensetzung/Angaben zu Bestandteilen

Name Komponent(en)		Gew. %	CAS nr	EINECS nr	Index nr	Reach nr	EINSTUFUNG
Borax decahydrat	:	> 99.9 %	1303-96-4	215-540-4	005-011-01-1	01-2119490790-32	Repr. Cat. 2; R60 Repr. Cat. 2; R61 Xi; R36
							Eye Irrit. 2; H319 Repr. 1B; H360FD

Der vollständige Text von die R-Sätze und (EU)H-Hinweise is im Abschnitt 16.

Hinweis: SCL gilt Hinweis: SVHC

ABSCHNITT 4. Erste-Hilfe-Maßnahmen

4.1. Beschreibung der Erste-Hilfe-Maßnahmen

Allgemein

: Beim Zweifel oder andauernden Symptomen, immer Arzt konsultieren. Bewußtlosen Menschen nichts eingeben.



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ABSCHNITT 4. Erste-Hilfe-Maßnahmen (Fortsetzung)

Erste Hilfe	
- Einatmen	 Opfer zur Ruhe kommen lassen, in halb-sitzender Lage bringen. Frische Luft zuführen. Bei unregelmässiger Atmung oder beim Atemstillstand, künstlich beatmen. Ein Arzt konsultieren.
- Hautkontakt	 Verunreinigte Kleidung ablegen. Haut sofort gründlich mit Seife/Wasser spülen. (ev. Duschen). Artz konsultieren, wenn sich negative Reaktionen oder Reizungen einstellen.
- Augenkontakt	Sofort gründlich und länger (mindestens 15 Min.) mit vielem Wasser ausspülen. Kontaktlinsen ausnehmen. Augenarzt konsultieren.
- Verschlucken	: KEIN ERBRECHEN HERBEIFÜHREN. Der Mund spülen mit Wasser. Slachtopfer viel Wasser trinken lassen. Ärztliche Hilfe holen.

4.2. Wichtigste akute oder verzögert auftretende Symptome und Wirkungen

Siehe Abschnitt 11.

4.3. Hinweise auf ärztliche Soforthilfe und Spezialbehandlung

Für fachliche Beratung Ärzte sollten sich an die NVCI oder die belgische Antigiftzentrum.

ABSCHNITT 5. Maßnahmen zur Brandbekämpfung

5.1. Löschmittel

Löschmittel	
- Geeignete	: Löschpulver , Schaum , Kohlenstoffdioxid (CO2) , Sprühwasser .
- Nicht geeignete	: Keine bekannt .
5.2. Besondere vom Stoff ode	er Gemisch ausgehende Gefahren
Spezielle Expositionsgefahren	: Beim Feuer können giftige und metallhaltende Dämpfe freikommen.
5.3. Hinweise für die Brandbe	kämpfung
Schutzende Ausrüstung	: In nächster Nähe des Feuers geschlossenes Atemschutzgerät verwenden und angemessene Schutzkleidung tragen.
Besondere Massnahmen	: Zur K ühlung in der N ähe befindlichen Ger äts Wasserspr ühstrahl oder -nebel verwenden. Es ist zu vermeiden, da ß zur Brandl öschung verwendetes Wasser in die Umwelt gelangt.

ABSCHNITT 6. Maßnahmen bei unbeabsichtigter Freisetzung

	sichtsmaßnahmen, Schutzausrüstungen und in Notfällen anzuwendende
Verfahren	
Personenbezogene Vorsichtsmaßnahmen	Sofort die Personen am angesteckten Ort räumen und gut lüften. Einatmung des Produkt und Berührung mit den Augen, der Haut und Kleider vermeiden. Empfohlene Personenschutzausrüstung tragen. (Siehe Abschnitt 8)
<u>6.2. Umweltschutzmaßnahm</u>	<u>en</u>
Umweltschutzmaßnahmen	: Eindringen das Produkt in Kanalisation, öffentlichen Gewässer oder dem Boden verhindern.
	Falls das Produkt in die Kanalisation oder öffentliche Gewässer gelangt, sind die Behörden zu benachrichtigen.
6.3. Methoden und Material f	<u>ür Rückhaltung nd Reinigung</u>
Reinigungsmethode	 Das Leckprodukt versammeln in abgeschlossenen Fässer. Rückstände mit vielen Wasser wegspülen.



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ABSCHNITT 6. Maßnahmen bei unbeabsichtigter Freisetzung (Fortsetzung)

Die Spülflüssigkeit neutralisieren mit Säure.

6.4. Verweis auf andere Abschnitte

BRENNTAG

Für persönliche Schutzmittel, siehe Abschnitt 8. Für Behandlung das Abfallprodukt, siehe Abschnitt 13.

ABSCHNITT 7. Handhabung und Lagerung

7.1. Schutzsmaßnahmen zur sicheren Handhabung

Handhabung	: VERBREITUNG VON STAUB VORBEUGEN. STRENGE HYGIENE !
	Exposition von (schwangeren) Frauen vermeiden.
	Einatmung des Produktes und Berührung mit Augen, Haut und Kleider vermeiden. Empfohlene Personenschutzausrüstung tragen. (Siehe Abschnitt 8) Bei der Arbeit nicht essen, trinken oder rauchen.
	Waschen Sie Ihre Hände, vorher und nachher, das Sie mit dem Produkt bearbeitet haben.
	Notvorrichtungen für Augenspülungen und Duschen für Erste-Hilfe- Maßnahmen bei der Behandlung von Erfrierungsverletzungen sollten dort, wo eine potentielle Exposition eintreten kann, in unmittelbarer Nähe verfügbar sein.
7.2. Bedingungen zur sicheren L	.agerung unter Berücksichtigung von Unverträglichkeiten
Lagerung	: Nur im gut abgeschlossenen Originalbehälter an einem gut gelüfteten und trocken Ort aufbewahren.
	Alle gefährlichen Produkte müßten auf einen Leckbehälter gesetzt werden oder eingetonnt werden.
	Fernhalten von : Starke Reduktionsmittel , Stärke Oxidationsmitteln , Starke Säuren
Geeignetes Verpakkungsmaterial	Synthetischer Stoff

* Nicht geeignetes Verpakkungsmaterial : Verschiedene Metalle .

7.3. Spezifische Endanwendungen

Für den identifizierten Verwendungen, siehe Unterabschnitt 1.2 und/oder Expositionsszenarien.

ABSCHNITT 8. Begrenzung und Überwachung der Exposition/Persönliche Schutzausrüstunge

8.1. Zu überwachende Parameter

Berufsbedingte Expositionsgrenzen	: Borax decahydrat : Grenzwert (BE) : 2 mg/m³ (2011) Borax decahydrat : Kurze Zeitwert (BE) : 6 mg/m³ (2011)
Biologischen Grenzwerte	: Bei Vorliegen der Daten werden diese aufgenommen.
DNELs	 Borax decahydrat : Arbeiter, akut - lokale Effekte, einatmen : 22,3 mg/m³ Borax decahydrat : Arbeiter, langzeit - systemische Effekte, einatmen : 12,8 mg/m³
	• Borax decahydrat : Arbeiter, langzeit - systemische Effekte, dermal : 42478 mg / Tag
	 Borax decahydrat : Verbraucher, akut - lokale Effekte, einatmen : 22,3 mg/m³ Borax decahydrat : Verbraucher, akut - systemische Effekte, oral : 1,5 mg/kg bw/ Tag
	 Borax decahydrat : Verbraucher, langzeit - lokale Effekte, einatmen : 22,3 mg/m³ Borax decahydrat : Verbraucher, langzeit - systemische Effekte, einatmen : 6,5 mg/kg bw/ Tag
	 Borax decahydrat : Verbraucher, langzeit - systemische Effekte, dermal : 303,5 mg/kg bw/ Tag
	Borax decahydrat : Verbraucher, langzeit - systemische Effekte, dermal : 1,5 mg/ kg bw/ Tag
	• Borax decahydrat : Verbraucher, langzeit - systemische Effekte, oral : 1,5 mg/kg



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ABSCHNITT 8. Begrenzung und Überwachung der Exposition/Persönliche Schutzausrüstunge

	PNECs	bw/ Tag : • Borax decahydrat : Süßwasser : 1,35 mg B/I • Borax decahydrat : Salzwasser : 1,35 mg B/I • Borax decahydrat : Süßwassersediment : 1,8 mg B/kg • Borax decahydrat : Salzwassersediment : 1,8 mg B/kg • Borax decahydrat : Boden : 5,4 mg B/kg • Borax decahydrat : Intermittierend Freisetzung : 9,1 mg B/I • Borax decahydrat : Wasserreinigungsinstallation : 1,75 mg B/I
	8.2. Begrenzung und Überwachung	g der Exposition
	Technische Massnahmen	: Ventilation , Lokale Absaugung .
	Persönliche Schutzmittel	
	- Atemschutz	: CE-Geprüfter staubfilternder Atemschutz (Filtertyp P3).
	- Hautschutz	: Geeignete Schutzkleidung .
:	- Handschutz	 Geeignete Materialien für Schutzhandschuhe (EN 374): Die arbeitsplatzspezifische Eignung sollte mit den Schutzhandschuhherstellern abgeklärt werden. Material : Butylgummi Dicke : 0,11 mm Durchbruchszeit : > 8 St
	- Augen-/Gesichtsschutz	: Schutzbrille .
	Begrenzung und Überwachung der Umweltexposition	: Siehe Abschnitte 6, 7, 12 und 13.

ABSCHNITT 9. Physikalische und chemische Eigenschaften

9.1. Angaben zu den grundlegenden physikalischen und chemischen Eigenschaften

Physikalische Form (20°C)	: Kristaliner fester Stoff.
Aussicht/Farbe	: Weiß .
Geruch	: Geruchlos .
Geruchsschwelle	: Nicht anwendbar.
pH-Wert	: 9,2 (1% Lös. , 20°C)
Schmelz-/Gefrierpunkt	: 741 °C
Siedepunkt/Siedestrecke (1013 hPa)	: 1575 °C
Flammpunkt	: Nicht anwendbar.
Feuergefahr	: Nicht anwendbar.
Verdampfungsgeschwindigkeit	: Nicht anwendbar.
Explosionsgrenzen in Luft	: Nicht anwendbar.
Dampfdruck	: Nicht anwendbar.
Die relative Dichte (Wasser=1)	: 1,7
Löslichkeit in Wasser (20°C)	: 5 g/ 100 ml
Log P Oktanol/Wasser (20°C)	: 1,53 - 1,58
Zuendtemperatur	: Nicht anwendbar.
Minimum Entzündungsenergie	:Es liegen keine Angaben vor.
Zersetzungstemperatur	: 320 °C
Viskosität	: Nicht anwendbar.
Explosive Eigenschaften	: Keine chemischen Gruppen mit explosive Eigenschaften zugeordnet .
Oxidationseigenschaften	: Keine chemischen Gruppen mit oxidierenden Eigenschaften zugeordnet .



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<u>10.1. Reaktivität</u>	
Reaktivität	: Reagiert heftig mit: Starke Reduktionsmittel . Reagiert mit starke Oxidationsmitteln und starke Säuren.
<u>10.2. Chemische Stabilität</u>	
Stabilität	: Stabil unter normalen Umständen . Bei Erhitzung: Wasserverlust => Formung von: Borax wasserfrei
10.3. Möglichkeit gefährlicher R	<u>leaktionen</u>
Gefährliche Reaktionen	: Reagiert heftig mit: Starke Reduktionsmittel (Metalhydride, Alkali Metalle). Formung von: Brennbare Gas (Wasserstoffgaz) => Kann Explosion und Bran verursachen.
10.4. Zu vermeidenden Bedingu	ingen_
Zu vermeidenden Zuständen	: Wärme .
10.5. Unverträgliche Materialien	<u>l</u>
Nicht in Verbindung bringen mit	: Starke Reduktionsmittel, Stärke Oxidationsmitteln, Starke Säuren.
10.6. Gefährliche Zersetzungsp	rodukte
Gefährliche Zersetzungsprodukte	: Wasserstoffgaz , Natriumoxyde , Borium .

ABSCHNITT 11. Toxikologische Angaben

11.1. Angaben zu toxikologischen Wirkungen

TI.I. Angaben zu toxikologische	in Wirkungen
Akute Toxizität	
- Einatmen	: Kann eine Reizung der Atemwege bewirken. Symptome umfassen: Schmerzlicher Kehle , Hust , Schwindel .
- Hautkontakt	 Keine reizende Effekten zu erwarten. Borax decahydrat : LD50 (Kaninchen, Dermal) : >2000 mg/kg
- Nahrungsaufnahme	: Reizend zum Mund, zur Kehle und zum Verdauungkanal Symptome umfassen: Brandiges Gefühl , Übelkeit , Bauchkrämpfe , Durchfall , Blaue Haut . • Borax decahydrat : LD50 (Ratte, Oral) : 6000 mg/kg
Atz-/Reizwirkung auf die Haut	: Keine Effekten erwartet.
Schwere Augenschädigung/-reizung	: Verursacht schwere Augenreizung.
Aspirationsgefahr	: Bei höher Konzentration : Kann eine Erkrankung der Lungen verursachen.
Sensibilisierung der Atemwege/Haut	: Nicht sensibel .
Karzinogenität	: Nicht als karcinogen klassifiziert .
Mutagenität	: Nicht als mutagen klassifiziert .
Reproduktionstoxizität	: Kann die Fortpflanzungsfähigkeit beeinträchtigen. Kann das Kind im Mutterleib schädigen.
	Die Niederlande : Borax decahydrat wird in die SZW-Liste aufgenommen .
Spezifische Zielorgan-Toxizität - einmaliger Exposition	: Beim Menschen : Nicht für Organtoxizität klassifiziert . Bei Tieren : Keine Effekten bekannt.
Spezifische Zielorgan-Toxizität - wiederholter Exposition	: Beim Menschen : Nicht für Organtoxizität klassifiziert . Bei Tieren : Keine Effekten bekannt.

ABSCHNITT 12. Umweltbezogene Angaben

12.1. Toxizität



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3SCHNITT 12. Umweltbezogene Angaben (Fortsetzung)				
Ekotoxizität	 Borax decahydrat : CE50 (Daphnia magna, 48 St) : 133 mg B/l Borax decahydrat : CE50 (Alge, 72 St) : 40 mg B/l (Pseudokirchneriella subcapitata) Borax decahydrat : LC50 (Fisch, 96 St) : 79,7 mg B/l (Pimephales promelas) 			
12.2. Persistenz und Abbaubarke	it in the second se			
Persistenz und Abbaubarkeit	· • Borax decahydrat : Persistenz und Abbaubarkeit : Es liegen keine Angaben vor.			
12.3. Bioakkumulationspotenzial				
Bioakkumulation	: • Borax decahydrat : Bioakkumulation : Keine Bio-Akkumulation .			
<u>12.4. Mobilität im Boden</u>				
Mobilität	: • Borax decahydrat : Mobilität : Mäßig löslich im Wasser .			
12.5. Ergebnisse der PBT- und vF	<u>vB-Beurteilung</u>			
Ergebnisse	: • Borax decahydrat : PBT/vPvB : Nein			
12.6. Andere schädliche Wirkunge	<u>en</u>			
WGK-Klasse (DE)	: 1 (Schwacher Wasserverschmutzer).			
Wasserbeschwerlichkeit (NL)	: 12			
Sanierungsanspannung (NL)	: C			
Potenzial zur fotochemischen Ozonbildung	: Es liegen keine Angaben vor.			
Potenzial zum Ozonabbau	: Es liegen keine Angaben vor.			
Potenzial zur Störung der endokrinen Systeme	: Es liegen keine Angaben vor.			
Potenzial zur Erwärmung der Erdatmosphäre	: Es liegen keine Angaben vor.			

ABSCHNITT 13. Hinweise zur Entsorgung

13.1. Verfahren der Abfallbeha Produktvernichtung	 Das Produkt muss vernichtet werden gemäss der lokale und internationale Gesetzgebung, durch ein gesetzlich erkannte und spezialisierte Firma.
Europäische Abfallstoffenliste	 XXXXXX - Europäischer Abfallproduktcode. Dieser Code wird auf der Grundlage von die gegenwärtigsten Anwendungen zugewiesen und kann nicht für Verunreinigungen repräsentativ sein, die am wirkungsvollen Gebrauch des Produktes entstanden wurden. Der Produzent der Vergeudung muß seinen Prozeß selbst auswerten und muß die passende überschüssige Kodierung bewilligen. Sehen Sie Entscheidung 2001/118/EG.
Behandlung der Verpakkung	Die gebrauchte Verpakkung ist ausschliesslich f ür die Verpakkung dieses Produktes zu benutzen. Nach Gebrauch die Verpackung sorgf ältig ausleeren und abschliessen.

ABSCHNITT 14. Angaben zum Transport

14.1. UN-Nummer	
UN Nr	: -
14.2. Ordnungsgemäß	<u> Se UN-Versandbezeichnung</u>
ADR-Name	: -
ADN-Name	: -
IMDG-Name	: -



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ABSCHNITT 14. Angaben z	um Transport (Fortsetzung)	
14.3. Transportgefahrenklass		
Klasse	: -	
<u>14.4. Verpackungsgruppe</u>		
Verpackungstyp	: -	
<u>14.5. Umweltgefahren</u>		
Umweltgefährlich	:-	
Meeresschadstoff	: -	
14.6. Besondere Vorsichtsma	<u> Snahmen für den Verwender</u>	
Gefahrandeutung	: -	
Gefahrsymbol(e)	:-	
EmS-N°	:-	
	gemäß Anhang II des MARPOL-Übereinkommens 73/78 und gemäß IBC-	
<u>Code</u>		
Schiffstyp	:-	
Verschmutzungskategorie	: -	

ABSCHNITT 15. Rechtsvorschriften

	it, Gesundheits- und Umweltschutz/spezifische Rechtsvorschriften für
<u>den Stoff oder das Gemisch</u>	
Inventarisierungen	 Kanadische Inventarisation (DSL): Aufgenommen im Inventarisation. Europäische Inventarisation (EINECS): Aufgenommen im Inventarisation. Japanische Inventarisation (ENCS): Aufgenommen im Inventarisation. Koreanische Inventarisation (KECI): Aufgenommen im Inventarisation. USA-Inventarisation (TSCA): Aufgenommen im Inventarisation.
NFPA-N°	: 1-0-0
Einschlägigen EU Vorschrift(en)	 Richtlinie 92/85/EWG des Rates vom 19. Oktober 1992 über die Durchführung von Maßnahmen zur Verbesserung der Sicherheit und des Gesundheitsschutzes von schwangeren Arbeitnehmerinnen, Wöchnerinnen und stillenden Arbeitnehmerinnen am Arbeitsplatz Richtlinie 96/82/EG des Rates vom 9. Dezember 1996 zur Beherrschung der Gefahren bei schweren Unfällen mit gefährlichen Stoffen Richtlinie 98/24/EG des Rates vom 7. April 1998 zum Schutz von Gesundheit und Sicherheit der Arbeitnehmer vor der Gefährdung durch chemische Arbeitsstoffe bei der Arbeit Richtlinie 2004/37/EG des Europäischen Parlaments und des Rates vom 29. April 2004 über den Schutz der Arbeitnehmer gegen Gefährdung durch Karzinogene oder Mutagene bei der Arbeit Entscheidung 2001/118/EG der Kommission vom 16. Januar 2001 zur Änderung der Entscheidung 2000/532/EG über ein Abfallverzeichnis Verordnung (EG) Nr. 1272/2008 des Europäischen Parlaments und des Rates vom 16. Dezember 2008 über die Einstufung, Kennzeichnung und Verpackung von Stoffen und Gemischen, zur Änderung und Aufhebung der Richtlinien 67/548/EWG und 1999/45/EG und zur Änderung der Verordnung (EG) Nr. 1907/2006 Verordnung (EG) Nr. 453/2010 der Kommission vom 20. Mai 2010 zur Änderung der Verordnung (EG) Nr. 1907/2006 des Europäischen Parlaments und des Rates zur Registrierung, Bewertung, Zulassung und Beschränkung chemischer Stoffe (Reach)

* Die Beschränkungen in Anhang XVII der Verordnung (EG) Nr. 1907/2006 sind zu beachten.

15.2. Stoffsicherheitsbeurteilung

Blatt : 9 / 10

Revision nr : 5

Datum : 2/6/2014 Ersetzt : 19/3/2013

BORAX DECAHYDRAT

Code : 11010

ABSCHNITT 15. Rechtsvorschriften (Fortsetzung)

* Eine Stoffsicherheitsbeurteilung wurde aus der Produkt durchgeführt.

ABSCHNITT 16. Sonstige Angaben

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Dieses Sicherheitsdatenblatt ist aufgestellt worden gemäss der Verordnung (EU) Nr. 453/2010. Dieses Sicherheitsblatt ist ausschliesslich bestimmt für industriel/professionel Gebrauch.

* Änderung hinsichtlich voriger Revision.

*	Änderungen	: Abschnitt 1, Abschnitt 2, Abschnitt 3, Abschnitt 6, Abschnitt 7, Abschnitt 8, Abschnitt 15.
	Quelle der Daten	 Die Angaben stützen sich auf den heutigen Stand unserer Kenninnisse (Produzent(en) ,). Sehe auch auf der Adresse: http://apps.echa.europa.eu/registered/registered-sub.aspx#search
	R-Sätz(e)	 R36 - Reizt die Augen. R60 - Kann die Fortpflanzungsf\u00e4higkeit beeintr\u00e4chtigen. R61 - Kann das Kind im Mutterleib sch\u00e4digen.
	(EU)H-Hinweis(e)	 H319 - Verursacht schwere Augenreizung. H360FD - Kann die Fortpflanzungsfähigkeit beeinträchtigen. Kann das Kind im Mutterleib schädigen.
*	Liste der Abkürzungen und Akronyme	 ADN (Accord européen relatif au transport international des marchandises Dangereuses par voie de Navigation intérieur) : Europäisches Übereinkommen über die internationale Beförderung gefährlicher Güter in der Binnenschifffahrt ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) : Europäisches Übereinkommen über die internationale Beförderung gefährlicher Güter auf der Straße DNEL (Derived No Effect Level) : Grenzwert, unterhalb dessen der Stoff keine Wirkung ausübt EmS (Emergency Schedule) : den ersten Code verweist auf die einschlägigen Brandklasse und den zweite code verweist auf die einschlägingen Verschütten Zeitplan IMDG (International Maritime Dangerous Goods code) : Internationalen Übereinkommens für Gefahrgutkennzeichnung für gefährliche Güter im Seeschiffsverkehr NFPA (National Fire Protection Association) oder Gefahrendiamant NVCI : National Vergiftungen Information Zentrum PBT : persistente, bioakkumulierbar und toxisch PNEC (Predicted No Effect Concentration) : Konzentration unter die Exposition gegenüber einem Stoff ohne Wirkung REACH : Registrierung, Bewertung, Zulassung und beschränkung von Chemikalier SCL (Specific Concentration Limits) : spezifische Konzentrationsgrenzwerte SVHC (Substance of Very High Concern) : besonders besorgniserregende Stoff SZW-Liste : Nicht-einschräkende Liste gifter Reproduktionssubstanzen auf die Aufzeichnungspflicht zusätzlich als auf Artikel 4.2a abgezielt Anwendung findet, zweter Absatz des Erlass über Arbeitsbedingungen vPvB : sehr persistent und sehr bioakkumulierbar WGK (Wassergefahrdungsklasse)

Diese Information ist unseres Wissens korrekt und vollständig am Daten der Ausgabe des Sicherheitsdatenblatts. Diese Information betrifft nur dieses Produkt und gibt keine Garantie auf der Qualität und vollständigkeit der Eigenschaften des Produkts, oder falls das Produkt zusammen mit anderen Produkten oder im einzigen anderen Prozess gebraucht wird. Es bleibt die Verantwortlichkeit des Benutzers sich zu sichern dass diese Information anwendbar und vollständig ist, bezuglich seinen Spezialgebrauch des Produkts.

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BRENNTAG		Blatt : 10 / 10	
		Revision nr : 5	
		Datum : 2/6/2014	
	Ersetzt : 19/3/2013		
BORAX DECAHYDRAT		Code : 11010	

BRENNTAG übernimmt keine Verantwortung und lehnt Haftung für Verlust oder Schaden ab, die aus dem Gebrauch des Produkts entstehen könnten.

Ende des Dokumentes



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11Use as processing aid3NANA1, 2, 3, 4, 5, 8a, 8b, 9, 13, 14, 15, 17, 18, 19, 22, 23, 24NANAES531112Use as reactive process agent or use as catalyst3NANA1, 2, 3, 4, 15, 17, 18, 19, 22, 23, 244NAES530013Manufacture of catalysts3NANANA3, 4, 5, 8a, 8b, 9, 141, 3, 6a, 6bNAES539514Use as a process chemical3NANANA5, 8a, 8b, 9, 14, 15, 22, 236bNAES5395	No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environm ental Release Category (ERC)	Article Category (AC)	Specified
2 Use as an intermediate 3 NA NA 5, 8a, 8b, 9, 14, 15 1, 6a, 6b NA ESS315 3 Formulation & (re)packing of substances and mixtures 3 NA NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15 2 NA ES5302 4 Use as additive 22 NA NA 21 10a, 11a NA ES5337 5 Use as additive 21 NA NA 21 10a, 11a NA ES5337 6 Use in adhesives and sealants 3 NA NA NA 5, 7, 8a, 50, 9, 10, 11, 13, 18, 19, 23, 24 Sa, 8b, 9, 10, 12, 13, 18, 19, 23, 24 NA ES5336 7 Use in Cleaning Agents 3 NA NA 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 12, 13, 18, 19, 23, 24 Sa, 8b, 9, 13, 14, 19, 23, 24 NA ES5307 9 Use in Cleaning Agents 22 NA NA 2, 5, 5a, 9, 13, 8d, 8d, 9d, 10, 12, 13, 18, 19, 23, 24 NA ES5307 10 Use in agrochemicals 22 NA NA 2, 5, 5a, 9, 13, 16, 18, 19, 22, 2	1		3	NA	NA	8a, 8b, 9,	1, 6a	NA	ES5510
3 (re)packing of substances and mixtures 3 NA NA NA 5, 8a, 8b, 9, 14, 15 2 NA ESS302 4 Use as additive 22 NA NA 21 10a, 11a NA ESS337 5 Use as additive 21 NA 35 NA 8a NA ESS337 6 Use in adhesives and sealants 3 NA NA 21 10a, 11a NA ES5377 7 Use in adhesives and sealants 3 NA NA NA 5 NA Ba NA ES7005 7 Use in Cleaning Agents 2 NA NA 1,2,3,4 5,6,7,8a,8b,9,10,13 8a, 8d NA ES7005 8 Use in Cleaning Agents 3 NA NA 1,2,3,4 5,6,7,8a,8b,9,10,13 8a, 8d NA ES7191 9 Use in agrochemicals 22 NA NA 2,5,6a,8b,9,13 8d, 8f NA ES5337 10 Use in building and construction work 2	2	Use as an intermediate	3	NA	NA	5, 8a, 8b,	1, 6a, 6b	NA	ES5315
5 Use as additive 21 NA 35 NA Ba NA ES5479 6 Use in adhesives and sealants 3 NA NA NA Ba NA ES7005 7 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 19 5 NA ES7005 8 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 4, 15, 7, 8a, 8b, 9, 10, 13, 19 8a, 8d NA ES5336 8 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 4, 15, 7, 8a, 8b, 9, 10, 12, 13, 18, 19, 23, 24 NA ES7191 9 Use in Cleaning Agents 3 NA NA 2, 5, 8a, 9, 13, 18, 19, 23, 24 NA ES7191 10 Use in agrochemicals 22 NA NA 2, 5, 8a, 9, 13, 18, 19, 23, 24 NA ES5307 10 Use in building and construction work 21 NA NA 10a, 11a NA ES5311 11 Use as processing aid <td< td=""><td>3</td><td>(re)packing of substances and</td><td>3</td><td>NA</td><td>NA</td><td>5, 8a, 8b,</td><td>2</td><td>NA</td><td>ES5302</td></td<>	3	(re)packing of substances and	3	NA	NA	5, 8a, 8b,	2	NA	ES5302
6 Use in adhesives and sealants 3 NA NA NA S, 7, 8a, 8b, 9, 10, 13 5 NA ES7005 7 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13 5 NA ES7005 8 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 10, 11, 13, 19 8a, 8d NA ES5336 9 Use in Cleaning Agents 3 NA NA NA 2, 5, 8a, 56, 7, 8a, 8b, 9, 10, 12, 13, 18, 19, 23, 24 NA ES7191 9 Use in agrochemicals 22 NA NA Q, 1, 9b NA 10a, 11a NA ES5307 10 Use in building and construction work 21 NA 0, 1, 9b NA 10a, 11a NA ES5342 11 Use as processing aid 3 NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 12, 2, 24 NA ES5311 12 Use as reactive of catalyst 3 NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 12, 2, 24, 45, 8a, 8b, 9, 12, 2, 2, 24 <td< td=""><td>4</td><td>Use as additive</td><td>22</td><td>NA</td><td>NA</td><td>21</td><td>10a, 11a</td><td>NA</td><td>ES5337</td></td<>	4	Use as additive	22	NA	NA	21	10a, 11a	NA	ES5337
6 Use in adhesives and sealants 3 NA NA S, 7, 8a, 8b, 9, 10, 13 5 NA ES7005 7 Use in Cleaning Agents 22 NA NA NA 1, 2, 3, 10, 11, 13, 19 8a, 8d NA ES5336 8 Use in Cleaning Agents 3 NA NA NA 1, 2, 3, 4, 5, 6, 7, 8a, 8b, 9, 10, 12, 13, 18, 19, 23, 24 A NA ES7191 9 Use in Cleaning Agents 3 NA NA NA 8a, 8b, 9, 10, 12, 13, 18, 19, 23, 24 A NA ES7191 9 Use in agrochemicals 22 NA NA 0, 1, 9b NA 10a, 11a NA ES5307 10 Use in building and construction work 21 NA 0, 1, 9b NA 10a, 11a NA ES5342 11 Use as processing aid 3 NA NA 1, 2, 3, 4, 5, 6, 8a, 8b, 9, 13, 14, 15, 17, 18, 19, 22, 24 4 NA ES5311 12 Use as processing aid 3 NA NA 1, 2, 3, 4, 8a, 8b, 9, 16, 3, 36, 6b <td>5</td> <td>Use as additive</td> <td>21</td> <td>NA</td> <td>35</td> <td>NA</td> <td>8a</td> <td>NA</td> <td>ES5479</td>	5	Use as additive	21	NA	35	NA	8a	NA	ES5479
7 Use in Cleaning Agents 22 NA NA 10, 11, 13, 19 8a, 8d NA ES5336 8 Use in Cleaning Agents 3 NA NA NA 10, 11, 13, 19 8a, 8d NA ES5336 9 Use in agrochemicals 22 NA NA NA 2, 5, 8a, 9, 13 8a, 8c, 8d, 8f NA ES7191 10 Use in building and construction work 21 NA NA 2, 5, 8a, 9, 13 8a, 8c, 8d, 8f NA ES5337 11 Use as processing aid 21 NA 0, 1, 9b NA 10a, 11a NA ES5312 12 Use as reactive process agent or use as catalyst 3 NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 13, 14, 15, 17, 18, 19, 22, 23, 24 4 NA ES5301 13 Manufacture of catalysts 3 NA NA 3, 4, 5, 8a, 8b, 9, 14 1, 6a, 6b NA ES5395 14 Use as a process chemical 3 NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 4 6b NA <td< td=""><td>6</td><td></td><td>3</td><td>NA</td><td>NA</td><td>5, 7, 8a, 8b, 9, 10,</td><td>5</td><td>NA</td><td>ES7005</td></td<>	6		3	NA	NA	5, 7, 8a, 8b, 9, 10,	5	NA	ES7005
8Use in Cleaning Agents3NANA $\begin{bmatrix} 5, 6, 7, \\ 8a, 8b, 9, \\ 10, 12, \\13, 18, \\19, 23, 24 \end{bmatrix}$ 4NAES71919Use in agrochemicals22NANA $\begin{bmatrix} 2, 5, 8a, \\ 9, 13 \end{bmatrix}$ $\begin{bmatrix} 8a, 8c, \\ 8d, 8f \end{bmatrix}$ NAES530710Use in building and construction work21NA0, 1, 9bNA10a, 11aNAES534211Use as processing aid3NANA $\begin{bmatrix} 1, 2, 3, 4, \\ 5, 8a, 8b, \\ 9, 13, 14, \\15, 17, \\18, 19, \\22, 23, 24 \end{bmatrix}$ 4NAES531112Use as reactive process agent or use as catalyst3NANA $\begin{bmatrix} 1, 2, 3, 4, \\ 5, 8a, 8b, \\ 9, 13, 14, \\15, 17, \\18, 19, \\22, 23, 24 \end{bmatrix}$ 1, 6a, 6bNAES530013Manufacture of catalysts3NANA $\begin{bmatrix} 3, 4, 5, \\ 8a, 8b, 9, \\14, 4 \end{bmatrix}$ 1, 3, 6a, 6bNAES539514Use as a process chemical3NANANA $\begin{bmatrix} 1, 2, 3, 4, \\ 8a, 8b, 9, \\14, 5, 22, 23 \end{bmatrix}$ 6bNAES5395	7		22	NA	NA	10, 11,	8a, 8d	NA	ES5336
9 Ose in agrochemicals 22 NA NA 9, 13 8d, 8f NA ES3307 10 Use in building and construction work 21 NA 0, 1, 9b NA 10a, 11a NA ES5342 11 Use as processing aid 3 NA NA NA 10a, 11a NA ES5342 11 Use as processing aid 3 NA NA NA 10a, 11a NA ES5342 12 Use as reactive process agent or use as catalyst 3 NA NA 1, 2, 3, 4, 1, 6a, 6b NA ES5300 13 Manufacture of catalysts 3 NA NA 3, 4, 5, 8a, 8b, 9, 14, 15, 6b NA ES5395 14 Use as a process chemical 3 NA NA 1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15, 22, 23 6b NA ES5395	8		3	NA	NA	5, 6, 7, 8a, 8b, 9, 10, 12, 13, 18,	4	NA	ES7191
10 construction work 21 NA 0, 1, 30 NA INA INA <thina< th=""> <thina< th=""> INA<td>9</td><td></td><td>22</td><td>NA</td><td>NA</td><td></td><td></td><td>NA</td><td>ES5307</td></thina<></thina<>	9		22	NA	NA			NA	ES5307
11 Use as processing aid 3 NA NA NA S, 8a, 8b, 9, 13, 14, 15, 17, 18, 19, 22, 23, 24 4 NA ES5311 12 Use as reactive process agent or use as catalyst 3 NA NA NA 1, 2, 3, 4, 8a, 8b 1, 6a, 6b NA ES5300 13 Manufacture of catalysts 3 NA NA NA 3, 4, 5, 8a, 8b, 9, 14 1, 3, 6a, 6b NA ES5395 14 Use as a process chemical 3 NA NA NA S, 8a, 8b, 9, 14, 15, 22, 23 6b NA ES5395	10	Use in building and construction work	21	NA	0, 1, 9b	NA	10a, 11a	NA	ES5342
12process agent or use as catalyst3NANA1, 2, 3, 4, 8a, 8b1, 6a, 6bNAES530013Manufacture of catalysts3NANANA3, 4, 5, 8a, 8b, 9, 141, 3, 6a, 6bNAES539514Use as a process chemical3NANANA1, 2, 3, 4, 5, 8a, 8b, 9, 146bNAES5395	11	Use as processing aid	3	NA	NA	5, 8a, 8b, 9, 13, 14, 15, 17, 18, 19,	4	NA	ES5311
13 Interference 3 NA NA 8a, 8b, 9, 14 1, 5, 6a, 6b NA ES5395 14 Use as a process chemical 3 NA NA NA NA ES5395	12	process agent or use	3	NA	NA		1, 6a, 6b	NA	ES5300
14Use as a process chemical3NANA5, 8a, 8b, 9, 14, 15, 22, 236bNAES7024	13		3	NA	NA	8a, 8b, 9,		NA	ES5395
15 Use in glass 3 NA NA 1, 2, 3, 2, 5, 6a NA ES5304	14	•	3	NA	NA	5, 8a, 8b, 9, 14, 15,	6b	NA	ES7024
	15	Use in glass	3	NA	NA	1, 2, 3,	2, 5, 6a	NA	ES5304
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	production				8a, 8b, 15, 22, 23			
16	Use in nuclear power plants	3	NA	NA	1, 2, 3, 4, 5, 8b, 15	7	NA	ES7190
17	Use of abrasives	22	NA	NA	21	12a	NA	ES5303
18	Industrial formulation	3	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15, 22, 23, 26	3	NA	ES5309



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PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposu PROC2: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC4: ProC6b: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, peletrisation PROC15: Use as laboratory reagent Environmental Release Categories ERC1: Manufacture of substances ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) 2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC6a Concentration of the Substance in Mixture/Article Covers percentage substance in the product up to 100 % (unless stated differently). Armount used Annual amount per site Erectional onsite conditions and measures to provent release Factor: Air 0,53 g/ton of product Technical conditions and measures to provent release Factor: Water Substance specific waste water treatment.; Electorstatic precipitation, Cyclones, ceramic filte Bag filters, Fabric filter Organizational measures to prevent/limit release from the site Vater Substance specific waste water treatment., Ion exchange, Reverse osmosis (Degradation effectiven	1. Short title of Exposure Sco Main User Groups	T	s of substances as such or in preparations at industrial		
Environmental Release Categories ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) 2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC6a Product characteristics Concentration of the Substance in Mixture/Article Covers percentage substance in the product up to 100% (unless stated differently). Amount used Annual amount per site 100000 ton(s)/year (No water emissions ERC1, ERC6a) Frequency and duration of use Continuous exposure 220 days/year Other given operational conditions affecting environmental exposure Continuous exposure 0,53 g/ton of product Technical conditions and measures at process level (source) to prevent release Technical consite conditions and measures to reduce or limit discharges, air emissions and releases to soil Air Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filter Vater Water Substance specific waste water treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %) Organizational measures related to sewage treatment plant Waste treatment Send back to the process		 PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation PROC15: Use as laboratory reagent 			
Product characteristicsConcentration of the Substance in Mixture/ArticleCovers percentage substance in the product up to 100 % (unless stated differently).Amount usedAnnual amount per site100000 ton(s)/year (No water emissions ERC1, ERC6a)Frequency and duration of useContinuous exposure220 days/yearOther given operational conditions affecting environmental exposureContinuous exposure220 days/yearTechnical conditions and measures to process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the siteAirSubstance specific waste water treatment; lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)Orditions and measures related to sewage treatment plantWaste treatmentSend back to the process		ERC6a: Industrial use res			
Product characteristics Substance in Mixture/Article 100 % (unless stated differently). Amount used Annual amount per site 100000 ton(s)/year (No water emissions ERC1, ERC6a) Frequency and duration of use Continuous exposure 220 days/year Other given operational conditions affecting environmental exposure Emission or Release Factor: Air 0,53 g/ton of product Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site Air Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filter Conditions and measures to prevent/limit release from the site Wastewater emission controls are not applicable as there is no direct release to wastewater. Conditions and measures related to sewage treatment plant Waste treatment Send back to the process	2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC1, ERC6a		
Annount used ERC6a) Frequency and duration of use Continuous exposure 220 days/year Other given operational conditions affecting environmental exposure Emission or Release Factor: Air 0,53 g/ton of product Technical conditions and measures at process level (source) to prevent release Air Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filter Water Substance specific waste water treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %) Organizational measures related to sewage treatment plant Waste treatment Send back to the process	Product characteristics	Substance in	Covers percentage substance in the product up to 100 % (unless stated differently).		
Other given operational conditions affecting environmental exposureEmission or Release Factor: Air0,53 g/ton of productTechnical conditions and measures at process level (source) to prevent release Technical conditions and measures to reduce or limit discharges, air emissions and releases to soilAirSubstance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filterWaterSubstance specific waste water treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)Organizational measures related to sewage treatment plantWaste treatmentSubstance specific waste air treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)Waste treatmentSend back to the process	Amount used	Annual amount per site			
Other given operational conditions affecting environmental exposureFactor: Air0,53 g/ton of productTechnical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soilAirSubstance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filterWaterSubstance specific waste water treatment, Ion exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)Organizational measures related to sewage treatment plantWaste water emission controls are not applicable as there is no direct release to waste water.Conditions and measures related to externed treatment plantWaste treatmentSend back to the processWaste treatment	Frequency and duration of use	Continuous exposure	220 days/year		
environmental exposureEmission or Release Factor: Water0 g/ton of productTechnical conditions and measures at process level (source) to prevent releaseAirSubstance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filter Bag filters, Fabric filterTechnical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soilAirSubstance specific waste water treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)Organizational measures to prevent/limit release from the siteWastewater emission controls are not applicable as there is no direct release to wastewater.Conditions and measures related to sewage treatment plantWaste treatmentSend back to the process			0,53 g/ton of product		
measures at process level (source) to prevent release Air Electrostatic precipitation, Cyclones, ceramic filter Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Air Substance specific waste water treatment, lon exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %) Organizational measures to prevent/limit release from the site Wastewater emission controls are not applicable as there is no direct release to wastewater. Conditions and measures related to sewage treatment plant Waste treatment Send back to the process			0 g/ton of product		
measures to reduce or limit Water Substance specific waste water treatment, for exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %) Organizational measures to prevent/limit release from the site Water exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %) Conditions and measures related to sewage treatment plant Wastewater emission controls are not applicable as there is no direct release to wastewater. Conditions and measures related to sewage treatment plant Waste treatment Send back to the process	measures at process level (source) to prevent release	Air	Electrostatic precipitation, Cyclones, ceramic filters,		
Organizational measures to prevent/limit release from the site Conditions and measures related to sewage treatment plant Wastewater emission controls are not applicable as there is no direct release to wastewater. Conditions and measures related Waste treatment Conditions and measures related Waste treatment Send back to the process Send back to the process	measures to reduce or limit discharges, air emissions and	Water	exchange, Reverse osmosis (Degradation		
to sewage treatment plant wastewater. Conditions and measures related Waste treatment Send back to the process	Organizational measures to				
to outernal tractment of waste for	to sewage treatment plant	Wastewater emission controls are not applicable as there is no direct release to wastewater.			
to external treatment of waste for Disposal methods Vasuum up spillage and collect in suitable		Waste treatment	Send back to the process		
disposal Disposal Nacium up spinage and conect in suitable		Disposal methods	Vacuum up spillage and collect in suitable		



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		containers for disposal., Dispose of as hazardous waste in compliance with local and national regulations.		
Conditions and measures related	Recovery Methods	There is no envisaged external recovery of waste.		
to external recovery of waste				
		re for: PROC1, PROC2, PROC3		
Activity	Product delivery/storage - p	roduct storage - indoor		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder		
Amount used	Amount per Shift	1000 kg		
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions affecting workers exposure	Indoor use.			
Technical conditions and measures to control dispersion from source towards the worker		in the closed system, such as pouring and removal of EV is used to control fumes.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Wear protective shoes. Safety glasses Safety goggles In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3			
2.3 Contributing scenario co PROC14	ntrolling worker exposu	re for: PROC1, PROC2, PROC3, PROC4,		
Activity	Processing			
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 5% - 25%		
	Physical Form (at time of use)	granules, Powder		
Amount used	Amount per Use 1500 kg			
	The amount used per worker varies from activity to activity			
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions	Indoor use.			
affecting workers exposure	Operation is carried out at elevated temperature (> 20°C above ambient			

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	temperature).		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer connectors. Provide local exhaust venti Discharge sacks via suitabl Provide a good standard of windows etc. Controlled ve powered fan. Clear spills immediately. Provide extract ventilation t	e vented charge chute. general ventilation. Natural ventilation is from doors, ntilation means air is supplied or removed by a o points where emissions occur.	
Organisational measures to prevent /limit releases, dispersion and exposure		ining to prevent/minimize exposures intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clo Wear protective shoes. Safety glasses Wear protective gloves. In case of dust or aerosol fo filter (P2) or Particle filter:P3	othing. ormation: use respiratory protection with approved	
2.4 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b	
Activity	Relevant for Cleaning and M	laintenance	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations more than 25%	
	Physical Form (at time of use)	granules, Powder	
Amount used	The amount used per work	er varies from activity to activity	
Other operational conditions affecting workers exposure	Indoor and outdoor use.		
Technical conditions and measures to control dispersion from source towards the worker	provide extract ventilation a	al enclosure of the operation or equipment and t openings.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clo Wear protective shoes. Safety glasses In case of dust or aerosol for filter (P2) or Particle filter:P3	othing. ormation: use respiratory protection with approved	
	ntrolling worker exposu	re for: PROC8a, PROC8b	
2.5 Contributing scenario co			
2.5 Contributing scenario con Activity	Off-loading substances from	n ships.	



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Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder		
Amount used	Amount per Application	10000 kg		
Frequency and duration of use	Frequency of use	1 - 2 days/month		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).			
Other operational conditions affecting workers exposure	Outdoor use.			
Technical conditions and measures to control dispersion from source towards the worker	Transfer via enclosed lines. Closed process and closed circuits where relevant and possible Use closed dosing, transfer, sampling and application systems including connectors. Provide local exhaust ventilation (LEV). Use front end loaders with air conditioned cab			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	or Wear air purifying half mask APF10 Equipment cleaning and Wear air purifying half mask APF10			
2.6 Contributing scenario co	maintenance	Particle filter:P2		
Activity	Loading (including marine v repacking (including drums	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling, ion and associated laboratory activities.		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 5% - 25%		
	Physical Form (at time of use)	Solid, high dustiness, granules, Powder		
Amount used	Amount per Use	25000 kg		
	Application duration	30 min		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).			
Other operational conditions	Outdoor use.			
affecting workers exposure	Assumes activities are at a	mbient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible.			



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Organisational measures to prevent /limit releases, dispersion		ining to prevent/minimize exposures intenance of equipment and machines.
and exposure Conditions and measures related	Wear suitable protective clo Wear protective shoes. Safety glasses	othing.
to personal protection, hygiene and health evaluation	Wear respiratory protection Particle filter:P2 or	
2.7 Contributing scenario co	Particle filter:P3	re for: PROC8a, PROC8b, PROC9
Activity	Packaging	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 5% - 25%
	Physical Form (at time of use)	granules, Powder
Amount used	The amount used per work	er varies from activity to activity
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).
Other operational conditions	Indoor use.	
affecting workers exposure	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). Automate activity where possible.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular inspection and maintenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In the case of dust or aeros Particle filter:P2 or Particle filter:P3	ol formation use respirator with an approved filter.
2.8 Contributing scenario co		re for: PROC15
Activity		in laboratory settings, including material transfers and
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 5% - 25%
	Physical Form (at time of use)	Powdered substance, granular-like
Amount used	Amount per Application	1 kg
Frequency and duration of use		to 8 hours (unless stated differently).
Technical conditions and	Handle within a fume cupb	pard or implement suitable equivalent methods to
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measures to control dispersion from source towards the worker	minimise exposure.
Organisational measures to	Ensure operatives are trained to minimise exposures.
prevent /limit releases, dispersion	
and exposure	
Conditions and measures related	Wear a laboratory coat
to personal protection, hygiene	Safety shoes
and health evaluation	Safety glasses

3. Exposure estimation and reference to its source

Environment

METALS EUSES IT tool

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1, ERC6a	No water discharge to the environment	Soil	PEC	0,01mg/kg dry weight (d.w.)	0,002

Workers

PROC2, PROC4, PROC8a, PROC8b, PROC9, PROC15 MEASE PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC14, PROC15 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value, 8 hours/day, without respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC1, PROC2, PROC3, PROC4, PROC14	8 hours/day	Inhalation worker exposure	0,39 - 0,41mg/m³	0,27 - 0,28
PROC4	Solid, high dustiness., Concentration of substance in product: 5% - 25%, during <15 mins	Dermal worker exposure	0,014mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m ³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours, with gloves	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, Crane drivers	Inhalation worker exposure	0,2mg/m ³	0,14
PROC8a,	90th percentile value,	Inhalation worker	0,68mg/m ³	0,47
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PROC8b	Trimming ships	exposure		
PROC8a, PROC8b	90th percentile value, Driving small front end loaders in the ship	Inhalation worker exposure	1,35mg/m³	
PROC8a, PROC8b	90th percentile value, Work in the warehouse, Air conditioned cab front end loaders	Inhalation worker exposure	0,44mg/m³	0,30
PROC8b	90th percentile value, Open-cab front end loaders, With respiratory protection	Inhalation worker exposure	0,72mg/m³	0,50
PROC8a	Crane drivers, during 1 - 4 hours, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8a, PROC8b	Trimming ships, during 15 mins - 1 hour	Dermal worker exposure	57,6mg/kg bw/day	0,012
PROC8a, PROC8b	Driving small front end loaders in the ship, during 1 - 4 hours, Air conditioned cab front end loaders	Dermal worker exposure	0,058mg/kg bw/day	< 0,001
PROC8a, PROC8b	Work in the warehouse, Air conditioned cab front end loaders, without air conditioned cab	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, without respiratory protection	Inhalation worker exposure	0,37mg/m³	0,26
PROC8a, PROC8b	during 15 mins - 1 hour, with gloves, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,029mg/kg bw/day	< 0,001
PROC8a, PROC8b, PROC9	90th percentile value, With respiratory protection, Packing in big bags	Inhalation worker exposure	0,58mg/m³	0,4
PROC8a, PROC8b, PROC9	90th percentile value, Packing in 25kg sacks	Inhalation worker exposure	1mg/m ³	0,69
PROC8a, PROC8b, PROC9	Packing in big bags, Packing in 25kg sacks, Solid, high dustiness., with gloves	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
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PROC15		Inhalable dust.	0,0005mg/m³	
PROC15	90th percentile value	Inhalation worker exposure	0,0001mg/m ³	
PROC15	during 15 mins - 1 hour	Dermal worker exposure	0,014mg/kg bw/day	
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When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832



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1. Short title of Exposure So	enario 2: Use as an inte	rmediate
Main User Groups	SU 3: Industrial uses: Use sites	s of substances as such or in preparations at industria
Process categories	PROC2: Use in closed, cc PROC3: Use in closed ba PROC4: Use in batch and exposure arises PROC5: Mixing or blendin and articles (multistage an PROC8a: Transfer of subs vessels/large containers at PROC8b: Transfer of subs vessels/large containers at PROC9: Transfer of subst filling line, including weighi	stance or preparation (charging/discharging) from/to a non-dedicated facilities stance or preparation (charging/discharging) from/to a dedicated facilities ance or preparation into small containers (dedicated ng) reparations or articles by tabletting, compression,
Environmental Release Categories	ERC1: Manufacture of sul ERC6a: Industrial use res intermediates) ERC6b: Industrial use of r	ulting in manufacture of another substance (use of
2.1 Contributing scenario co	ontrolling environmental	exposure for: ERC1, ERC6a, ERC6b
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Annual amount per site	74 ton(s)/year (Default dilution ERC6a)
Amount used	Annual amount per site	190 ton(s)/year (Dilution of 10 ERC1, ERC6a, ERC6b)
	Annual amount per site	1150 ton(s)/year (Dilution of 100 ERC1, ERC6a, ERC6b)
	Continuous exposure	365 days/year (Default dilution ERC6a)
Frequency and duration of use	Continuous exposure	300 days/year (Dilution of 10, Dilution of 100 ERC1, ERC6a, ERC6b)
E	Other data. Other information	Local freshwater dilution factor:: 10
Environment factors not influenced by risk management	Other data. Other information	Local marine water dilution factor:: 100
	Dilution Factor (River)	500
	Emission or Release	50000 g/ton of product (Default dilution ERC1,
Other given operational conditions affecting environmental exposure	Factor: Air	ERC6a, ERC6b)



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	Factor: Water	ERC6a, ERC6b)
	Emission or Release	36562 g/ton of product (Dilution of 10, Dilution of
	Factor: Air	100 ERC1, ERC6a, ERC6b)
	Emission or Release Factor: Water	60000 g/ton of product (Dilution of 10, Dilution of 100 ERC1, ERC6a, ERC6b)
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber, Ceramic & metal mash filters, PM10 particles are removed
measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to	Water	Substance specific waste water treatment, Ion exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)
prevent/limit release from the site		
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant
to sewage treatment plant	The concentration of the sum municipal STP	ubstance should not exceed 1,75 mg/L in the
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Send back to the process, Substance containing waste shall be handled as hazardous waste and removed by licensed waste removal company, incinerated or recycled
disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal.
2.2 Contributing scenario co	ntrolling worker exposu	re for: PROC1, PROC2, PROC3
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	Powdered substance, granules
Amount used	Amount per Shift	1000 kg
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).
Other operational conditions	Indoor use.	
affection and and a second second	Assumes activities are at ambient temperature. Use closed dosing, transfer, sampling and application systems including connectors. Provide local exhaust ventilation (LEV). Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes.	
Technical conditions and measures to control dispersion	Use closed dosing, transfer connectors. Provide local exhaust venti Where there are breaches	r, sampling and application systems including lation (LEV). in the closed system, such as pouring and removal o
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion	Use closed dosing, transfer connectors. Provide local exhaust venti Where there are breaches slag in metal production, LI Ensure operatives are train	r, sampling and application systems including lation (LEV). in the closed system, such as pouring and removal o EV is used to control fumes.
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion and exposure Conditions and measures related to personal protection, hygiene	Use closed dosing, transfer connectors. Provide local exhaust venti Where there are breaches slag in metal production, LI Ensure operatives are train	r, sampling and application systems including lation (LEV). in the closed system, such as pouring and removal on EV is used to control fumes. Ned to minimise exposures.
affecting workers exposure Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion and exposure Conditions and measures related to personal protection, hygiene and health evaluation PA102765_002	Use closed dosing, transfer connectors. Provide local exhaust venti Where there are breaches slag in metal production, Lt Ensure operatives are train Regular inspection and ma Wear protective clothing. Safety shoes	r, sampling and application systems including lation (LEV). in the closed system, such as pouring and removal c EV is used to control fumes. red to minimise exposures.



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In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3 Potentially closed processing operations at elevated temperature. Activity Concentration of the Covers percentage substance in the product up to Substance in 100 % (unless stated differently). Mixture/Article Product characteristics Physical Form (at time of Powdered substance, granules use) Amount used The amount used per worker varies from activity to activity 24 hours/day Frequency of use Frequency and duration of use Frequency of use 365 days/year Indoor use. Other operational conditions The process temperatures are mainly very high, as these processes include affecting workers exposure glass making, ceramics, steel & alloy making Worker in separate cabine without specific ventilation Use closed dosing, transfer, sampling and application systems including Technical conditions and measures to control dispersion connectors. from source towards the worker Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes. Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines. Organisational measures to Workers in the risky process/areas identified should be trained a) to avoid to prevent /limit releases, dispersion work without respiratory protection and b) to understand the irritating properties and exposure and, especially, the respiratory inhalation effects and c) to follow the safer procedures instructed by the employer. Operatives wear overalls or heavy heat resistant clothing Wear protective gloves. Safety glasses Goggles In case of dust or aerosol formation: use respiratory protection with approved Conditions and measures related filter (P2) to personal protection, hygiene or and health evaluation Particle filter:P3 Use battery-powered air fed helmets These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained 2.4 Contributing scenario controlling worker exposure for: PROC4, PROC5, PROC8b Covers reloading, mixing or compounding and associated activities in the Process Activity Categories listed above Concentration of the Covers percentage substance in the product up to Product characteristics PA102765_002 13/127 ΕN



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	Substance in Mixture/Article	100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	s and by facility	
Frequency and duration of use	Exposure duration per day	60 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Use closed dosing, transfer, sampling and application systems including connectors. Provide local exhaust ventilation (LEV). Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train Regular inspection and ma	ed to minimise exposures. intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses Goggles In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b	
Activity	Equipment maintenance		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	s and by facility	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor and outdoor use.		
Technical conditions and	Use closed dosing, transfe	r, sampling and application systems including	



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measures to control dispersion from source towards the worker	connectors. Worker in separate cabine without specific ventilation Provide local exhaust ventilation (LEV).
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses Wear protective gloves. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3

- 2.6 Contributing scenario controlling worker exposure for: PROC8b
- Large scale

Activity	Bulk loading (including marine vessel/barge, rail/road car and IBC loading)		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).)
	Physical Form (at time of use)	Powdered substance, granular-like	
Amount used	Amount per Use	40000 kg	
Frequency and duration of use	Application duration	120 min	
Other operational conditions	Indoor		
affecting workers exposure	Assumes activities are at a	mbient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	connectors. Provide dust filtration for ai	Use closed dosing, transfer, sampling and application systems including	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses or Goggles		
2.7 Contributing scenario con	ntrolling worker exposu	re for: PROC9	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,11% - 8,6%	
	Physical Form (at time of use)	solid, liquid, pasty	_
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Frequency and duration of use Technical conditions and measures to control dispersion from source towards the worker Organisational measures to	Automate activity where po	10000 kg to 8 hours (unless stated differently).	
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to	Automate activity where po		
	Automate activity where possible. Provide local exhaust ventilation (LEV).		
prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.8 Contributing scenario cor	ntrolling worker exposu	re for: PROC14	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	s and by facility	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to	Minimise exposure by partia provide extract ventilation a Provide local exhaust ventil Ensure operatives are train	ation (LEV).	
prevent /limit releases, dispersion and exposure	Regular inspection and mai	ntenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses Wear protective gloves. In case of dust or aerosol formation: use respiratory protection with approved filter (P2)		
	or Particle filter:P3		
2.9 Contributing scenario cor	<u> </u>	re for: PROC15	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
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Amount used	Amount per Application	1 kg
Frequency and duration of use	Sometimes during the work	ing day, only for short periods of time
Technical conditions and measures to control dispersion from source towards the worker	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a laboratory coat Safety shoes Safety glasses Wear protective gloves.	

3. Exposure estimation and reference to its source

Environment

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1, ERC6a, ERC6b	Dilution of 10	Fresh water	PEC	1956µg/L	0,969
ERC1, ERC6a, ERC6b	Dilution of 10	Soil	PEC	0,86mg/kg dry weight (d.w.)	0,158
ERC1, ERC6a, ERC6b	Dilution of 100	Fresh water	PEC	1206µg/L	0,597
ERC1, ERC6a, ERC6b	Dilution of 100	Soil	PEC	5,15mg/kg dry weight (d.w.)	0,954

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15 Workplace measurements PROC2, PROC4, PROC8a, PROC9, PROC14 MEASE PROC8b Advanced REACH Tool (ART model)

PROC9, PROC14 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value, without respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC1, PROC2, PROC3	90th percentile value, without respiratory protection	Inhalation worker exposure	0,08mg/m³	

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PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC4, PROC5 PROC8b	90th percentile value, With respiratory protection, half mask	Inhalation worker exposure	0,2mg/m ³	0,14
PROC4	Solid, high dustiness., during 15 mins - 1 hour, with local exhaust ventilation	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE), Equipment maintenance	Inhalation worker exposure	1,33mg/m³	0,92
PROC8a	Equipment maintenance, during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b		Inhalation worker exposure	0,016mg/m ³	0,011
PROC8b	with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,03mg/m ³	0,021
PROC2	Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC9	90th percentile value, solid, with local exhaust ventilation, With respiratory protection	Inhalation worker exposure	0,4mg/m³	0,28
PROC9	90th percentile value, liquid, with local exhaust ventilation	Inhalation worker exposure	0,01mg/m ³	0,007
PROC9	Concentration of substance in product: 5% - 25%, Solid, high dustiness.	Dermal worker exposure	1,44mg/kg bw/day	< 0,001
PROC9	Concentration of substance in product: 5% - 25%, liquid	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
PROC14		Inhalation worker exposure	1,3mg/m ³	0,9
PROC14	90th percentile value, with local exhaust ventilation	Inhalation worker exposure	0,15mg/m ³	0,10
PROC14	Solid, high dustiness.	Dermal worker exposure	2,4mg/kg bw/day	< 0,001
PROC15	90th percentile value	Inhalation worker exposure	0,16mg/m ³	0,11

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ROC14 Solid, high dustine Concentration of substance in produ - 25%	Dermal worker	exposure 0,014mg/	/kg bw/day	< 0,001
. Guidance to Downstream U Exposure Scenario	lser to evaluate wheth	er he works inside	the bound	laries set by th
be necessary to define appropriate Where other Risk Management Me risks are managed to at least equiv Only properly trained persons shall within the boundaries set by the ES	valent levels. I make use of scaling metł		hether the O	C and RMM are
Where other Risk Management Me risks are managed to at least equiv	valent levels. I make use of scaling meth S ased on boron such that n ary. The equivalent tonnag d in the product table. For	ods while checking w o RCR exceeds 0.97, e of product handled those operations that nage cannot exceed t Conversion fact	using back o on site shoul handle a cor the site tonna or for the	calculations with d be calculated nbination of
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Where other Risk Management Merisks are managed to at least equiv Only properly trained persons shall within the boundaries set by the ES Tonnage calculations have been bo the relevant PNEC's when necessa from the conversion factors detailer borate compounds, the boron equiv Substance Boric acid Boric oxide Disodium tetraborate anhydrous Disodium tetraborate pentahydr Disodium tetraborate decahydra	valent levels. I make use of scaling method ased on boron such that n ary. The equivalent tonnaged in the product table. For valent of the combined tor Formula H ₃ BO ₃ B2O ₃ B2O ₃ Na ₂ B ₄ O ₇ rate Na ₂ B ₄ O ₇ x 5H ₂ O ate Na ₂ B ₄ O ₇ x 10H ₂ O the Na ₂ B ₈ O ₁₃ x 4H ₂ O	ods while checking w o RCR exceeds 0.97, e of product handled those operations that nage cannot exceed t Conversion factor equivalent dose (multiply by) 0,1748 0,311 0,2149 0,1484 0,1134 0,2096	using back o on site shoul handle a cor the site tonna or for the	calculations with d be calculated mbination of
Where other Risk Management Merisks are managed to at least equiv Only properly trained persons shall within the boundaries set by the ES Tonnage calculations have been bo the relevant PNEC's when necessa from the conversion factors detailed borate compounds, the boron equiv Substance Boric acid Boric oxide Disodium tetraborate anhydrous Disodium tetraborate pentahydra Disodium tetraborate decahydra Sodium metaborate (anhydrous	valent levels. I make use of scaling method ased on boron such that n ary. The equivalent tonnaged in the product table. For valent of the combined tor Formula H ₃ BO ₃ B2O ₃ S Na ₂ B ₄ O ₇ Tate Na ₂ B ₄ O ₇ x 5H ₂ O ate Na ₂ B ₄ O ₇ x 5H ₂ O ate Na ₂ B ₄ O ₇ x 10H ₂ O the Na ₂ B ₈ O ₁₃ x 4H ₂ O NaBO ₂ NaBO ₂ x 2H ₂ O	ods while checking w o RCR exceeds 0.97, e of product handled those operations that nage cannot exceed t Conversion fact equivalent dose (multiply by) 0,1748 0,311 0,2149 0,1484 0,1134 0,2096 0,1643	using back o on site shoul handle a cor the site tonna or for the	calculations with d be calculated nbination of
Where other Risk Management Merisks are managed to at least equiv Only properly trained persons shall within the boundaries set by the ES Tonnage calculations have been bo the relevant PNEC's when necessa from the conversion factors detailer borate compounds, the boron equiv Substance Boric acid Boric oxide Disodium tetraborate anhydrous Disodium tetraborate pentahydr Disodium tetraborate decahydra Disodium tetraborate tetrahydra Sodium metaborate (anhydrous Sodium metaborate (dihydrate)	valent levels. I make use of scaling method ased on boron such that n ary. The equivalent tonnaged in the product table. For valent of the combined tor Formula H ₃ BO ₃ B2O	ods while checking w o RCR exceeds 0.97, e of product handled those operations that nage cannot exceed t Conversion fact equivalent dose (multiply by) 0.1748 0.311 0.2149 0.1484 0.1134 0.2096 0.1643 0.1062	using back o on site shoul handle a cor the site tonna or for the	calculations with d be calculated nbination of

Additional good practice advice beyond the REACH Chemical Safety Assessment

Take care for general good hygiene and housekeeping.



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1. Short title of Exposure Scenario 3: Formulation & (re)packing of substances and mixtures			
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites		
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation PROC15: Use as laboratory reagent		
Environmental Release Categories	ERC2: Formulation of pre	parations	
2.1 Contributing scenario co	ntrolling environmenta	exposure for: ERC2	
Activity	Formulation of substance	in adhesives	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Annual amount per site	1000 ton(s)/year (No water emissions ERC2)	
Frequency and duration of use	Continuous exposure	240 days/year	
Other given operational conditions affecting	Emission or Release Factor: Air	50 g/ton of product	
environmental exposure	Emission or Release Factor: Water	0 g/ton of product	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filters, Bag filters, Fabric filter	
measures to reduce or limit discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness: 40 - 90 %)	
Organizational measures to prevent/limit release from the site	· · · · · · · · · · · · · · · · · · ·		
Conditions and measures related to sewage treatment plant	Wastewater emission con wastewater.	trols are not applicable as there is no direct release to	
Conditions and measures related	Waste treatment	Send back to the process	
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Activity	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing,		
2.3 Contributing scenario co	ntrolling environmental	exposure for: ERC2	
Conditions and measures related to external treatment of waste for disposal	Disposal methodsVacuum up spillage and collect in suitable containers for disposal., Dispose of as hazar waste in compliance with local and national regulations.		
	Waste treatment	Send back to the process	
Conditions and measures related to sewage treatment plant	Wastewater emission controls are not applicable as there is no direct release to wastewater., The concentration of the substance should not exceed 1,75 mg/L in the municipal STP		
Organizational measures to prevent/limit release from the site		· · · · · · · · · · · · · · · · · · ·	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness: 40 - 90 %)	
Technical conditions and measures at process level (source) to prevent release	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filters, Bag filters, Fabric filter	
environmental exposure	Emission or Release Factor: Water	0 g/ton of product	
Other given operational conditions affecting	Emission or Release Factor: Air	200 g/ton of product	
innuenced by tisk management	Other data. Other information	Local freshwater dilution factor:10	
Environment factors not influenced by risk management	Dilution Factor (Coastal Areas)	100	
	Dilution Factor (River)	500	
Frequency and duration of use	Continuous exposure	255 days/year	
Product characteristics	Substance in Mixture/Article Annual amount per site	100 % (unless stated differently). 15000 ton(s)/year (No water emissions ERC2)	
Activity	Formulation of substance i Concentration of the	Covers percentage substance in the product up to	
2.2 Contributing scenario co			
to external recovery of waste	recovery of waste		
Conditions and measures related	Recovery Methods	regulations. There is no envisaged external recovery of waste.	
to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Dispose of as hazardous waste in compliance with local and national	



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	sampling, maintenance and	d associated laboratory activities.	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Annual tonnage	15000 ton(s)/year (No water emissions ERC2)	
Frequency and duration of use	Continuous exposure	200 days/year	
	Dilution Factor (River)	500	
Environment factors not influenced by risk management	Dilution Factor (Coastal Areas)	100	
initialized by lisk management	Other data. Other information	Local freshwater dilution factor:10	
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	400 g/ton of product	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, Bag filters, Fabric filter, Ceramic & metal mash filters, PM10 particles are removed	
measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness: 40 - 90 %)	
prevent/limit release from the site			
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater., If sites discharge to a municipal STP the concentration of the substance should not exceed 10 mg/l in the municipal STP		
	Waste treatment	Send back to the process	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Dispose of as hazardous waste in compliance with local and national regulations.	
2.4 Contributing scenario co	ntrolling worker exposu	re for: PROC1, PROC2, PROC3	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	granules, Powder	
Amount used	per shift:	1000 kg	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a closed system. Where there are breaches in the closed system, such as pouring and removal c slag in metal production, LEV is used to control fumes.		
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Organizational massures to			
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
and exposure	Regular Inspection and ma		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC5	
Activity		talworking fluid concentrates	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 5,5%	
	Physical Form (at time of use)	Solid in solution	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Exposure duration	60 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a	mbient temperature.	
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to	Provide local exhaust ventilation (LEV). Closed and semi-closed process where appropriate Ensure that task is semi-automated or automated Ensure operatives are trained to minimise exposures.		
prevent /limit releases, dispersion and exposure	Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.6 Contributing scenario con PROC8b, PROC9	ntrolling worker exposu	re for: PROC2, PROC3, PROC4, PROC5,	
Activity	Formulation of substance in	adhesives	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 1,5%	
	Physical Form (at time of use)	granules, Powder, liquid	
Amounturod	Amount per Day	300 kg	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Continuous exposure		
Other operational conditions	Indoor use.		
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affecting workers exposure				
Technical conditions and measures to control dispersion	Provide local exhaust ventilation (LEV). Ensure that task is semi-automated or automated			
from source towards the worker				
Organisational measures to prevent /limit releases, dispersion and exposure	Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the irritating properties and, especially, the respiratory inhalation effects and c) to follow the safer procedures instructed by the employer. Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. If no adequate ventilation is available: Wear air purifying mask APF4 or Wear air purifying half mask APF10 Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained			
2.7 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b		
Activity	Equipment maintenance			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder		
Amount used	Would vary by requirements and by facility			
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).			
Other operational conditions affecting workers exposure	Indoor and outdoor use. Assumes activities are at ambient temperature.			
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). Automate activity where possible.			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3			
2.8 Contributing scenario co	ntrolling worker exposu	re for: PROC8b		
Large scale				
Activity	Bulk loading (including marine vessel/barge, rail/road car and IBC loading)			
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Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder		
Amount used	Amount per Use	40000 kg		
Frequency and duration of use	Exposure duration	60 - 120 min		
Other operational conditions	Indoor use.			
affecting workers exposure	Assumes activities are at ambient temperature.			
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion	Automate activity where possible. Provide dust filtration for air displaced from the silo during filling. Use in closed process Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
and exposure				
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety glasses Wear chemically resistant gloves. Safety goggles			
2.9 Contributing scenario controlling worker exposure for: PROC4, PROC5, PROC8b				
Activity	Covers reloading, mixing or compounding and associated activities in the Process Categories listed above			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder		
Amount used	Would vary by requirements and by facility			
Frequency and duration of use	Exposure duration	60 min		
Other operational conditions	Indoor use.			
affecting workers exposure	Assumes activities are at ambient temperature.			
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). Ensure that task is semi-automated or automated Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the irritating properties and, especially, the respiratory inhalation effects and c) to follow the safer procedures instructed by the employer.			
Conditions and measures related	Wear protective clothing.			
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to personal protection, hygiene and health evaluation	Wear protective gloves. Safety glasses Goggles In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained		
2.10 Contributing scenario	controlling worker expo	osure for: PROC14	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	granules, Powder	
Amount used	The amount used per worker varies from activity to activity		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).		
Other operational conditions	Indoor use.		
affecting workers exposure			
Technical conditions and	Provide local exhaust ventilation (LEV).		
measures to control dispersion from source towards the worker			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.11 Contributing scenario	controlling worker expo	osure for: PROC15	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	granules, Powder	
Amount used	Amount per Use	1 kg	
Frequency and duration of use	Several times during the working day, only for short periods of time		
Technical conditions and measures to control dispersion from source towards the worker	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.		
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Ensure operatives are trained to minimise exposures.				
Regular inspection and maintenance of equipment and machines.				
Wear protective clothing. Safety shoes				
controlling worker expo	osure for: PROC9			
Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,11% - 8,6%			
Physical Form (at time of use)	solid, liquid, pasty			
Amount per Day	10000 kg			
The amount used per worker varies from activity to activity				
Covers daily exposures up	to 8 hours (unless stated differently).			
Provide extraction ventilation at points where emissions occur. Automate activity where possible.				
Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.				
Weer protective elething				
Use suitable eye protection. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or				
	Regular inspection and ma Wear protective clothing. Safety shoes Safety glasses Wear protective gloves. controlling worker expe Concentration of the Substance in Mixture/Article Physical Form (at time of use) Amount per Day The amount used per work Covers daily exposures up Provide extraction ventilation Automate activity where poor Ensure operatives are train Regular inspection and ma Wear protective clothing. Use suitable eye protection In case of dust or aerosol f filter (P2)			

3. Exposure estimation and reference to its source

Environment

METALS EUSES IT tool

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR	
ERC2	No water discharge to the environment	Soil	PEC	0,01mg/kg dry weight (d.w.)	0,002	
ERC2	No water discharge to the environment, Detergent powders, liquid detergents	Soil	PEC	0,37mg/kg dry weight (d.w.)	0,069	
ERC2	No water discharge to the environment	Soil	PEC	0,74mg/kg dry weight (d.w.)	0,137	
FEICA spERC 2.1a.v1 has been used to evaluate the exposure for the environment. AISE spERC 2.1 has been used to evaluate the exposure for the environment.						
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Workers

PROC4, PROC5, PROC9, PROC15 Workplace measurements PROC2, PROC4, PROC5, PROC8a, PROC8b, PROC14 MEASE PROC9 Advanced REACH Tool (ART model) PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario			Level of Exposure RCR		
PROC1, PROC2, PROC3	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	0,08mg/m³	0,06	
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001	
PROC8b	liquid, Concentration: 1%, during 15 mins - 1 hour	Dermal worker exposure	0,005mg/kg bw/day	< 0,001	
PROC8a, PROC8b	90th percentile value, Equipment maintenance, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m³	0,92	
PROC8a	Equipment maintenance, during 1 - 4 hours	Dermal worker exposure	0,173mg/kg/day	< 0,001	
PROC8b	Dedicated facility, Large task, with local exhaust ventilation	Inhalation worker exposure	0,03mg/m ³	0,021	
PROC2	Material transfers, Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001	
PROC4, PROC5	90th percentile value, Direct discharge, small scale	Inhalation worker exposure	0,78mg/m³	0,54	
PROC4	Solid, high dustiness., during 15 mins - 1 hour, small scale	Dermal worker exposure	0,48mg/kg bw/day	< 0,001	
PROC4, PROC5, PROC8b	90th percentile value, Large scale, With respiratory protection, half mask	Inhalation worker exposure	0,2mg/m³	0,14	
PROC4	Solid, high dustiness., Large scale	Dermal worker exposure	4,8mg/kg bw/day	< 0,001	
PROC14	90th percentile value, with local exhaust ventilation	Inhalation worker exposure	0,15mg/m ³	< 0,001	

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PROC14	Solid, high dustiness., > 4 h (half tour)	Dermal worker exposure	2,4mg/kg/day	< 0,001
PROC14	Solid, high dustiness., Concentration of substance in product: 5% - 25%, > 4 h (half tour)	Dermal worker exposure 0,014mg/kg bw/da		< 0,001
PROC15	90th percentile value, 8 hours/day	Inhalation worker exposure	0,16mg/m³	0,11
PROC9	with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,01mg/m³	0,007
PROC9	with local exhaust ventilation, without respiratory protection	Inhalation worker exposure	0,4mg/m³	0,28
PROC9	90th percentile value, Solid, high dustiness.	Dermal worker exposure	1,44mg/m³	< 0,001
PROC9	90th percentile value, liquid	Dermal worker exposure	0,144mg/m³	< 0,001

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES



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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H₃BO₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832



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1. Short title of Exposure Scenario 4: Use as additive					
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)				
Process categories	PROC21: Low energy manipulation of substances bound in materials and/or articles				
Environmental Release Categories	ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release ERC11a: Wide dispersive indoor use of long-life articles and materials with low release				
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC10a, ERC11a			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).			
Amount used	Amounts used in the EU (tonnes/year)	1,1 Million tonnes/year			
Frequency and duration of use	Continuous exposure	365 days/year			
Environment factors not influenced by risk management	Other data. Other information Local freshwater dilution factor:: 10				
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Water32000 g/ton of product				
Technical conditions and	The substance is not relea	sed during its life cycle.			
measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site					
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant			
to sewage treatment plant	Flow rate of sewage treatment plant effluent	2.000 m3/d			
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste in accordance with environmental legislation.			
2.2 Contributing scenario co	ntrolling worker exposu	re for: PROC21			
Product characteristics	Concentration of the Substance in Concentration of substance in product: 1,5				
	Physical Form (at time of use)	solid			
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Amount used	The amount used per worker varies from activity to activity
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).
Other operational conditions affecting workers exposure	Indoor use. All processes are carried out in confined areas
Technical conditions and measures to control dispersion from source towards the worker	Ensure adequate ventilation, especially in confined areas.
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or FFP1 mask

3. Exposure estimation and reference to its source

Environment

METALS EUSES IT tool

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC10a, ERC11a		Water	PEC	1021µg/L	0,505
ERC10a, ERC11a		Sewage treatment plant (STP)	PEC	9644µg/L	0,964

Workers

MEASE Estimation based on workplace measurements						
Contributing Scenario	Specific conditions Exposure routes Lev		Level of Exposure	RCR		
PROC21	90th percentile value	Inhalation worker exposure	0,3mg/m ³	0,21		
PROC21	Concentration: 1%, Installation of cellulose insulation	Dermal worker exposure	0,99mg/m³	< 0,001		
PROC21	Concentration: 1%, Cutting of plasterboard	Inhalation worker exposure	0,005mg/m ³	0,0034		

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may

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be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB₅O ₈ x 5H₂0	0,1832



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Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)			
Chemical product category	PC35: Washing and cleaning products (including solvent based products)			
Environmental Release Categories	ERC8a: Wide dispersive in	door use of processing aids in open systems		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC8a		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
Amount used	Regional use tonnage (tons/year):	93,2 ton(s)/year		
Amount used	Amounts used in the EU (tonnes/year)	35000 ton(s)/year		
Frequency and duration of use	Continuous exposure	365 days/year, Dispersive use.		
Environment factors not influenced by risk management	Other data.Other information	Local freshwater dilution factor:: 10		
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Water	1000000 g/ton of product		
	Type of Sewage Treatment Plant	Municipal sewage treatment plant		
Conditions and measures related to sewage treatment plant	Flow rate of sewage treatment plant effluent 2.000 m3/d			
	The concentration of the su municipal STP	ubstance should not exceed 1,75 mg/L in the		
2.2 Contributing scenario co products	ntrolling consumer expo	osure for: PC35: Laundry and dish washing		
	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to %.		
Product characteristics	Physical Form (at time of use)	liquid		
	Exposure duration	10 min		
Frequency and duration of use	Frequency of use	10 Times per week		
Human factors not influenced by	Exposed skin areas	Covers skin contact area up to 1980 cm ²		
risk management	Body weight	60 kg		
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Instructions addressed to the consumer via produc labelling Wear suitable gloves.		



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3. Exposure estimation and reference to its source

Environment

Estimation based on workplace measurements

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8a, ERC8d		Sewage treatment plant (STP)	PEC	9589µg/L	0,959
ERC8a, ERC8d		Fresh water	PEC	1015µg/L	0,503

Consumers

Workplace measurements

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR		
PC35	worst-case, Hand wash	Consumer dermal exposure	0,14mg/kg bw/day			
PC35	worst-case, Laundry bleaching/pre-treatment	Consumer dermal exposure	5,84mg/kg bw/day			
PC35	worst-case, Laundry regular	Consumer dermal exposure	0,58mg/kg bw/day			
Estimated inhalative exposure value is regarded to be negligible.						

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For scaling see: http://www.arche-consulting.be/metal-CSA-toolbox/du-scaling tool

If measured data are not available, the DU may make use of an appropriate scaling tool such as EASE Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.



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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H₃BO₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832



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1. Short title of Exposure Sc	enario 6: Use in adhesiv	ves and sealants		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites			
PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposur PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring				
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix			
2.1 Contributing scenario co	ontrolling environmenta	exposure for: ERC5		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
Amount used	Annual amount per site	7,5 ton(s)/year (Dilution of 10 ERC5)		
Amount used	Annual amount per site	75 ton(s)/year (Dilution of 100 ERC5)		
Frequency and duration of use	Continuous exposure	100 days/year		
	Other data. Other information	Local freshwater dilution factor:: 10		
Environment factors not influenced by risk management	Other data. Other information	Local marine water dilution factor:: 100		
	Dilution Factor (River)	500		
	Emission or Release Factor: Air	36562 g/ton of product (Dilution of 10 ERC5)		
	Emission or Release Factor: Water	500000 g/ton of product (Dilution of 10 ERC5)		
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	36562 g/ton of product (Dilution of 100 ERC5)		
	Emission or Release Factor: Water	500000 g/ton of product (Dilution of 100 ERC5)		
	Emission or Release Factor: Air	36562 g/ton of product (Dilution of 1000 ERC5)		
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	Emission or Release Factor: Water	500000 g/ton of product (Dilution of 1000 ERC5)	
	Emission or Release Factor: Air	36562 g/ton of product (No water emissions ERC5)	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and	Air	Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber, Ceramic & metal mash filters, PM10 particles are removed	
measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness 40 - 90 %)	
prevent/limit release from the site			
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant	
to sewage treatment plant	The concentration of the s municipal STP	substance should not exceed 1,75 mg/L in the	
	Waste treatment	Send back to the process, or, Send offsite to approved hazardous waste incinerator	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Waste product and empty containers should be disposed of as hazardous waste in accordance with all local and national regulations.	
2.2 Contributing scenario co	ntrolling environmenta	Lexposure for: ERC5	
Activity	Formulation of substance	•	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 100 % (unless stated differently).	
Amount used	Annual amount per site	2000 ton(s)/year	
Frequency and duration of use	Continuous exposure	100 days/year	
	Other data. Other information	Local freshwater dilution factor:: 10	
Environment factors not influenced by risk management	Other data. Other information	Local marine water dilution factor:: 100	
	Dilution Factor (River)	500	
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	9000 g/ton of product	
Technical conditions and measures at process level (source) to prevent release	Air	Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber	
Technical onsite conditions and measures to reduce or limit	Water	Substance specific waste water treatment, Reverse	

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measures to reduce or limit

osmosis, Ion exchange (Degradation effectiveness:



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discharges, air emissions and 40 - 90 %) releases to soil Organizational measures to prevent/limit release from the site Conditions and measures related Wastewater emission controls are not applicable as there is no direct release to to sewage treatment plant wastewater. Send back to the process, or, Send offsite to Waste treatment approved hazardous waste incinerator Conditions and measures related Vacuum up spillage and collect in suitable to external treatment of waste for containers for disposal., Waste product and empty disposal containers should be disposed of as hazardous **Disposal methods** waste in accordance with all local and national regulations. 2.3 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3 Activity Potentially closed processing operations at elevated temperature. Concentration of the Covers percentage substance in the product up to Substance in 100 % (unless stated differently). Mixture/Article Product characteristics Physical Form (at time of Powdered substance, granules use) Amount used The amount used per worker varies from activity to activity Frequency of use 24 hours/day Frequency and duration of use Frequency of use 365 days/year Indoor use. Other operational conditions The process temperatures are mainly very high, as these processes include affecting workers exposure glass making, ceramics, steel & alloy making Use in closed process, no likelihood of exposure Technical conditions and Worker in separate cabine without specific ventilation measures to control dispersion Where there are breaches in the closed system, such as pouring and removal of from source towards the worker slag in metal production, LEV is used to control fumes. Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines. and exposure Operatives wear overalls or heavy heat resistant clothing In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 Conditions and measures related Use battery-powered air fed helmets to personal protection, hygiene These respirators, if worn correctly, with a good face fit, will provide sufficient and health evaluation protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained Equipment cleaning and Wear protective gloves. maintenance Safety glasses PA102765_002 39/127 EN



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		or Safety goggles	
2.4 Contributing scenario co	ntrolling worker exposu	re for: PROC1, PROC2, PROC3	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Shift	1000 kg	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Where there are breaches in the closed system, such as pouring and removal of slag in metal production. LEV is used to control fumes.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation			
2.5 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4, PROC5, PROC7, PROC8b, PROC9, PROC10, PROC13			

Relevant for Adhesives

Activity	Application			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 1,5%		
	Physical Form (at time of use)	liquid		
Amount used	Amount per Day 300 kg			
Frequency and duration of use	ency and duration of use Covers daily exposures up to 8 hours (unless stated differer			
Other operational conditions	Indoor use.			
affecting workers exposure				
Technical conditions and measures to control dispersion from source towards the worker	Ensure that task is semi-automated or automated Provide local exhaust ventilation (LEV).			

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Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines and exposure Conditions and measures related Wear protective clothing. to personal protection, hygiene Safety glasses and health evaluation 2.6 Contributing scenario controlling worker exposure for: PROC4, PROC5, PROC8b Concentration of the Covers percentage substance in the product up to Substance in 100 % (unless stated differently). Mixture/Article Product characteristics Physical Form (at time of Powdered substance, granules use) Amount used Would vary by requirements and by facility Frequency and duration of use Application duration 60 min Other operational conditions Indoor use. affecting workers exposure Assumes activities are at ambient temperature. Ensure that task is semi-automated or automated Provide local exhaust ventilation (LEV). Single use bags can be opened by the use of sharp prongs at the discharge Technical conditions and measures to control dispersion hopper. When the big bag is placed at the discharge hopper and lowered, the from source towards the worker prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines. and exposure Wear protective clothing. Wear protective gloves. Safety glasses Goggles In case of dust or aerosol formation: use respiratory protection with approved Conditions and measures related filter (P2) to personal protection, hygiene or and health evaluation Particle filter:P3 These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained 2.7 Contributing scenario controlling worker exposure for: PROC7 Concentration of the Concentration of substance in product : 0,08% -Substance in 1,1% Mixture/Article Product characteristics Physical Form (at time of solid, liquid use) The amount used per worker varies from activity to activity Amount used PA102765_002 41/127 EN



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Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions	Indoor use.			
affecting workers exposure	Process may involve high temperature			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.			
	Wear protective clothing. Wear protective gloves. Safety glasses or Goggles			
Conditions and measures related to personal protection, hygiene and health evaluation	Spraying/fogging by manual application	If spraying inside a kiln/furnace: Use battery-powered air fed helmets In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 If there is potential for oxygen deficiency, a suitable compressed airline should be used in conjunction with the full-face respirator to provide an independent supply of fresh air Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained		
2.8 Contributing scenario co	ntrolling worker exposu	re for: PROC7, PROC10		
Activity	Analisation of supersal Dave			
Activity	Application of enamel, Pow	der coating, Manual spray application (liquid products)		
Product characteristics	Concentration of the Substance in Mixture/Article	der coating, Manual spray application (liquid products) Covers concentrations up to 12,9 %		
	Concentration of the Substance in			
	Concentration of the Substance in Mixture/Article Physical Form (at time of use)	Covers concentrations up to 12,9 %		
Product characteristics	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture		
Product characteristics Amount used	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity		
Product characteristics Amount used Frequency and duration of use	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity		
Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity		
Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and measures to control dispersion	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up Indoor use.	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity to 8 hours (unless stated differently).		
Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up Indoor use. Spraying Ensure operatives are train	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity to 8 hours (unless stated differently). Ensure that a spraying booth is used.		
Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and measures to control dispersion from source towards the worker Organisational measures to	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up Indoor use. Spraying Ensure operatives are train Regular inspection and ma	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity to 8 hours (unless stated differently). Ensure that a spraying booth is used. ed to minimise exposures. intenance of equipment and machines. ilation measures are not possible or insufficient,		
Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion and exposure Conditions and measures related to personal protection, hygiene	Concentration of the Substance in Mixture/Article Physical Form (at time of use) The amount used per work Covers daily exposures up Indoor use. Spraying Ensure operatives are train Regular inspection and ma Wear protective clothing. If technical exhaust or vent respiratory protection must Particle filter:P2	Covers concentrations up to 12,9 % Powdered mixture, Liquid mixture er varies from activity to activity to 8 hours (unless stated differently). Ensure that a spraying booth is used. ed to minimise exposures. intenance of equipment and machines. ilation measures are not possible or insufficient,		



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Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained

2.9 Contributing scenario co	ntrolling worker exposu	re for: PROC7, PROC10	
Activity	Liquid formulation, spray ap	plication	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,5% - 3,6%	
	Physical Form (at time of use)	Liquid mixture	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a spraying booth is used. Provide local exhaust ventilation (LEV).		
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular inspection and maintenance of equipment and machines.		
	Wear protective clothing. Wear chemically resistant gloves.		
Conditions and measures related to personal protection, hygiene and health evaluation	Manual Spraying	Safety glasses Wear respiratory protection. Particle filter:P2 or Particle filter:P3 Use battery-powered air fed helmets Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained	
2.10 Contributing scenario	controlling worker expo	osure for: PROC8a, PROC8b	
Activity	Equipment maintenance		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirements and by facility		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).		
Other operational conditions affecting workers exposure	Indoor and outdoor use.		
Technical conditions and measures to control dispersion	Use closed dosing, transfer, sampling and application systems including connectors.		
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from source towards the worker	Worker in separate cabine without specific ventilation Provide extraction ventilation at points where emissions occur.
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3

2.11 Contributing scenario controlling worker exposure for: PROC8b

Large scale

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Amount used	Amount per Day	10000 kg	
	Physical Form (at time of use) solid, liquid, pasty		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,11% - 8,6%	
2.12 Contributing scenario	controlling worker expo	osure for: PROC9	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses or Goggles		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Technical conditions and measures to control dispersion from source towards the worker	Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) Use closed dosing, transfer, sampling and application systems including connectors. Provide dust filtration for air displaced from the silo during filling. Provide local exhaust ventilation (LEV).		
Other operational conditions affecting workers exposure	Indoor use. Assumes activities are at a		
Frequency and duration of use	Exposure duration 120 min		
Amount used	Amount per Application 40000 kg		
Product characteristics	Physical Form (at time of use)	Powdered substance, granules	
	Concentration of the Substance in Mixture/Article Covers percentage substance in the pro 100 % (unless stated differently).		0



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Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).
Other operational conditions affecting workers exposure	Indoor use.
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Provide local exhaust ventilation (LEV).
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3

3. Exposure estimation and reference to its source

Environment

Workplace measurements					
Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC5		Water	PEC	1931µg/L	0,956
ERC5		Soil	PEC	0,04mg/kg dry weight (d.w.)	0,007

FEICA spERC 5.1a.v1 has been used to evaluate the exposure for the environment.

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9 Workplace measurements PROC2, PROC4, PROC7, PROC8a, PROC9, PROC19 MEASE

PROC7 Advanced REACH Tool (ART model)

PROC7, PROC9, PROC10, PROC13, PROC19 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	cleaning, during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC1, PROC2, PROC3	without respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
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PROC7, PROC10, PROC13	Concentration of substance in product : 0% - 5%, with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,11mg/m³	0,076
PROC7	Spraying, Concentration of substance in product : 0% - 5%	Dermal worker exposure	0,048mg/kg bw/day	0,01
PROC4, PROC5	90th percentile value, no respiratory protection (RPE), small scale	Inhalation worker exposure	0,78mg/m³	0,54
PROC4	Solid, high dustiness., during 15 mins - 1 hour, small scale	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC4, PROC5, PROC8b	90th percentile value, Large scale, With respiratory protection, half mask	Inhalation worker exposure	0,2mg/m³	0,14
PROC4	Solid, high dustiness., during 15 mins - 1 hour, with local exhaust ventilation	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC7, PROC19	without respiratory protection	Inhalation worker exposure	0,012mg/m ³	0,008
PROC7, PROC19	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,42mg/kg bw/day	< 0,001
PROC7	with local exhaust ventilation, With respiratory protection, liquid	Inhalation worker exposure	0,67mg/m³	0,46
PROC7	liquid, Concentration of substance in product : 0% - 5%, with local exhaust ventilation	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b		Inhalation worker exposure	0,016mg/m ³	0,011
PROC8b	with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,03mg/m ³	0,021
PROC2	Solid, high dustiness.	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
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PROC9	90th percentile value, no respiratory protection (RPE), solid, with local exhaust ventilation	Inhalation worker exposure	0,4mg/m³	0,28
PROC9	90th percentile value, liquid, with local exhaust ventilation	Inhalation worker exposure	0,01mg/m³	0,007
PROC9	Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	1,44mg/kg bw/day	< 0,001
PROC9	liquid, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,144mg/kg bw/day	< 0,001

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.



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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)	
Boric acid	H ₃ BO ₃	0,1748	
Boric oxide	B2O3	0,311	
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149	
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484	
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134	
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096	
Sodium metaborate (anhydrous)	NaBO ₂	0,1643	
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062	
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784	
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636	
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832	
f measured data are not available, the (www.ebrc.de/mease.html) to estimate For further information on the assessm	the associated exposu	ure.	3 MEASE
Iditional good practice advice beyon	d the REACH Chemi	cal Safety Assessment	

Take care for general good hygiene and housekeeping.

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1. Short title of Exposure Sco	enario 7: Use in Cleaning	g Agents		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)			
Process categories	 PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC10: Roller application or brushing PROC11: Non industrial spraying PROC13: Treatment of articles by dipping and pouring PROC19: Hand-mixing with intimate contact and only PPE available 			
Environmental Release Categories		door use of processing aids in open systems utdoor use of processing aids in open systems		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC8a, ERC8d		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Regional use tonnage (tons/year):	93,2 ton(s)/year		
Amount used	Amounts used in the EU (tonnes/year)	35000 ton(s)/year (Dilution of 10 ERC8a, ERC8d)		
Frequency and duration of use	Continuous exposure	365 days/year, Dispersive use.		
Environment factors not influenced by risk management	Other data. Other information Local freshwater dilution factor:: 10			
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Water1000000 g/ton of product			
	Type of Sewage Treatment Plant	Municipal sewage treatment plant		
Conditions and measures related to sewage treatment plant	Flow rate of sewage treatment plant effluent	2.000 m3/d		
	The concentration of the su municipal STP	ubstance should not exceed 1,75 mg/L in the		
2.2 Contributing scenario co PROC11, PROC13, PROC		re for: PROC1, PROC2, PROC3, PROC10,		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 0,5%		
	Physical Form (at time of use)	liquid		
Amount used	The amount used per work	er varies from activity to activity		
Frequency and duration of use	Exposure duration per day	1 min		
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	Frequency of use	5 Times per day	
Other operational conditions	Indoor use.		
affecting workers exposure			
Technical conditions and	Ensure that task is semi-au	utomated or automated	
measures to control dispersion from source towards the worker			
Organisational measures to		intenance of equipment and machines.	
prevent /limit releases, dispersion and exposure	Ensure operatives are train	ted to minimise exposures.	
Conditions and measures related	Use suitable eye protection	ı.	
to personal protection, hygiene	Wear protective gloves.		
and health evaluation			
2.3 Contributing scenario co	ntrolling worker exposu	re for: PROC11, PROC13	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 0,5%	
	Physical Form (at time of use)	liquid	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).		
Technical conditions and measures to control dispersion from source towards the worker	Use product in a well-ventilated area only. Where possible use of specific dispensers and pumps specifically designed to prevent splashes/spills/exposure to occur.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		

3. Exposure estimation and reference to its source

Environment

Workplace me	Workplace measurements					
Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR	
ERC8a, ERC8d		Sewage treatment plant (STP)	PEC	9589µg/L	0,959	
ERC8a, ERC8d		Water	PEC	1015µg/L	0,503	

Workers

PROC19 MEASE PROC11 Advanced REACH Tool (ART model) (inhalative exposure)					
Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR	
PROC19	Hand wash, liquid, Concentration: 1%,	Dermal worker exposure	0,048mg/kg bw/day	< 0,001	
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Version 1.0 Print Date 26.05.2014 Revision date / valid from 26.05.2014 during 15 mins - 1 hour liquid detergents, Inhalation worker PROC11 0,01mg/m³ 0,007 Spraying, Large scale exposure Inhalative exposure is regarded to be not relevant. 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the **Exposure Scenario** Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value. Substance Formula Conversion factor for the equivalent dose of B (multiply by) Boric acid H₃BO₃ 0.1748 B2O3 Boric oxide 0.311 Disodium tetraborate anhydrous Na₂B₄O₇ 0.2149 Na2B407 x 5H20 Disodium tetraborate pentahydrate 0.1484 Disodium tetraborate decahydrate Na2B4O7 x 10H20 0.1134 Na2B8013 x 4H20 Disodium octoborate tetrahydrate 0.2096 Sodium metaborate (anhydrous) NaBO₂ 0,1643 Sodium metaborate (dihydrate) NaBO₂ x 2H₂0 0.1062 NaBO₂ x 4H₂0 Sodium metaborate (tetrahydrate) 0.0784 Sodium pentaborate (anhydrous) NaB₅O₈ 0.2636 Sodium pentaborate (pentahydrate) NaB508 x 5H20 0.1832 If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. For further information on the assessment method, see: http://www.advancedreachtool.com Additional good practice advice beyond the REACH Chemical Safety Assessment

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1. Short title of Exposure Sce	enario 8: Use in Cleaning	g Agents	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites		
Process categories	 PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC6: Calendering operations PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC13: Treatment of articles by dipping and pouring PROC13: Treatment of articles by dipping and pouring PROC13: Open processing and transfer operations with minerals/metals at elevated temperature PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles 		
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC4	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Regional use tonnage (tons/year):	93,2 ton(s)/year	
Frequency and duration of use	Continuous exposure	365 days/year, Dispersive use.	
	Type of Sewage Treatment Plant	Municipal sewage treatment plant	
Conditions and measures related to sewage treatment plant	Flow rate of sewage treatment plant effluent	2.000 m3/d	
	The concentration of the sum municipal STP	ubstance should not exceed 1,75 mg/L in the	
		re for: PROC1, PROC2, PROC3, PROC5, OC12, PROC13, PROC18, PROC19, PROC23,	
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PROC24			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 2%	
	Physical Form (at time of use)	liquid	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Exposure duration per day	5 min	
	Frequency of use	10 Times per day	
Other operational conditions	Indoor use.		
affecting workers exposure			
Technical conditions and	Ensure that task is semi-au	utomated or automated	
measures to control dispersion from source towards the worker			
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
and exposure			
Conditions and measures related to personal protection, hygiene	Use suitable eye protectior Wear protective gloves.).	
and health evaluation	Troai protocitto giotoci		
2.3 Contributing scenario co	ntrolling worker exposu	re for: PROC7	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 1 %.	
	Physical Form (at time of use)	liquid	
Frequency and duration of use	Exposure duration per day	> 240 min	
Conditions and measures related	Wear protective gloves.		
to personal protection, hygiene and health evaluation			
3. Exposure estimation and	reference to its source		
Environment			
Estimation based on workplace	e measurements		

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4		Sewage treatment plant (STP)	PEC	0,06mg/L	0,04
ERC4		Fresh water	PEC	63µg/L	0,05
ERC4		Fresh water	PEC	0,37mg/kg dry	0,20
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ΕN

BRENNTAG SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006 Borax decahydrate Version 1.0 Print Date 26.05.2014 Revision date / valid from 26.05.2014 sediment weight (d.w.) Workers MEASE Contributing **Specific conditions** Exposure routes Level of Exposure RCR Scenario Hand wash, during 15 mins - 1 hour, PROC19 Dermal worker exposure 0,005mg/kg bw/day ---Concentration: 1%, with aloves PROC7 with gloves Dermal worker exposure 0,002mg/kg bw/day ----Inhalative exposure is regarded to be not relevant. 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the **Exposure Scenario** Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value. Substance Formula Conversion factor for the equivalent dose of B (multiply by) Boric acid H₃BO₃ 0.1748 Boric oxide B2O3 0.311 Disodium tetraborate anhydrous Na₂B₄O₇ 0.2149 Disodium tetraborate pentahydrate Na2B4O7 x 5H20 0.1484 Na2B4O7 x 10H20 Disodium tetraborate decahydrate 0.1134 Disodium octoborate tetrahydrate Na2B8013 x 4H20 0.2096 Sodium metaborate (anhydrous) NaBO₂ 0.1643 Sodium metaborate (dihydrate) NaBO₂ x 2H₂0 0.1062 NaBO₂ x 4H₂0 0.0784 Sodium metaborate (tetrahydrate) Sodium pentaborate (anhydrous) NaB₅O₈ 0.2636 Sodium pentaborate (pentahydrate) NaB5O8 x 5H20 0,1832 PA102765_002 54/127 EN



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If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

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Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)			
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring			
Environmental Release Categories	ERC8c: Wide dispersive ir ERC8d: Wide dispersive o	ndoor use of processing aids in open systems ndoor use resulting in inclusion into or onto a matrix utdoor use of processing aids in open systems utdoor use resulting in inclusion into or onto a matrix		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC8a, ERC8c, ERC8d, ERC8f		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
Amount used	The quantity applied depe support the crop in questic	nds upon that necessary to raise the level in the soil to on		
Frequency and duration of use	Continuous exposure	Fertilizers containing the substance are only used when there are insufficient substance levels in the soil to support crop growth. They tend not to be used in large quantities nor for long periods of time. The use of a substance containing fertiliser will depend upon the requirements of the crop being grown		
Technical conditions and measures at process level	Water	There are no direct releases to adjacent surface waters, Drift should be minimized		
(source) to prevent release Technical onsite conditions and measures to reduce or limit	Soil	Used on soils which have low concentrations of the substance		
discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site				
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Substance containing waste shall be handled as hazardous waste and removed by licensed waste removal company, incinerated or recycled		
2.2 Contributing scenario co	<u> </u>			
Activity	Fertigation using liquid ferti			
Product characteristics	Concentration of the Substance in	Concentration of substance in product: 0,01 % - 36,0 %		
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	Mixture/Article		
	Physical Form (at time of use)	liquid	
Amount used	The amount of fertiliser used at any one time will depend on the area to be fertilised, but is likely to be several tonnes		
Frequency and duration of use	The system runs constantly, with IBC's being changed over once or twice per week(PROC2)		
Technical conditions and measures to control dispersion from source towards the worker	IBC's or silos containing the liquid fertiliser should be connected to a fertigation system which automatically irrigates and fertilises plants in fields or greenhouses Use closed dosing, transfer, sampling and application systems including connectors.(PROC2)		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
2.3 Contributing scenario co	ntrolling worker exposu	re for: PROC5, PROC8a	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,06% - 4,5%	
	Physical Form (at time of use)	granules	
Amount used	The amount of fertiliser used at any one time will depend on the area to be fertilised, but is likely to be several tonnes		
Frequency and duration of use	Exposure duration per day	60 min	
1 2	Frequency of use	2 days/year	
Other operational conditions affecting workers exposure	Indoor and outdoor use. Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained (Efficiency: 90 - 95 %) Wear suitable protective clothing. Wear protective gloves.		
2.4 Contributing scenario co		re for: PROC9	
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Activity	Transfer of liquid foliar fertilizer		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,01 $\%$ - 36,0 $\%$	
	Physical Form (at time of use)	Aqueous solution	
Amount used	The amount of fertiliser used at any one time will depend on the area to be fertilised, but is likely to be several tonnes		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently)., The application of liquid foliar fertiliser could be carried out using a knapsack sprayer or a tractor-pulled spraybar, If spraying using a backpack, the worker may need to refill his backpack several times during a shift, probably from a tank taken to the field, If spraying using a spray bar, the tank may need to be refilled several times during a shift. This is likely to be pumped from a tank, or may be gravity filled		
Other operational conditions affecting workers exposure	Outdoor use.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC13	
Activity	Application of liquid foliar fe	rtiliser	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,01 % - 36,0 %	
	Physical Form (at time of use)	liquid	
Amount used	The amount of fertiliser used at any one time will depend on the area to be fertilised, but is likely to be several tonnes		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently)., The application of liquid foliar fertiliser could be carried out using a knapsack sprayer or a tractor-pulled spraybar		
Other operational conditions affecting workers exposure	Outdoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Use a tractor mounted spray bar with closed tractor cab and air condition		
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		

3. Exposure estimation and reference to its source

Environment

Significant emissions to the terrestrial environment are not expected.

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Workers

PROC5, PROC8a Workplace measurements PROC8a, PROC9 MEASE

PROC5, PROC8a Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC8a		Dermal worker exposure	0,014mg/kg bw/day	< 0,001
PROC8a	without gloves, Concentration of substance in product : 0% - 5%	Dermal worker exposure	0,019mg/kg bw/day	< 0,001
PROC5, PROC8a	no respiratory protection (RPE), Direct discharge	Inhalation worker exposure	0,09mg/m³	0,062
PROC5, PROC8a	Solid, high dustiness., (open systems)	Inhalation worker exposure	1,22mg/m ³	0,84
PROC9	application as solution, Concentration of substance in product : 0% - 5%, during 15 mins - 1 hour, Material transfers	Inhalation worker exposure	0,29mg/m³	< 0,001

There is no opportunity for inhalation exposure as the fertiliser is liquid and is fed via closed system to the soil. There may be the opportunity for dermal exposure during changeover of IBCs or during bulk deliveries of liquid fertilisers, when pipework is connected and disconnected.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.



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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)	
Boric acid	H ₃ BO ₃	0,1748	
Boric oxide	B2O3	0,311	
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149	
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484	
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134	
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096	
Sodium metaborate (anhydrous)	NaBO ₂	0,1643	
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062	
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784]
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636	
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832	
If measured data are not available, the (www.ebrc.de/mease.html) to estimate For further information on the assessm Iditional good practice advice beyor	the associated exposu ent method, see: http:/	ure. //www.advancedreachtool.com	
line with the requirements of good agr e substance and the application rate sl quirements.	hould be adjusted acco		
ake care for general good hygiene and	nousekeeping.		



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1. Short title of Exposure Sce	enario 10: Use in buildin	g and construction work	
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)		
Chemical product category	PC0: Other products: PC1: Adhesives, sealants PC9b: Fillers, putties, plasters, modelling clay		
Environmental Release Categories	ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release ERC11a: Wide dispersive indoor use of long-life articles and materials with low release		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC10a, ERC11a	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Amounts used in the EU (tonnes/year)	1,1 Million tonnes/year	
Frequency and duration of use	Continuous exposure	365 days/year, Dispersive use.	
Environment factors not influenced by risk management	Other data.Other information	Local freshwater dilution factor:: 10	
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Water	32000 g/ton of product	
Technical conditions and measures at process level (source) to prevent release	Air	Air emission controls are not applicable as there is no direct release to air.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site			
	Type of Sewage Treatment Plant	Municipal sewage treatment plant	
Conditions and measures related to sewage treatment plant	Flow rate of sewage treatment plant effluent	2.000 m3/d	
	If sites discharge to a municipal STP the concentration of the substance should not exceed 10 mg/l in the municipal STP		
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste in accordance with environmental legislation.	
2.2 Contributing scenario co	ntrolling consumer exp	osure for: PC0, AC4	
Use of substance containing const	truction materials		
Product characteristics	Concentration of the	Covers concentrations up to 0,15%	
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	Substance in Mixture/Article			
	Physical Form (at time of use)	Solid substance		
Frequency and duration of use	Exposure duration per day	480 min		
	Frequency of use	5 days/year		
	Breathing rate	34,7 m3/day(PC0)		
Human factors not influenced by	Body weight	60 kg(PC0)		
risk management	Breathing rate	20 m3/day(AC4)		
	Body weight	60 - 70 kg(AC4)		
Other given operational	Indoor and outdoor use.			
conditions affecting consumers exposure				
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.		
2.3 Contributing scenario co	ntrolling consumer expo	osure for: PC0		
Installation of substance containing	g cellulose insulation			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 18%		
		1		
Frequency and duration of use	Frequency of use	480 minutes/day		
Human factors not influenced by	Breathing rate	34,7 m3/day		
risk management	Body weight	60 kg		
2.4 Contributing scenario co	ntrolling consumer expo	osure for: PC0		
Use in mattresses as flame retarda	ants			
Human factors not influenced by	Adults; bodyweight for adu	It consumers: 60 kg(PC0)		
risk management	Body weight	20 kg(child PC0)		
2.5 Contributing scenario controlling consumer exposure for: PC1, AC8				
Mouthing of card board and oral co				
Product characteristics	Concentration of the	Covers concentrations up to 2%		
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	Substance in Mixture/Article	
	Physical Form (at time of use)	Massive objects
Amount used	Amount used per event (oral exposure)	2 g
Frequency and duration of use	Occasional exposure	
Human factors not influenced by risk management	Body weight	20 kg(child PC1)
	ntrolling consumer expo	osure for: PC9b: Modelling clay, AC10
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 8%
Human factors not influenced by risk management	Body weight	20 kg
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Limit the concentration of the substance to 5,75% Instructions addressed to the consumer via product labelling
	Consumer Measures	Instructions addressed to the consumer via product labelling

3. Exposure estimation and reference to its source

Environment

METALS EUSES IT tool

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC10a, ERC11a		Water	PEC	1021 µg/L	0,505
ERC10a, ERC11a		Sewage treatment plant (STP)	PEC	9644 µg/L	0,964

Consumers

PC0, AC4 Workplace measurements AC4 Estimation based on workplace measurements PC9b Other measured data PC0 Estimation based on published data PC1 Estimation based on measured data

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PC0, AC4		Inhalable dust.	0,34mg/m ³	
PC0	60kg body weight, worst- case	Consumer inhalation exposure	1,72 .10-5 mg/m ³	
AC4		Consumer inhalation exposure	0,0000983mg/kg/da y	
PC0		Consumer inhalation exposure	0,0636mg/kg/day	
PC0	adult	Consumer dermal exposure	1mg/kg/day	
PC0		Consumer inhalation exposure	5,2 .10-6 mg/m ³	
PC0		Consumer oral exposure	0,0028mg/kg/day	
PC0	children	Consumer dermal exposure	1,76mg/kg/day	
PC1	worst-case, child	Consumer oral exposure	0,1mg/kg/day	
PC9b	worst-case, child	Consumer oral exposure	3,87mg/kg/day	
PC9b	worst-case, child	Consumer dermal exposure	0,00438mg/kg/day	

Estimated dermal exposure value is regarded to be negligible. Estimated inhalative exposure value is regarded to be negligible.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.



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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H₃BO₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

The ConsExpo model has been used to estimate consumer exposures unless otherwise indicated. Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES



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1. Short title of Exposure Sc	enario 11: Use as proce	ssing aid	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industria sites		
Process categories	 PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC11: Treatment of articles by dipping and pouring PROC11: PROC11: Use as laboratory reagent PROC11: PROC12: Use as laboratory reagent PROC13: Greasing at high energy conditions and in partly open process PROC13: Greasing at high energy conditions PROC14: Protentially closed processing operations with minerals/metals at elevated temperature; industrial setting PROC22: Open processing and transfer operations with minerals/metals at elevated temperature PROC23: Open processing and transfer operations with minerals/metals at elevated temperature 		
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becomin part of articles		
2.1 Contributing scenario co	ontrolling environmental	exposure for: ERC4	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Annual site tonnage (tons/year):	14 ton(s)/year (Dilution of 10 ERC4)	
Amount used	Annual site tonnage (tons/year):	140 ton(s)/year (Dilution of 100 ERC4)	
	Annual site tonnage (tons/year):	1150 ton(s)/year (Dilution of 1000 ERC4)	
Frequency and duration of use	Continuous exposure	365 days/year	
Environment factors not influenced by risk management	Other data. Other information	Local freshwater dilution factor:: 10	
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	Others date. Others			
	Other data. Other information	Local marine water dilution factor:: 100		
	Dilution Factor (River)	500		
Other given operational conditions affecting	Emission or Release Factor: Air	36562 g/ton of product		
environmental exposure	Emission or Release Factor: Water	1000000 g/ton of product		
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit	Air	Apply technical measures aiming at reducing releases to air., Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber, Ceramic & metal mash filters, PM10 particles are removed		
discharges, air emissions and releases to soil Organizational measures to	Water	Substance specific waste water treatment, Ion exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)		
prevent/limit release from the site				
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant		
to sewage treatment plant	The concentration of the su municipal STP	The concentration of the substance should not exceed 1,75 mg/L in the municipal STP		
Conditions and measures related	Waste treatment	Send back to the process, Substance containing waste shall be handled as hazardous waste and removed by licensed waste removal company, incinerated or recycled		
to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Waste product and empty containers should be disposed of as hazardous waste in accordance with all local and national regulations.		
2.2 Contributing scenario co PROC23	ntrolling worker exposu	re for: PROC1, PROC2, PROC3, PROC22,		
Activity	Potentially closed processir	ng operations at elevated temperature.		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	Powdered substance, granules		
Amount used	The amount used per worker varies from activity to activity			
Frequency and duration of the	Frequency of use	24 hours/day		
Frequency and duration of use	Frequency of use	365 days/year		
Other operational conditions	Indoor use.			
affecting workers exposure	The process temperatures are mainly very high, as these processes inclugilass making, ceramics, steel & alloy making			
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	Use in closed process, no		
Technical conditions and	Ensure that the worker is in a separated (control) room with independent air supply		
measures to control dispersion			
from source towards the worker	Where there are breaches in the closed system, such as pouring and removal of		
	slag in metal production, LEV is used to control fumes.		
	Ensure operatives are trained to minimise exposures.		
Organisational measures to	Regular inspection and maintenance of equipment and machines. Workers in the risky process/areas identified should be trained a) to avoid to		
prevent /limit releases, dispersion	work without respiratory protection and b) to understand the corrosive properties		
and exposure	and, especially, the respiratory inhalation effects and c) to follow the safety		
	procedures instructed by th		
		Wear protective gloves.	
		Safety glasses	
	Equipment cleaning and	or	
	maintenance	Goggles	
		Operatives wear overalls or heavy heat resistant	
Conditions and measures related		clothing	
to personal protection, hygiene		ormation: use respiratory protection with approved	
and health evaluation	filter (P2)		
	or Dentiale filter DO		
	Particle filter:P3	d halmata	
	Use battery-powered air fe	correctly, with a good face fit, will provide sufficient	
	protection	conectly, with a good face iit, will provide sufficient	
2.3 Contributing scenario co		re for: PROC1, PROC2, PROC2	
2.5 Contributing Sechario Co			
	Concentration of the Substance in	Covers percentage substance in the product up to	
Product characteristics	Mixture/Article	100 % (unless stated differently).	
FIDUUCI CHARACIENSIICS			
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	per shift:	1000 kg	
		1000 Kg	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and	Handle substance within a		
measures to control dispersion		to points where emissions occur. in the closed system, such as pouring and removal of	
from source towards the worker		EV is used to control fumes.	
Organisational measures to	Ensure operatives are train		
prevent /limit releases, dispersion		intenance of equipment and machines.	
and exposure			
	Wear protective clothing.		
	Safety shoes		
Conditions and measures related	Safety glasses		
		ormation: use respiratory protection with approved	
and health evaluation	filter (P2)		
	Oľ Dartiala filtor D2		
	Particle filter:P3		
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-	Concentration of the		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations more than 25%	
	Physical Form (at time of use)	Solid, high dustiness	
Frequency and duration of use	Exposure duration per day	< 15 min	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective gloves.		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC4	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations more than 25%	
	Physical Form (at time of use)	Solid, high dustiness	
Frequency and duration of use	Exposure duration per day	15 - 60 min	
Other operational conditions	Indoor use.		
affecting workers exposure	The process temperatures are mainly very high, as these processes include glass making, ceramics, steel & alloy making		
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective gloves. If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn. Particle filter:P2 Particle filter:P3 Use battery-powered air fed helmets These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained		
2.6 Contributing scenario co	ntrolling worker exposu	re for: PROC4, PROC5, PROC8b	
Activity	Covers reloading, mixing or compounding and associated activities in the Proces Categories listed above		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of	Powdered substance, granules	
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	use)		
Amount used	Would vary by requirements and by facility		
Frequency and duration of use	Exposure duration per day	60 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a	mbient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation on furnaces and other work areas with potential dust generation, dust capturing and removal techniques Closed and semi-closed process where appropriate Discharge sacks via suitable vented charge chute. Automate activity where possible. Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure		
Organisational measures to	Ensure operatives are train		
prevent /limit releases, dispersion	Regular inspection and ma	intenance of equipment and machines.	
and exposure	Wear protective clothing.		
	Wear protective clothing. Wear protective gloves. Safety glasses or Goggles		
Conditions and measures related to personal protection, hygiene	In case of dust or aerosol formation: use respiratory protection with approved filter (P2)		
and health evaluation	or Particle filter:P3 These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure that a good face seal can be obtained		
2.7 Contributing scenario cor	ntrolling worker exposu	re for: PROC5	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 5,5%	
	Physical Form (at time of use)	Solids in solution	
Amount used	The amount used per worker varies from activity to activity		
Frequency and duration of use	Only for certain activities with the substance in solution		
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Ensure that task is semi-automated or automated		
Organisational measures to	Ensure operatives are trained to minimise exposures.		
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prevent /limit releases, dispersion and exposure	Regular inspection and maintenance of equipment and machines. Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Wear protective gloves. Safety glasses or Goggles		
2.8 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b	
Activity	Relevant for Cleaning and I	Maintenance	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	ts and by facility	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor and outdoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Worker in separate cabine without specific ventilation Provide extract ventilation to points where emissions occur.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses Wear protective gloves. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.9 Contributing scenario co	ntrolling worker exposu	re for: PROC8b	
Large scale			
Activity	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling storage, unloading, distribution and associated laboratory activities.		
Product characteristics	Concentration of the Substance in Mixture/ArticleCovers percentage substance in the product up to 100 % (unless stated differently).		

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	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Use	40000 kg	
Frequency and duration of use	Exposure duration per day	60 - 120 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at ambient temperature.		
Technical conditions and	Use closed dosing, transfer, sampling and application systems including		
measures to control dispersion from source towards the worker	connectors. Provide dust filtration for air displaced from the silo during filling.		
Organisational measures to	Ensure operatives are train		
prevent /limit releases, dispersion		intenance of equipment and machines.	
and exposure	· · ·	· ·	
	Wear suitable protective cl	othing.	
Conditions and measures related	Wear protective gloves.		
to personal protection, hygiene and health evaluation	Safety glasses or		
	Goggles		
2.10 Contributing scenario	controlling worker expe	osure for: PROC8b	
5	Concentration of the		
	Substance in	Covers the percentage of the substance in the product up to 100 % (unless stated differently).	
Product characteristics	Mixture/Article	product up to 100 % (unless stated differentity).	
	Physical Form (at time of	Powdered substance, granules	
	use)	Fowdered substance, granues	
Amount used	Amount per Use	25 - 200 kg	
Frequency and duration of use	Exposure duration	30 min	
Other operational conditions	Indoor use.		
affecting workers exposure			
Technical conditions and	Canopy hoods over the bat	ths capture and remove steam	
measures to control dispersion			
from source towards the worker			
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are train	intenance of equipment and machines.	
and exposure			
	Complete suit protecting ag	gainst chemicals	
	Wear chemically resistant gloves.		
	Safety goggles		
Conditions and measures related	Wear face protective shield. Conditions and measures related Respiratory protection is not required but is recommended.		
to personal protection, hygiene		le (P1 - P3) has to be established depending on work-	
and health evaluation place related limit values and the actual exposition			
	In case of dust or aerosol formation: use respiratory protection with approve		
	filter (P2)		
	or Particle filter:P3		
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2.11 Contributing scenario	2.11 Contributing scenario controlling worker exposure for: PROC9			
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,11% - 8,6%		
	Physical Form (at time of use)	solid, liquid, pasty		
Amount used	Amount per Day	10000 kg		
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions	Indoor use.			
affecting workers exposure				
Technical conditions and	Automate activity where po	ossible.		
measures to control dispersion	LEV not required			
from source towards the worker	Handling of solids	Provide local exhaust ventilation (LEV).		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3 Wear protective gloves.			
2.12 Contributing scenario controlling worker exposure for: PROC13				
Metal working fluids				
	Concentration of the			

Product characteristics	Substance in Mixture/Article	Covers concentrations up to 1%	
	Physical Form (at time of use)	Solids in solution	
Amount used	Amount per Use	25 - 200 kg	
Frequency and duration of use	Application duration	60 min	
Other energianal conditions	Indoor use.		
Other operational conditions affecting workers exposure	Process temperature	60 °C	
-			
Technical conditions and	Canopy hoods over the baths capture and remove steam		
measures to control dispersion			
from source towards the worker			
Organisational measures to	Ensure operatives are trained to minimise exposures.		
prevent /limit releases, dispersion	Regular inspection and maintenance of equipment and machines.		
and exposure			

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Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. Safety goggles or Wear face protecive shield. Complete suit protecting against chemicals		
2.13 Contributing scenario	controlling worker exposure for: PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 1 %.	
	Physical Form (at time of use)	Solid in solution	
Amount used	Amount per Application	50 I	
Frequency and duration of use	Exposure duration	12 min	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Ensure that task is semi-au	utomated or automated	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
2.14 Contributing scenario	controlling worker exp	osure for: PROC14	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Provide local exhaust ventilation (LEV). Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved		
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Г	filter (DO)		
	filter (P2) or		
	Particle filter:P3		
2.15 Contributing scenario	controlling worker expo	osure for: PROC15	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Use	1 kg	
Frequency and duration of use	Sometimes during the work	ing day, only for short periods of time	
Technical conditions and measures to control dispersion from source towards the worker	Handle within a fume cupbo minimise exposure.	pard or implement suitable equivalent methods to	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train Regular inspection and ma	ed to minimise exposures. intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses Wear protective gloves.		
2.16 Contributing scenario	controlling worker expo	osure for: PROC17, PROC24	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 5,5%	
	Physical Form (at time of use) Solids in solution		
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions	Indoor use.		
affecting workers exposure	Process may involve high t		
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). Closed process and closed circuits where relevant and possible A switch integrated with the machine should prevent the enclosure being opened while the machine is used There should also be a time delay so that the LEV has time to remove the aerosol before the enclosure is opened		
Organisational measures to prevent /limit releases, dispersion and exposure	Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes. Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses		
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	or Safety goggles		
	In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or		
	Particle filter:P3		
2.17 Contributing scenario	controlling worker expe	osure for: PROC18	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0% - 0,01%	
	Physical Form (at time of use)	pasty	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions	Indoor use.		
affecting workers exposure	Process may involve high t	emperature	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). Use a receptor hood for fumes/vapours. Closed and semi-closed process where appropriate There should also be a time delay so that the LEV has time to remove the aerosol before the enclosure is opened		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train Regular inspection and ma	ed to minimise exposures. intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety goggles or Wear face protecive shield.		
2.18 Contributing scenario	controlling worker expe	osure for: PROC19	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 5 %.	
	Physical Form (at time of use)	solid, liquid	
Amount used	Amount per Application	50 I	
Frequency and duration of use	Application duration	5 - 10 min	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train	ed to minimise exposures.	
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3. Exposure estimation and reference to its source

Environment

Estimation based on workplace measurements

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	Dilution of 10, Dilution of 100	Water	PEC	1974µg/L	0,977
ERC4	Dilution of 10	Soil	PEC	0,07mg/kg dry weight (d.w.)	0,013
ERC4	Dilution of 1000	Water	PEC	1575µg/L	0,954
ERC4	Dilution of 1000	Soil	PEC	5,15mg/kg dry weight (d.w.)	0,954
ERC4	Dilution of 100	Soil	PEC	0,63mg/kg dry weight (d.w.)	0,117

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC17, PROC22, PROC23, PROC24 Workplace measurements

PROC2, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC14, PROC15, PROC17, PROC19, PROC23 MEASE

PROC4, PROC8b, PROC9 Advanced REACH Tool (ART model)

PROC1, PROC14, PROC15, PROC18, PROC19 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC22, PROC23	90th percentile value, without respiratory protection, Elevated process temperature	Inhalation worker exposure	0,08mg/m³	0,06
PROC23	with local exhaust ventilation, With face shield, Elevated process temperature	Inhalation worker exposure	0,01mg/m³	0,0069
PROC2	Solid, high dustiness., during 15 mins - 1 hour, Elevated process temperature	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC1, PROC2, PROC3	90th percentile value	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001

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PROC2		Dermal worker exposure	0,002mg/kg bw/day	
PROC4		Dermal worker exposure	0,48mg/kg bw/day	
PROC4, PROC5	90th percentile value, small scale	Inhalation worker exposure	0,78mg/m ³	0,54
PROC4	Solid, high dustiness., during 15 mins - 1 hour, small scale	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC4, PROC5, PROC8b	90th percentile value, With respiratory protection, half mask, Large scale	Inhalation worker exposure	0,2mg/m³	0,14
PROC4	Solid, high dustiness., during 15 mins - 1 hour, with local exhaust ventilation, Large scale	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC5	during 15 mins - 1 hour, Concentration: 1%	Dermal worker exposure	0,005mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE), Relevant for Cleaning and Maintenance	Inhalation worker exposure	1,33mg/m³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours, Relevant for Cleaning and Maintenance	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b	Large scale	Inhalation worker exposure	0,016mg/m³	0,011
PROC8b	with local exhaust ventilation, 90th percentile value, Large scale	Inhalation worker exposure	0,03mg/kg bw/day	0,021
PROC2	Solid, high dustiness., during <15 mins, Large scale	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC8b	without respiratory protection	Inhalation worker exposure	0,78mg/m ³	0,54
PROC8b	Solid, high dustiness., during 15 mins - 1 hour, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,288mg/kg bw/day	< 0,001
PROC9	with local exhaust ventilation, Small package filling, solid	Inhalation worker exposure	0,4mg/m³	0,28
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PROC9	liquid, with local exhaust ventilation	Dermal worker exposure	0,01mg/m ³	0,007
PROC9	Solid, high dustiness.	Dermal worker exposure	1,44mg/kg bw/day	< 0,001
PROC9	liquid	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
PROC4	liquid, Concentration: 1%, during 15 mins - 1 hour, Manual, Additive premixing, Plating	Inhalation worker exposure	0,048mg/kg bw/day	< 0,001
PROC19	application as solution, Concentration: 1%, without gloves, during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC14	Measured exposure data	Inhalation worker exposure	1,3mg/m ³	0,9
PROC14	90th percentile value, with local exhaust ventilation	Inhalation worker exposure	0,15mg/m³	0,10
PROC14	Solid, high dustiness.	Dermal worker exposure	2,4mg/kg bw/day	< 0,001
PROC15	90th percentile value	Inhalation worker exposure	0,16mg/m ³	0,11
PROC15	Solid, high dustiness., Concentration of substance in product: 5% - 25%, without gloves	Dermal worker exposure	0,014mg/kg bw/day	< 0,001
PROC17, PROC24	90th percentile value	Inhalation worker exposure	< 0,01mg/m ³	0,007
PROC17, PROC24		Inhalation worker exposure	0,07mg/m ³	0,048
PROC17	Concentration: 1%, without gloves, liquid	Dermal worker exposure	2,4mg/kg bw/day	< 0,001
PROC18	with local exhaust ventilation	Inhalation worker exposure	0,0017mg/m ³	0,0012
PROC10	during 15 mins - 1 hour, Concentration: 1%, liquid, Manual, Application	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC19	Powdery developer formulations, Powdery fixer formulation	Inhalation worker exposure	0,001mg/m ³	< 0,001
PROC19	Solid, high dustiness., during <15 mins, Concentration of substance in product : 0% - 5%	Dermal worker exposure	0,198mg/kg bw/day	< 0,001
PROC19	application as solution,	Dermal worker exposure	0,024mg/kg bw/day	< 0,001



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Concentration of substance in product : 0% - 5%, during <15 mins

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Predicted exposures are not expected to exceed the applicable exposure limits when the operational conditions/risk management measures given in section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.

For further information on the assessment method, see: http://www.advancedreachtool.com

Additional good practice advice beyond the REACH Chemical Safety Assessment

Take care for general good hygiene and housekeeping.

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1. Short title of Exposure Sco	enario 12: Use as reactiv	ve process agent or use as catalyst	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites		
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities		
Environmental Release Categories	ERC6a: Industrial use resu intermediates)	ERC1: Manufacture of substances ERC6a: Industrial use resulting in manufacture of another substance (use of	
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC1, ERC6a, ERC6b	
Activity	Application in a closed sys	tem	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 1 %.	
Amount used	Typical amount of one batch	3 tonnes	
Frequency and duration of use	Continuous exposure	7 - 21 days/year	
Environment factors not influenced by risk management	Other data. Other information	Local freshwater dilution factor:: 10	
Technical conditions and measures at process level	No releases		
(source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site			
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater.		
Conditions and measures related to external treatment of waste for disposal	Disposal methods Solid wastes contaminated are collected into containers and sent to external waste disposal facilities		
2.2 Contributing scenario co PROC8a, PROC8b	ntrolling worker exposu	rre for: PROC1, PROC2, PROC3, PROC4,	
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No exposure assessment presented for human health.

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Workers

no exposure expected.

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

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For further information on the assessment method, see: http://www.ecetoc.org/tra

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1. Short title of Exposure Sce	enario 13: Manufacture o	of catalysts	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites		
Process categories	PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation		
Environmental Release Categories	ERC1: Manufacture of substances ERC3: Formulation in materials ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids		
2.1 Contributing scenario co	ntrolling environmental	exposure for: ERC1, ERC3, ERC6a, ERC6b	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Annual tonnage	200 ton(s)/year	
Frequency and duration of use	Continuous exposure	330 days/year	
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	No discharge of substance into waste water	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal.	
2.2 Contributing scenario co	ntrolling environmental	exposure for: ERC1, ERC3, ERC6a, ERC6b	
Activity	Manufacture of catalysts		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
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Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.	
Technical conditions and measures to control dispersion from source towards the worker	Use in closed process Where there are breaches in the closed system, such as pouring and removal slag in metal production, LEV is used to control fumes.	
Other operational conditions affecting workers exposure	Indoor use.	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).
Amount used	Amount per Shift	1000 kg
	Physical Form (at time of use)	Powdered substance, granules
2.3 Contributing scenario co Product characteristics	ntrolling worker exposu Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Disposal methods	containers for disposal.
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Substance containing waste shall be handled as hazardous waste and removed by licensed waste removal company, incinerated or recycled Vacuum up spillage and collect in suitable
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
Organizational measures to prevent/limit release from the site		
discharges, air emissions and releases to soil		echnologies are required to minimize emissions and ng cleaning and maintenance procedures
Technical onsite conditions and measures to reduce or limit	Water	Maximize waste water reuse.
environmental exposure Technical conditions and measures at process level (source) to prevent release	Air	Treatment of air emissions by bag filters, fabric filter and wet scrubber, High efficiency particulate air filter (HEPA filter), ceramic filters
Other given operational conditions affecting	Emission or Release Factor: Air	2,7 g/ton of product
Environment factors not influenced by risk management	Other data. Other information	Local freshwater dilution factor:: 10
Frequency and duration of use	Continuous exposure	330 days/year
Amount used	Annual amount per site	200 ton(s)/year



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Activity	Covers reloading, mixing or Categories listed above	compounding and associated activities in the Process	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	ts and by facility	
Frequency and duration of use	Exposure duration	60 min	
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Assumes activities are at ambient temperature. Use in closed process Provide extract ventilation to points where emissions occur. Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC8b	
Large scale			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Use	40000 kg	
Frequency and duration of use	Exposure duration	120 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Use in closed process		
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		



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and exposure Conditions and measures related Wear suitable protective clothing. to personal protection, hygiene and health evaluation 2.6 Contributing scenario controlling worker exposure for: PROC8a, PROC8b Relevant for Cleaning and Maintenance Activity Concentration of the Covers percentage substance in the product up to Substance in 100 % (unless stated differently). Mixture/Article Product characteristics Physical Form (at time of Powdered substance, granules use) Amount used Would vary by requirements and by facility Frequency and duration of use Covers daily exposures up to 8 hours (unless stated differently). Indoor and outdoor use. Other operational conditions affecting workers exposure Technical conditions and Worker in separate cabine without specific ventilation measures to control dispersion Provide extract ventilation to material transfer points and other openings. from source towards the worker Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines and exposure Wear suitable protective clothing. Safety shoes Conditions and measures related Safety glasses to personal protection, hygiene In case of dust or aerosol formation: use respiratory protection with approved and health evaluation filter (P2) or Particle filter:P3 2.7 Contributing scenario controlling worker exposure for: PROC9 Concentration of the Concentration of substance in product: 0,11% -Substance in 8.6% Mixture/Article Product characteristics Physical Form (at time of solid, liquid, pasty use) Amount used Amount per Use 10000 ka Covers daily exposures up to 8 hours (unless stated differently). Frequency and duration of use Technical conditions and Handling of solids Provide local exhaust ventilation (LEV). measures to control dispersion from source towards the worker Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines. and exposure Conditions and measures related Wear protective clothing. to personal protection, hygiene In case of dust or aerosol formation: use respiratory protection with approved and health evaluation filter (P2) PA102765_002 87/127 ΕN



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	or			
	Particle filter:P3			
2.8 Contributing scenario co	2.8 Contributing scenario controlling worker exposure for: PROC14			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	Powdered substance, granules		
Amount used	The amount used per work	er varies from activity to activity		
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).			
Other operational conditions	Indoor use.			
affecting workers exposure				
Technical conditions and	Handle substance within a closed system.			
measures to control dispersion from source towards the worker				
Organisational measures to	Ensure operatives are train			
prevent /limit releases, dispersion and exposure	Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3			
3. Exposure estimation and	reference to its source			

Environment

ERC1, ERC3, ERC6a, ERC6b Workplace measurements ERC1, ERC3, ERC6a, ERC6b MEASE

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1, ERC3, ERC6a, ERC6b		Soil	PEC	0,01mg/kg dry weight (d.w.)	0,001
ERC1, ERC3, ERC6a, ERC6b		Soil	PEC	0,01mg/kg dry weight (d.w.)	0,001

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8b, PROC9, PROC14 Workplace measurements PROC2, PROC4, PROC8a, PROC8b, PROC9, PROC14 MEASE PROC8a, PROC8b, PROC9, PROC14 Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value, no respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06
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	(RPE)			
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC4	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC4, PROC5	90th percentile value, small scale	Inhalation worker exposure	0,78mg/m ³	0,54
PROC4, PROC5 PROC8b	90th percentile value, With respiratory protection, half mask, Large scale	Inhalation worker exposure	0,2mg/m³	0,14
PROC4	Solid, high dustiness., during 15 mins - 1 hour, Large scale	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC8b		Inhalation worker exposure	0,016mg/m ³	0,011
PROC8b	90th percentile value, with local exhaust ventilation	Dermal worker exposure	0,03mg/m ³	0,021
PROC8b	Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024µg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC9	90th percentile value, with local exhaust ventilation, no respiratory protection (RPE)	Inhalation worker exposure	0,4mg/m³	0,28
PROC9	90th percentile value, with local exhaust ventilation	Inhalation worker exposure	0,01mg/m³	0,007
PROC9	Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	1,44mg/kg bw/day	< 0,001
PROC9	application as solution, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
PROC14		Inhalation worker exposure	1,3mg/m ³	0,9
PROC14	with local exhaust	Inhalation worker	0,15mg/m ³	0,1



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	ventilation, 90th percentile value	exposure		
PROC14	Solid, high dustiness.	Dermal worker exposure	2,4mg/kg bw/day	< 0,001

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.

For further information on the assessment method, see: http://www.advancedreachtool.com

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H₃BO₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832



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1. Short title of Exposure Sc	enario 14: Use as a proc	cess chemical	
Main User Groups	SU 3: Industrial uses: Use sites	es of substances as such or in preparations at industrial	
Process categories	 PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation PROC22: Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting PROC23: Open processing and transfer operations with minerals/metals at elevated temperature 		
Environmental Release Categories	ERC6b: Industrial use of r	eactive processing aids	
2.1 Contributing scenario co	ontrolling environmenta	l exposure for: ERC6b	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
Amount used	Annual amount per site	29 ton(s)/year	
Energy and dynation of your			
Frequency and duration of use	Continuous exposure	358 days/year	
	Continuous exposure Other data. Other information	358 days/year Local freshwater dilution factor:: 10	
Environment factors not influenced by risk management	Other data. Other		
Environment factors not	Other data. Other information Other data. Other	Local freshwater dilution factor:: 10	
Environment factors not influenced by risk management Other given operational	Other data. Other information Other data. Other information	Local freshwater dilution factor:: 10 Local marine water dilution factor:: 100	
Environment factors not influenced by risk management	Other data. Other information Other data. Other information Dilution Factor (River) Emission or Release	Local freshwater dilution factor:: 10 Local marine water dilution factor:: 100 500	
Environment factors not influenced by risk management Other given operational conditions affecting	Other data. Other information Other data. Other information Dilution Factor (River) Emission or Release Factor: Air Emission or Release	Local freshwater dilution factor:: 10 Local marine water dilution factor:: 100 500 1000 g/ton of product	



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measures to reduce or limit discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Ion exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)
Organizational measures to prevent/limit release from the site		
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant
to sewage treatment plant	The concentration of the sum municipal STP	ibstance should not exceed 1,75 mg/L in the
Conditions and measures related to external treatment of waste for	Waste treatment	Send back to the process, Substance containing waste shall be handled as hazardous waste and removed by licensed waste removal company, incinerated or recycled
disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal.
2.2 Contributing scenario co	ntrolling worker exposu	re for: PROC1, PROC2, PROC3
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	Powdered substance, granules
Amount used	Amount per Shift	1000 kg
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).
Other operational conditions	Indoor use.	
affecting workers exposure	Assumes activities are at a	
Technical conditions and measures to control dispersion from source towards the worker	Use product only in closed system. Use closed dosing, transfer, sampling and application systems including connectors. Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3	
2.3 Contributing scenario con PROC23	ntrolling worker exposu	re for: PROC1, PROC2, PROC3, PROC22,
Activity	Potentially closed processin	g operations at elevated temperature.
Product characteristics	Concentration of the Substance in	Covers percentage substance in the product up to 100 % (unless stated differently).
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Amount used	Physical Form (at time of use)	Powdered substance, granules		
	'			
	The amount used per worker varies from activity to activity			
Fraguanay and duration of usa	Frequency of use	24 hours/day		
Frequency and duration of use	Frequency of use	365 days/year		
Other operational conditions	Indoor use.			
affecting workers exposure	The process temperatures are mainly very high, as these processes include glass making, ceramics, steel & alloy making			
Technical conditions and measures to control dispersion from source towards the worker	connectors. Worker in separate cabine Where there are breaches	r, sampling and application systems including without specific ventilation in the closed system, such as pouring and removal of EV is used to control fumes.		
Organisational measures to prevent /limit releases, dispersion and exposure	Regular inspection and ma Workers in the risky proces work without respiratory pro-	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the irritating properties and, especially, the respiratory inhalation effects and c) to follow the safer		
Conditions and measures related to personal protection, hygiene and health evaluation				
	Equipment cleaning and maintenance	Wear protective gloves. Safety glasses Safety goggles		
2.4 Contributing scenario co	ntrolling worker exposu	re for: PROC4, PROC5, PROC8b		
Activity	Covers reloading, mixing or Categories listed above	compounding and associated activities in the Process		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	Powdered substance, granules		
Amount used	Would vary by requirement	s and by facility		
Frequency and duration of use	Application duration	60 min		
Other operational conditions	Indoor use.			
affecting workers exposure	Assumes activities are at a	mbient temperature.		



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Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Provide local exhaust ventilation (LEV). Discharge sacks via suitable vented charge chute. Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. This removes the operator from the immediate vicinity and contributes to a reduction in exposure		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train Regular inspection and ma	ed to minimise exposures. intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Wear protective gloves. Safety glasses Safety goggles In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b	
Activity	Equipment maintenance		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	s and by facility	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions affecting workers exposure	Indoor and outdoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Worker in separate cabine without specific ventilation Provide extract ventilation to points where emissions occur.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective shoes. Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.6 Contributing scenario co		re for: PROC8b	
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Large scale

Activity	Bulk loading (including marine vessel/barge, rail/road car and IBC loading)		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	0
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Application	40000 kg	
Frequency and duration of use	Application duration 120 min		
Other operational conditions affecting workers exposure	Indoor use. Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion	Use closed dosing, transfer, sampling and application systems including connectors. Automate activity where possible. Provide dust filtration for air displaced from the silo during filling. Provide local exhaust ventilation (LEV). Ensure operatives are trained to minimise exposures.		
and exposure	n Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses Goggles		
2.7 Contributing scenario co	ntrolling worker exposu	re for: PROC9	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 0,11% - 8,6%	
	Physical Form (at time of use)	solid, liquid, pasty	
Amount used	Amount per Day	10000 kg	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Provide local exhaust ventilation (LEV).		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
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2.0 Contributing Sectiant Co	ntrolling worker exposu	re for: PRUC14	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).		
Other operational conditions affecting workers exposure	Indoor use.		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Provide local exhaust ventilation (LEV).		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
2.9 Contributing scenario co	ntrolling worker exposu	re for: PROC15	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Application 1 kg		
Frequency and duration of use	Sometimes during the working day, only for short periods of time		
Technical conditions and measures to control dispersion from source towards the worker	Handle in a fume cupboard	l or under extract ventilation.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene	Wear a laboratory coat Safety shoes Safety glasses		

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Environment

Estimation based on workplace measurements

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6b		Fresh water	PEC	259µg/L	0,19
ERC6b		Fresh water sediment	PEC	1,74mg/kg	0,97
ERC6b		Soil	PEC	0,008mg/kg	0,001

Workers

PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC22, PROC23 Workplace measurements

PROC2, PROC4, PROC8a, PROC8b, PROC9, PROC14, PROC23 MEASE

PROC8b Advanced REACH Tool (ART model)

PROC1, PROC9, PROC14 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	0,08mg/m ³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC1, PROC2, PROC3, PROC22, PROC23	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	0,08mg/m³	0,06
PROC23	Solid, low dustiness., during <15 mins, With face shield	Inhalation worker exposure	0,01mg/kg bw/day	0,0069
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, small scale	Inhalation worker exposure	0,78mg/m ³	0,54
PROC4	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m ³	0,92
PROC8a, PROC8b	Solid, high dustiness., during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b		Inhalation worker	0,016mg/m ³	0,011
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		exposure		
PROC8b	Outdoor use., with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,03mg/m³	0,021
PROC2	Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC9	with local exhaust ventilation, no respiratory protection (RPE)	Inhalation worker exposure	0,4mg/m³	0,28
PROC9	90th percentile value, liquid, with local exhaust ventilation	Inhalation worker exposure	0,01mg/m³	0,007
PROC9	Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	1,44mg/kg bw/day	< 0,001
PROC9	liquid, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,144mg/kg bw/day	< 0,001
PROC14		Inhalation worker exposure	1,3mg/m ³	0,90
PROC14	90th percentile value, with local exhaust ventilation	Inhalation worker exposure	0,15mg/m³	0,10
PROC14	Solid, high dustiness.	Dermal worker exposure	2,4mg/kg bw/day	< 0,001
PROC15	90th percentile value	Inhalation worker exposure	0,16mg/m ³	0,11
PROC14	Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,014mg/kg bw/day	< 0,001

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

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Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

Additional good practice advice beyond the REACH Chemical Safety Assessment

Take care for general good hygiene and housekeeping.



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1. Short title of Exposure Sco	-	es of substances as such or in preparations at industrial		
Main User Groups	sites	sites		
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent PROC22: Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting PROC23: Open processing and transfer operations with minerals/metals at elevated temperature			
Environmental Release Categories	ERC2: Formulation of preparations ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)			
2.1 Contributing scenario co	ntrolling environmenta	l exposure for: ERC2, ERC5, ERC6a		
Activity	Glass wool production			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
Amount used	Annual amount per site	15000 ton(s)/year		
Frequency and duration of use	Continuous exposure	365 days/year		
Other given operational conditions affecting	Emission or Release Factor: Air	2827 g/ton of product		
environmental exposure	Emission or Release Factor: Water	0 g/ton of product		
Technical conditions and measures at process level (source) to prevent release	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filters, Bag filters, Fabric filter		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness: 40 - 90 %)		
Organizational measures to prevent/limit release from the site				
Conditions and measures related to sewage treatment plant	Not applicable as there is	no release to wastewater.		
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Prevent environmental discharge consistent with regulatory requirements.		
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2.2 Contributing scenario controlling environmental exposure for: ERC2, ERC5, ERC6a

Activity	Glass made by electric me	lting	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 100 % (unless stated differently).	
Amount used	Annual amount per site	15000 ton(s)/year (No water emissions ERC2, ERC5, ERC6a)	
Frequency and duration of use	Continuous exposure	365 days/year	
Other given operational	Emission or Release Factor: Air	392 g/ton of product	
conditions affecting environmental exposure	Emission or Release Factor: Water	0 g/ton of product	
Technical conditions and measures at process level (source) to prevent release	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filters, Bag filters, Fabric filter (Efficiency: 64 - 99 %)	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Reverse osmosis, Ion exchange (Degradation effectiveness: 40 - 90 %)	
Organizational measures to prevent/limit release from the site			
Conditions and measures related to sewage treatment plant	Not applicable as there is no release to wastewater.		
Conditions and measures related	Waste treatment	Send back to the process	
to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Prevent environmental discharge consistent with regulatory requirements.	

2.3 Contributing scenario controlling environmental exposure for: ERC2, ERC5, ERC6a

Product characteristics Su Mi	oncentration of the ubstance in lixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
Amount used An	nnual amount per site	5300 ton(s)/year (No water emissions ERC2, ERC5, ERC6a)
Frequency and duration of use Co	ontinuous exposure	365 days/year
Other given operational	mission or Release actor: Air	10896 g/ton of product
	mission or Release actor: Water	0 g/ton of product
Technical conditions and measures at process level Air (source) to prevent release	ir	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, ceramic filters, Bag filters, Fabric filter (Efficiency: 85 - 99 %)
Technical onsite conditions and		

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measures to reduce or limit Substance specific waste water treatment, Reverse discharges, air emissions and Water osmosis, Ion exchange (Degradation effectiveness: releases to soil 40 - 90 %) Organizational measures to prevent/limit release from the site Conditions and measures related Not applicable as there is no release to wastewater. to sewage treatment plant Substance containing waste shall be handled as Waste treatment hazardous waste and removed by licensed waste Conditions and measures related removal company, incinerated or recycled to external treatment of waste for Vacuum up spillage and collect in suitable disposal **Disposal methods** containers for disposal., Prevent environmental discharge consistent with regulatory requirements. 2.4 Contributing scenario controlling environmental exposure for: ERC2, ERC5, ERC6a Glass with a low alkali ratio, gas melting Activity Concentration of the Covers percentage substance in the product up to Product characteristics Substance in 100 % (unless stated differently). Mixture/Article 1150 ton(s)/year (No water emissions ERC2, Annual amount per site Amount used ERC5, ERC6a) Frequency and duration of use Continuous exposure 365 days/year Emission or Release 36562 g/ton of product Other given operational Factor: Air conditions affecting Emission or Release environmental exposure 0 g/ton of product Factor: Water Technical conditions and Substance specific waste air treatment:, measures at process level Air Electrostatic precipitation, Cyclones, ceramic filters, (source) to prevent release Bag filters, Fabric filter (Efficiency: 36 - 52 %) Technical onsite conditions and Substance specific waste water treatment, Reverse measures to reduce or limit Water osmosis, Ion exchange (Degradation effectiveness: discharges, air emissions and 40 - 90 %) releases to soil Organizational measures to prevent/limit release from the site Conditions and measures related Not applicable as there is no release to wastewater. to sewage treatment plant Send back to the process, Treat all waste as hazardous waste, Substance containing waste shall Waste treatment be handled as hazardous waste and removed by Conditions and measures related licensed waste removal company, incinerated or to external treatment of waste for recycled disposal Vacuum up spillage and collect in suitable **Disposal methods** containers for disposal., Prevent environmental discharge consistent with regulatory requirements. 2.5 Contributing scenario controlling worker exposure for: PROC8a, PROC8b PA102765_002 102/127 ΕN



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Activity	Equipment maintenance	1		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use) granules, Powder			
Amount used	Would vary by requirements and by facility			
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently).			
Other operational conditions affecting workers exposure	Indoor and outdoor use.			
Technical conditions and measures to control dispersion from source towards the worker Organisational measures to prevent /limit releases, dispersion and exposure	Use closed dosing, transfer, sampling and application systems including connectors. Worker in separate cabine without specific ventilation Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses Wear respiratory protection. Particle filter:P2 or Particle filter:P3			
	Particle filter:P3			
2.6 Contributing scenario co		re for: PROC8b		
2.6 Contributing scenario co		re for: PROC8b		
	ntrolling worker exposu	essel/barge, rail/road car and IBC loading) and		
Large scale	ntrolling worker exposu	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling		
Large scale	Loading (including marine v repacking (including drums storage, unloading, distribut Concentration of the Substance in	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to		
Large scale Activity Product characteristics	Loading (including marine v repacking (including drums storage, unloading, distribut Concentration of the Substance in Mixture/Article Physical Form (at time of	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently).		
Large scale Activity Product characteristics	ntrolling worker exposu	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently). granules, Powder		
Large scale Activity Product characteristics Amount used Frequency and duration of use Other operational conditions	Itrolling worker exposu Loading (including marine v repacking (including drums storage, unloading, distribut Concentration of the Substance in Mixture/Article Physical Form (at time of use) Amount per Use Exposure duration Indoor use.	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently). granules, Powder 40000 kg 120 min		
Large scale Activity Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure	ntrolling worker exposu	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently). granules, Powder 40000 kg 120 min mbient temperature.		
Large scale Activity Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure Technical conditions and measures to control dispersion from source towards the worker	ntrolling worker exposu Loading (including marine v repacking (including drums storage, unloading, distribut Concentration of the Substance in Mixture/Article Physical Form (at time of use) Amount per Use Exposure duration Indoor use. Assumes activities are at a Provide dust filtration for ai	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently). granules, Powder 40000 kg 120 min mbient temperature. r displaced from the silo during filling.		
Large scale Activity Product characteristics Amount used Frequency and duration of use Other operational conditions affecting workers exposure	ntrolling worker exposu Loading (including marine v repacking (including drums storage, unloading, distribut Concentration of the Substance in Mixture/Article Physical Form (at time of use) Amount per Use Exposure duration Indoor use. Assumes activities are at a Provide dust filtration for ai Ensure operatives are train	essel/barge, rail/road car and IBC loading) and and small packs) of substance, including its sampling ion and associated laboratory activities. Covers percentage substance in the product up to 100 % (unless stated differently). granules, Powder 40000 kg 120 min mbient temperature. r displaced from the silo during filling.		



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Wear protective clothing. Conditions and measures related Safety glasses to personal protection, hygiene Safety goggles and health evaluation Wear protective gloves. 2.7 Contributing scenario controlling worker exposure for: PROC15 Concentration of the Covers percentage substance in the product up to Substance in 100 % (unless stated differently). Product characteristics Mixture/Article Physical Form (at time of granules, Powder use) 1 kg Amount used Amount per Use Frequency and duration of use Several times during the working day, only for short periods of time Technical conditions and Handle in a fume cupboard or under extract ventilation. measures to control dispersion from source towards the worker Organisational measures to Ensure operatives are trained to minimise exposures. prevent /limit releases, dispersion Regular inspection and maintenance of equipment and machines. and exposure Wear protective clothing. Conditions and measures related Safety shoes to personal protection, hygiene Safety glasses and health evaluation Wear protective gloves. 2.8 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC22, PROC23

PRUGZS			
Activity	Potentially closed processir	g operations at elevated temperature.	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	granules, Powder	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of upo	Frequency of use	24 hours/day	
Frequency and duration of use	Frequency of use	365 days/year	
Other operational conditions	Indoor use.		
affecting workers exposure	The process temperatures are mainly very high, as these processes include glass making, ceramics, steel & alloy making		
Technical conditions and measures to control dispersion from source towards the worker	 Worker in separate cabine without specific ventilation Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Where there are breaches in the closed system, such as pouring and removal c slag in metal production, LEV is used to control fumes. Use product only in closed system. 		
Organisational measures to prevent /limit releases, dispersion	Ensure operatives are trained to minimise exposures.		
and exposure			
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Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses Safety goggles If no adequate ventilation is available: Wear respiratory protection. Particle filter:P2 or Particle filter:P3		
2.9 Contributing scenario co	ntrolling worker exposu	re for: PROC1, PROC2, PROC3	
Product characteristics	Concentration of the Substance in Mixture/ArticleCovers percentage substance in the product 100 % (unless stated differently).		
	Physical Form (at time of use)	granules, Powder	
Amount used	Amount per Shift 1000 kg		
Frequency and duration of use	Exposure duration per 60 - 240 min		
Human factors not influenced by risk management	Exposed skin surface	1980 cm ²	
Other operational conditions affecting workers exposure	Indoor use.	mbiont tomporature	
Technical conditions and measures to control dispersion from source towards the worker	Assumes activities are at ambient temperature. Provide local exhaust ventilation (LEV). Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Safety shoes Safety glasses Wear respiratory protection. In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
3. Exposure estimation and	reference to its source		

Environment

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Scenario	specific conditions	Compartment	Value	Level of Exposure	RCR
	o water discharge to environment,	Soil	PEC	5,20mg/kg dry weight (d.w.)	0,962

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	I				
	Production of glass wool				
ERC2, ERC5, ERC6a	Glass made by electric melting, No water discharge to the environment	Soil	PEC	0,54mg/kg dry weight (d.w.)	0,100
ERC2, ERC5, ERC6a	Glass with a high alkali ratio, gas melting, No water discharge to the environment	Soil	PEC	5,25mg/kg dry weight (d.w.)	0,97
ERC2, ERC5, ERC6a	Glass with a low alkali ratio, gas melting	Soil	PEC	5,26mg/kg dry weight (d.w.)	0,97

Workers

PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, PROC22 Workplace measurements PROC2, PROC8a, PROC14, PROC23 MEASE PROC8b Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC8a, PROC8b	90th percentile value, without respiratory protection	Inhalation worker exposure	1,33mg/m³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b	Indoor use., with local exhaust ventilation, 90th percentile value	Inhalation worker exposure	0,03mg/m ³	0,021
PROC2	Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC15	90th percentile value	Inhalation worker exposure	0,16mg/m ³	0,11
PROC14	without gloves, Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,014mg/kg bw/day	< 0,001
PROC22	without respiratory protection, 90th percentile value	Inhalation worker exposure	0,08mg/m³	0,06
PROC23	Solid, low dustiness., Concentration of substance in product : 0% - 5%, With face shield	Inhalation worker exposure	0,01mg/m ³	0,0069
PROC2	Solid, high dustiness.,	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
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	Concentration of substance in product: 5% - 25%, during 15 mins - 1 hour			
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg/day	< 0,001
PROC1, PROC2, PROC3	90th percentile value, without respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.

For further information on the assessment method, see: http://www.ebrc.de/mease.html

For scaling see: http://www.arche-consulting.be/metal-CSA-toolbox/du-scaling tool

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H ₃ BO ₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

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1. Short title of Exposure Scenario 16: Use in nuclear power plants

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC15: Use as laboratory reagent
Environmental Release Categories	ERC7: Industrial use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC7

Use in nuclear power plants without releases to water

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
Amount used	Annual amount per site	15000 ton(s)/year
Frequency and duration of use	Continuous exposure	75 days/year
Other given operational	Emission or Release Factor: Air	400 g/ton of product
conditions affecting environmental exposure	Emission or Release Factor: Water	0 g/ton of product
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Air	Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber, Ceramic & metal mash filters, PM10 particles are removed
	Water	Wastewater emission controls are not applicable as there is no direct release to wastewater.
Organizational measures to prevent/limit release from the site		
	Waste treatment	Send back to the process
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Waste product and empty containers should be disposed of as hazardous waste in accordance with all local and national regulations.
Conditions and measures related	Recovery Methods	There is no envisaged external recovery of waste.
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to external recovery of waste

2.2 Contributing scenario controlling environmental exposure for: ERC7

Use in nuclear power plants with releases to water after onsite treatment

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
Amount used	Annual amount per site	13000 ton(s)/year
Frequency and duration of use	Continuous exposure	32 days/year
Environment factors not influenced by risk management	Other data. Other information	Local marine water dilution factor:1000
Other given operational conditions affecting	Emission or Release Factor: Air	0 g/ton of product
environmental exposure	Emission or Release Factor: Water	13000 kg/year
Technical conditions and	Water	Substance specific waste water treatment
measures at process level (source) to prevent release	Use of closed filling equipn	nent
measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site		
	Waste treatment	Send back to the process
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Waste product and empty containers should be disposed of as hazardous waste in accordance with all local and national regulations.
Conditions and measures related	Recovery Methods	There is no envisaged external recovery of waste.
to external recovery of waste		
2.3 Contributing scenario col		re for: PROC1, PROC2, PROC3
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	Powdered substance, granules
Amount used	Amount per Shift	1000 kg
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).
Other operational conditions affecting workers exposure	Indoor use.	
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Technical conditions and		r, sampling and application systems including			
measures to control dispersion	connectors.	in the closed system, such as neuring and removal of			
from source towards the worker		Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes.			
Organisational measures to	Ensure operatives are trained to minimise exposures.				
prevent /limit releases, dispersion		intenance of equipment and machines.			
and exposure					
	Wear protective clothing.				
	Safety shoes				
Conditions and measures related	Safety glasses				
to personal protection, hygiene	In case of dust or aerosol f	ormation: use respiratory protection with approved			
and health evaluation	filter (P2)				
	or				
	Particle filter:P3				
2.4 Contributing scenario co	<u> </u>	re for: PROC4, PROC5, PROC8b			
Activity		compounding and associated activities in the Process			
, loavily	Categories listed above				
	Concentration of the	Covers percentage substance in the product up to			
	Substance in	100 % (unless stated differently).			
Product characteristics	Mixture/Article				
	Physical Form (at time of	Powdered substance, granules			
	use)	r ondorod odbolanco, grandico			
Amount used	Would vary by requirement	ts and by facility			
Frequency and duration of use	Exposure duration per	60 min			
	day				
Other operational conditions	Indoor use.				
affecting workers exposure	Assumes activities are at a	mbient temperature.			
	Use only semi-automated a	and predominantly enclosed filling lines.			
	Provide local exhaust venti				
-		st ventilation at machinery and at places where dust			
Technical conditions and	can be generated.				
measures to control dispersion from source towards the worker		ened by the use of sharp prongs at the discharge is placed at the discharge hopper and lowered, the			
nom source towards the worker		the bag releasing the substance into the hopper. This			
		the immediate vicinity and contributes to a reduction			
	in exposure				
Organisational measures to	Ensure operatives are train	ned to minimise exposures.			
prevent /limit releases, dispersion	Regular inspection and ma	intenance of equipment and machines.			
and exposure					
	Wear protective clothing.				
	Wear protective gloves.				
Conditions and measures related	Safety glasses				
to personal protection, hygiene	Safety goggles	ormation: use respiratory protection with approved			
and health evaluation	filter (P2)	סווומנוסו. עשב ובשטומנסוץ טוטנבטוטון שונון מטטרפט			
	or				
	Particle filter:P3				
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These respirators, if worn correctly, with a good face fit, will provide sufficient protection Where tightly fitting RPE is used, the worker should be face fit tested to ensure

that a good face seal can be obtained

2.5 Contributing scenario controlling worker exposure for: PROC8b

Large scale

Activity	Bulk loading (including mari	ne vessel/barge, rail/road car and IBC loading)	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Application	40000 kg	
Frequency and duration of use	Exposure duration per day	120 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and measures to control dispersion from source towards the worker	connectors.	r, sampling and application systems including r displaced from the silo during filling.	
Organisational measures to	Ensure operatives are train	ed to minimise exposures.	
prevent /limit releases, dispersion and exposure	Regular inspection and ma	intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses Safety goggles		
2.6 Contributing scenario co	ntrolling worker exposu	re for: PROC15	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Use	1 kg	
Frequency and duration of use	Several times during the w	orking day, only for short periods of time	
Technical conditions and	Handle in a fume cupboard	l or under extract ventilation.	
measures to control dispersion from source towards the worker			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.		
Conditions and measures related	Wear a laboratory coat		
to personal protection, hygiene	Wear protective shoes.		
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and health evaluation

Safety glasses Wear protective gloves

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC7	Nuclear power plants, No water discharge to the environment	Soil	PEC	0,55mg/kg dry weight (d.w.)	0,10
ERC7	Nuclear power plants	Marine sediment	PEC	1,59mg/kg dry weight (d.w.)	0,88
ERC7	Nuclear power plants	Soil	PEC	0,01mg/kg dry weight (d.w.)	0,001
ERC7	Nuclear power plants	Marine water	PEC	221µg/L	0,16

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8b, PROC15 Workplace measurements PROC2, PROC4, PROC14 MEASE

PROC8b Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	0,08mg/m³	0,06
PROC2	Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
PROC4, PROC5	90th percentile value, small scale	Inhalation worker exposure	0,78mg/m³	0,54
PROC4	Solid, high dustiness., during 15 mins - 1 hour, Large scale	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC4	Solid, high dustiness., during 15 mins - 1 hour, small scale	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC4, PROC5, PROC8b	90th percentile value, half mask, Large scale	Inhalation worker exposure	0,2mg/m ³	0,14
PROC8b		Inhalation worker exposure	0,016mg/m ³	0,011
PROC8b	Outdoor use., with local	Inhalation worker	0,03mg/m ³	0,021
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	exhaust ventilation, 90th percentile value	exposure		
PROC2	Solid, high dustiness., during <15 mins	Dermal worker exposure	0,024mg/kg bw/day	< 0,001
PROC15	90th percentile value	Inhalation worker exposure	0,16mg/m³	0,11
PROC14	Solid, high dustiness., Concentration of substance in product: 5% - 25%, with local exhaust ventilation	Dermal worker exposure	0,014mg/kg bw/day	< 0,001

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Additional good practice advice beyond the REACH Chemical Safety Assessment

Take care for general good hygiene and housekeeping.

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1. Short title of Exposure Scenario 17: Use of abrasives

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process categories	PROC21: Low energy manipulation of substances bound in materials and/or articles
Environmental Release Categories	ERC12a: Industrial processing of articles with abrasive techniques (low release)

2.1 Contributing scenario controlling environmental exposure for: ERC12a

The environmental release categories mentioned above are assumed to be the most important ones but other environmental release categories could also be possible.

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Conditions and measures related to external treatment of waste for	Waste treatment	Waste are recycled into the process, Substance containing waste shall be handled as hazardous
to sewage treatment plant	The concentration of the substance should not exceed 1,75 mg/L in the municipal STP	
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant
prevent/limit release from the site		GIECUVEIIESS. 40 - 30 /0)
discharges, air emissions and releases to soil Organizational measures to	Water	Substance specific waste water treatment, Ion exchange, Reverse osmosis (Degradation effectiveness: 40 - 90 %)
Other given operational conditions affecting environmental exposure Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit	Air	Substance specific waste air treatment:, Electrostatic precipitation, Cyclones, Treatment of air emissions by bag filters, fabric filter and wet scrubber, Ceramic & metal mash filters, PM10 particles are removed
	Emission or Release Factor: Air	25000 g/ton of product (No water emissions ERC12a)
	Emission or Release Factor: Water	25000 g/ton of product (Dilution of 10, Dilution of 100 ERC12a)
	Emission or Release Factor: Air	25000 g/ton of product (Dilution of 10, Dilution of 100 ERC12a)
Environment factors not influenced by risk management	Other data. Other information	Local freshwater dilution factor:: 10
Frequency and duration of use	Continuous exposure	20 days/year
	Annual tonnage	1700 ton(s)/year (No water emissions ERC12a)
Amount used	Annual tonnage	300 ton(s)/year (Dilution of 100 ERC12a)
	Annual tonnage	30 ton(s)/year (Dilution of 10 ERC12a)
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).



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disposal		waste and removed by licensed waste removal company, incinerated or recycled	
	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal.	
2.2 Contributing scenario co	ntrolling worker exposu	re for: PROC21	
Activity	Installation of plasterboard,	wood based boards and other products	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 1 %.	
	Physical Form (at time of use)	solid	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
Other operational conditions	Indoor use.		
affecting workers exposure			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train	ned to minimise exposures.	
Conditions and measures related	Wear suitable protective cle	othing.	
to personal protection, hygiene and health evaluation			
3. Exposure estimation and	reference to its source		

Environment

Estimation based on workplace measurements

Estimation ba	ised on workplace measur	ements	T		-	
Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR	
ERC12a	Dilution of 10	Fresh water	PEC	1932µg/L	0,956	
ERC12a	Dilution of 10	Soil	PEC	0,10mg/kg dry weight (d.w.)	0,018	
ERC12a	Dilution of 100	Fresh water	PEC	1932µg/L	0,956	
ERC12a	Dilution of 100	Soil	PEC	0,92mg/kg dry weight (d.w.)	0,171	
ERC12a	No water discharge to the environment	Soil	PEC	5,4mg/kg dry weight (d.w.)	0,964	
Workers MEASE						
Contributing Scenario	Specific conditions	Exposure ro	outes	Level of Exposure	RCR	
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Version 1.0 Print Date 26.05.2014 Revision date / valid from 26.05.2014 PROC21 Dermal worker exposure 0,99mg/m³ < 0,001 Inhalation worker PROC21 0,005mg/m³ 0,0034 --exposure 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the **Exposure Scenario** Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value. Substance Formula Conversion factor for the equivalent dose of B (multiply by) Boric acid H₃BO₃ 0.1748 Boric oxide B203 0.311 Disodium tetraborate anhydrous Na2B407 0.2149 Na2B4O7 x 5H20 0.1484 Disodium tetraborate pentahydrate Na2B4O7 x 10H20 Disodium tetraborate decahydrate 0.1134 Na2B8O13 x 4H20 Disodium octoborate tetrahydrate 0.2096 NaBO₂ 0.1643 Sodium metaborate (anhydrous) NaBO₂ x 2H₂0 Sodium metaborate (dihydrate) 0.1062 Sodium metaborate (tetrahydrate) NaBO₂ x 4H₂0 0.0784 Sodium pentaborate (anhydrous) NaB₅O₈ 0.2636 Sodium pentaborate (pentahydrate) NaB5O8 x 5H20 0.1832 If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure. Additional good practice advice beyond the REACH Chemical Safety Assessment Take care for general good hygiene and housekeeping.



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1. Short title of Exposure Scenario 18: Industrial formulation

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	 PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelettisation PROC22: Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting PROC23: Open processing and transfer operations with minerals/metals at elevated temperature PROC23: Handling of solid inorganic substances at ambient temperature
Environmental Release Categories	ERC3: Formulation in materials

2.1 Contributing scenario controlling environmental exposure for: ERC3

Product characteristics	Concentration of the Substance in Mixture/Article Covers percentage substance in the product up 100 % (unless stated differently). Mixture/Article 1150 ton(s)/year	
Amount used	Annual amount per site	1150 ton(s)/year
Frequency and duration of use	Continuous exposure	100 days/year
Environment factors not Other data Other		Local freshwater dilution factor:: 10
Other given operational	Emission or Release Factor: Air	36562 g/ton of product
conditions affecting environmental exposure	Emission or Release Factor: Water	2000 g/ton of product
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit	Air	Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination., Treatment of air emissions by bag filters, fabric filter and wet scrubber, Electrostatic precipitation, Cyclones, ceramic filters
discharges, air emissions and releases to soil	Water	Substance specific waste water treatment, Ion
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Organizational measures to		exchange, Reverse osmosis (Degradation	
prevent/limit release from the site		effectiveness: 40 - 90 %)	
Conditions and measures related	Type of Sewage Treatment Plant	Municipal sewage treatment plant	
to sewage treatment plant	The concentration of the su municipal STP	ubstance should not exceed 1,75 mg/L in the	
	Waste treatment	Send back to the process	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Vacuum up spillage and collect in suitable containers for disposal., Dispose of as hazardous waste in compliance with local and national regulations.	
2.2 Contributing scenario co	ntrolling worker exposu	re for: PROC2, PROC4	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations more than 25%	
	Physical Form (at time of use)	Solid, high dustiness	
Amount used	The amount used per worker varies from activity to activity		
Frequency and duration of use	Exposure duration per day	60 min	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).(PROC4)		
Conditions and measures related	Wear protective gloves.		
to personal protection, hygiene and health evaluation	Limit the substance conten	it in the mixture to 25 %.(PROC4)	
	ntrolling worker exposu	re for: PROC4, PROC5, PROC8b	
Activity		compounding and associated activities in the Process	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 25 %.	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Would vary by requirement	ts and by facility	
Frequency and duration of use	Exposure duration per day	60 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and measures to control dispersion from source towards the worker		to points where emissions occur. r, sampling and application systems including	
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	Single use bags can be opened by the use of sharp prongs at the discharge hopper. When the big bag is placed at the discharge hopper and lowered, the prongs cut into the base of the bag releasing the substance into the hopper. Theremoves the operator from the immediate vicinity and contributes to a reduction in exposure			
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular inspection and maintenance of equipment and machines.			
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3			
2.4 Contributing scenario co	ntrolling worker exposu	re for: PROC8a, PROC8b		
Activity	Equipment maintenance			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).		
	Physical Form (at time of use)	Powdered substance, granules		
Amount used	Would vary by requirement	s and by facility		
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions affecting workers exposure	Indoor and outdoor use.			
Technical conditions and measures to control dispersion from source towards the worker	Worker in separate cabine Provide extract ventilation	without specific ventilation to material transfer points and other openings.		
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are train Regular inspection and ma	ed to minimise exposures. intenance of equipment and machines.		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3			
2.5 Contributing scenario co	ntrolling worker exposu	re for: PROC8b		
Large scale				
Activity	Bulk loading (including mari	ne vessel/barge, rail/road car and IBC loading)		
Product characteristics	Concentration of the Covers percentage substance in the product up to			

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Substance in

100 % (unless stated differently).

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	Mixture/Article		
	Physical Form (at time of use)	Powdered substance, granular-like	
Amount used	Amount per Use 40000 kg		
Frequency and duration of use	Exposure duration	60 - 120 min	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at ambient temperature.		
Technical conditions and measures to control dispersion from source towards the worker	Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) Use closed dosing, transfer, sampling and application systems including connectors. Exhaust ventilation equipped with filters. Provide dust filtration for air displaced from the silo during filling.		
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee tra Regular inspection and ma	aining to prevent/minimize exposures intenance of equipment and machines.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear protective clothing. Wear protective gloves. Safety glasses Safety goggles		
2.6 Contributing scenario co	ntrolling worker exposu	re for: PROC9	
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 5% - 25%	
	Physical Form (at time of use)	Solid, high dustiness, liquid	
Frequency and duration of use	Exposure duration per day	> 240 min	
Technical conditions and	Provide local exhaust venti	lation (LEV).	
measures to control dispersion from source towards the worker			
Conditions and measures related	Wear protective gloves.		
to personal protection, hygiene and health evaluation			
2.7 Contributing scenario co	ntrolling worker exposu	re for: PROC9	
small scale			
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 40 %	
	Physical Form (at time of use)	solid, liquid, pasty	
Amount used	The amount used per work	er varies from activity to activity	
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).	
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Other operational conditions	Indoor use.			
affecting workers exposure				
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Provide extract ventilation to points where emissions occur. Provide local exhaust ventilation (LEV). Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.			
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures. Regular inspection and maintenance of equipment and machines.			
2.8 Contributing scenario co	ntrolling worker exposu	re for: PROC14		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 25 %.		
	Physical Form (at time of use)	Powdered substance, granular-like		
Amount used	The amount used per worker varies from activity to activity			
Frequency and duration of use	Covers daily exposures up	to 8 hours (unless stated differently).		
Other operational conditions affecting workers exposure	Indoor use.			
Technical conditions and measures to control dispersion from source towards the worker	Transfer via enclosed lines. Provide local exhaust ventilation (LEV). Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.			
Organisational measures to prevent /limit releases, dispersion	Provide basic employee training to prevent/minimize exposures			
and exposure				
Conditions and measures related to personal protection, hygiene	Wear suitable protective clu Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3			
Conditions and measures related to personal protection, hygiene and health evaluation	Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3	othing. ormation: use respiratory protection with approved		
and exposure Conditions and measures related to personal protection, hygiene and health evaluation 2.9 Contributing scenario co Product characteristics	Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3	othing. ormation: use respiratory protection with approved		
Conditions and measures related to personal protection, hygiene and health evaluation 2.9 Contributing scenario co	Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3 ntrolling worker exposu Concentration of the Substance in	othing. ormation: use respiratory protection with approved re for: PROC15		
Conditions and measures related to personal protection, hygiene and health evaluation 2.9 Contributing scenario co	Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3 ntrolling worker exposu Concentration of the Substance in Mixture/Article Physical Form (at time of	othing. ormation: use respiratory protection with approved re for: PROC15 Concentration of substance in product: 5% - 25%		
Conditions and measures related to personal protection, hygiene and health evaluation 2.9 Contributing scenario co Product characteristics	Safety shoes Safety glasses In case of dust or aerosol f filter (P2) or Particle filter:P3 ntrolling worker exposu Concentration of the Substance in Mixture/Article Physical Form (at time of use) Amount per Use	othing. ormation: use respiratory protection with approved re for: PROC15 Concentration of substance in product: 5% - 25% Powdered substance, granular-like		



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Technical conditions and	Handle in a fume cupboard or under extract ventilation.
measures to control dispersion	
from source towards the worker	
Organisational measures to	Ensure operatives are trained to minimise exposures.
prevent /limit releases, dispersion	Regular inspection and maintenance of equipment and machines.
and exposure	
Conditions and measures related	Wear suitable protective clothing.
to personal protection, hygiene	Safety shoes
and health evaluation	Safety glasses
	Wear protective gloves.
2.10 Contributing scenario	controlling worker exposure for: PROC1, PROC2, PROC3, PROC22,
PROC23	,

Activity Product characteristics	Concentration of the Substance in Mixture/Article Physical Form (at time of use)	g operations at elevated temperature. Covers percentage substance in the product up to 100 % (unless stated differently). Powdered substance, granules	
Product characteristics	Substance in Mixture/Article Physical Form (at time of use)	100 % (unless stated differently).	
	use)	Powdered substance, granules	
	The amount used per work		
Amount used		er varies from activity to activity	
Frequency and duration of use	Frequency of use	24 hours/day	
Frequency and duration of use	Frequency of use	365 days/year	
Other operational conditions affecting workers exposure	Indoor use. Operation is carried out at elevated temperature (> 20°C above ambient temperature).		
Technical conditions and measures to control dispersion from source towards the worker	Automate activity where possible. Provide local exhaust ventilation with enclosure of the source Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes. Worker in separate cabine without specific ventilation		
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular inspection and maintenance of equipment and machines. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the irritating properties and, especially, the respiratory inhalation effects and c) to follow the safer procedures instructed by the employer.		
Conditions and measures related to personal protection, hygiene and health evaluation	In case of dust or aerosol formation: use respiratory protection with appro filter (P2) or Particle filter:P3 Use battery-powered air fed helmets Operatives wear overalls or heavy heat resistant clothing Equipment cleaning and maintenance Wear protective gloves. Safety glasses Safety goggles		

2.11 Contributing scenario controlling worker exposure for: PROC23

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Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 1% - 5%	
	Physical Form (at time of use)	Solid, low dustiness	
Frequency and duration of use	Exposure duration per day < 15 min		
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear respiratory protection With respiratory mask APF		
2.12 Contributing scenario	controlling worker expo	osure for: PROC1, PROC2, PROC3	
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).	
	Physical Form (at time of use)	Powdered substance, granules	
Amount used	Amount per Shift	1000 kg	
	The amount used per work	er varies from activity to activity	
Other operational conditions	Indoor use.		
affecting workers exposure	Assumes activities are at a		
Technical conditions and measures to control dispersion from source towards the worker	Use closed dosing, transfer, sampling and application systems including connectors. Provide extraction ventilation at points where emissions occur. Where there are breaches in the closed system, such as pouring and removal of slag in metal production, LEV is used to control fumes.		
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures		
Conditions and measures related to personal protection, hygiene and health evaluation	Wear suitable protective clothing. Safety shoes Safety glasses In case of dust or aerosol formation: use respiratory protection with approved filter (P2) or Particle filter:P3		
3. Exposure estimation and	reference to its source		

used on workplace measu	rements			
Specific conditions	Compartment	Value	Level of Exposure	RCR
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			Specific conditions Compartment Value	Specific conditions Compartment Value Level of Exposure



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ERC3	 Soil	PEC	5,2mg/kg dry weight (d.w.)	0,97
ERC3	 Water	PEC	1206µg/L	0,597
ERC3	 Fresh water sediment	PEC	1,67mg/kg dry weight (d.w.)	0,93

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8b, PROC22, PROC23 Workplace measurements PROC2, PROC4, PROC8a, PROC9, PROC14, PROC15, PROC23 MEASE

PROC8b Advanced REACH Tool (ART model)

PROC1, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC23 Advanced REACH Tool (ART model) (inhalative exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC4	Concentrations >= 0% - <= 25%	Dermal worker exposure	0,48mg/kg bw/day	
PROC2		Dermal worker exposure	0,005mg/kg bw/day	
PROC2		Inhalable dust.	0,002mg/kg/day	
PROC2	Concentrations >= 0% - <= 25%	Inhalation worker exposure	0,001mg/kg bw/day	
PROC4, PROC5	90th percentile value, small scale	Inhalation worker exposure	0,78mg/m ³	0,54
PROC4	Solid, high dustiness., during 15 mins - 1 hour, small scale	Dermal worker exposure	0,48mg/kg bw/day	< 0,001
PROC4, PROC5, PROC8b	90th percentile value, With respiratory protection, half mask	Inhalation worker exposure	0,2mg/m ³	0,14
PROC4	Solid, high dustiness., during 15 mins - 1 hour, Large scale	Dermal worker exposure	4,8mg/kg bw/day	0,001
PROC8a, PROC8b	90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	1,33mg/m ³	0,92
PROC8a	Solid, high dustiness., during 1 - 4 hours	Dermal worker exposure	0,173mg/kg bw/day	< 0,001
PROC8b		Inhalation worker exposure	0,016mg/m ³	0,011
PROC8b	with local exhaust ventilation, Outdoor use., 90th percentile value	Inhalation worker exposure	0,03mg/m ³	0,021
PROC2	Solid, high dustiness., <	Dermal worker exposure	0,024mg/kg bw/day	



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15 min/day			
Solid, high dustiness., Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,144mg/kg bw/day	
liquid, Concentration of substance in product: 5% - 25%	Dermal worker exposure	0,014mg/kg bw/day	
90th percentile value	Inhalation worker exposure	0,001 - 0,4mg/m³	
90th percentile value, liquid	Inhalation worker exposure	0,01mg/m³	
90th percentile value	Inhalable dust.	7mg/m³	
> 4 h (half tour)	Dermal worker exposure	0,024mg/kg bw/day	
90th percentile value	Inhalation worker exposure	0,16mg/m³	
Solid, high dustiness., during 15 mins - 1 hour, with local exhaust ventilation, without gloves	Dermal worker exposure	0,014mg/kg bw/day	
90th percentile value, without respiratory protection	Inhalation worker exposure	0,08mg/m³	0,06
Solid, low dustiness., Concentration of substance in product : 0% - 5%, during <15 mins	Inhalation worker exposure	0,01mg/m³	0,0069
Solid, high dustiness., during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
With respiratory mask APF 40	Inhalation worker exposure	< 0,001mg/m ³	
90th percentile value, no respiratory protection (RPE)	Inhalation worker exposure	0,08mg/m³	0,06
cleaning, during 15 mins - 1 hour	Dermal worker exposure	0,048mg/kg bw/day	< 0,001
	Solid, high dustiness., Concentration of substance in product: 5% - 25% liquid, Concentration of substance in product: 5% - 25% 90th percentile value 90th percentile value, liquid 90th percentile value, 90th percentile value > 4 h (half tour) 90th percentile value Solid, high dustiness., during 15 mins - 1 hour, with local exhaust ventilation, without gloves 90th percentile value, without respiratory protection Solid, low dustiness., Concentration of substance in product : 0% - 5%, during <15 mins Solid, high dustiness., during 15 mins - 1 hour With respiratory mask APF 40 90th percentile value, no respiratory protection (RPE) cleaning, during 15 mins	Solid, high dustiness., Concentration of substance in product: 5% - 25%Dermal worker exposureliquid, Concentration of substance in product: 5% - 25%Dermal worker exposure90th percentile valueInhalation worker exposure90th percentile value, liquidInhalation worker exposure90th percentile value, liquidInhalable dust.> 4 h (half tour)Dermal worker exposure90th percentile valueInhalation worker exposure90th percentile valueInhalation worker exposure90th percentile valueInhalation worker exposure90th percentile valueInhalation worker exposure90th percentile valueInhalation worker exposure90th percentile value, with local exhaust ventilation, without glovesDermal worker exposure90th percentile value, without respiratory protectionInhalation worker exposureSolid, low dustiness., Concentration of substance in product : 0% - 5%, during <15 minsInhalation worker exposureSolid, high dustiness., during 15 mins - 1 hourDermal worker exposureWith respiratory mask APF 40Inhalation worker exposure90th percentile value, no respiratory protection (RPE)Inhalation worker exposure	Solid, high dustiness., Concentration of substance in product: 5% - 25%Dermal worker exposure0,144mg/kg bw/dayliquid, Concentration of substance in product: 5% - 25%Dermal worker exposure0,014mg/kg bw/day90th percentile valueInhalation worker exposure0,001 - 0,4mg/m³90th percentile value, liquidInhalation worker exposure0,01mg/m³90th percentile value, liquidInhalaton worker exposure0,01mg/m³90th percentile valueInhalaton worker exposure0,01mg/m³90th percentile valueInhalaton worker exposure0,024mg/kg bw/day90th percentile valueInhalation worker exposure0,014mg/kg bw/day90th percentile valueInhalation worker exposure0,014mg/kg bw/day90th percentile valueInhalation worker exposure0,014mg/kg bw/day90th percentile value, with local exhaustDermal worker exposure0,014mg/kg bw/day90th percentile value, without respiratory protectionInhalation worker exposure0,08mg/m³Solid, low dustiness., Concentration of substance in product : 0% - 5%, during 15 mins - 1 hour with respiratory mask APF 40Dermal worker exposure0,048mg/kg bw/dayWith respiratory mask APF 40Inhalation worker exposure0,001mg/m³90th percentile value, no respiratory protection (RPE)Inhalation worker exposure0,048mg/kg bw/day

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that

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risks are managed to at least equivalent levels.

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Tonnage calculations have been based on boron such that no RCR exceeds 0.97, using back calculations with the relevant PNEC's when necessary. The equivalent tonnage of product handled on site should be calculated from the conversion factors detailed in the product table. For those operations that handle a combination of borate compounds, the boron equivalent of the combined tonnage cannot exceed the site tonnage value.

Substance	Formula	Conversion factor for the equivalent dose of B (multiply by)
Boric acid	H₃BO₃	0,1748
Boric oxide	B2O3	0,311
Disodium tetraborate anhydrous	Na ₂ B ₄ O ₇	0,2149
Disodium tetraborate pentahydrate	Na ₂ B ₄ O ₇ x 5H ₂ 0	0,1484
Disodium tetraborate decahydrate	Na ₂ B ₄ O ₇ x 10H ₂ 0	0,1134
Disodium octoborate tetrahydrate	Na ₂ B ₈ O ₁₃ x 4H ₂ 0	0,2096
Sodium metaborate (anhydrous)	NaBO ₂	0,1643
Sodium metaborate (dihydrate)	NaBO ₂ x 2H ₂ 0	0,1062
Sodium metaborate (tetrahydrate)	NaBO ₂ x 4H ₂ 0	0,0784
Sodium pentaborate (anhydrous)	NaB ₅ O ₈	0,2636
Sodium pentaborate (pentahydrate)	NaB ₅ O ₈ x 5H ₂ 0	0,1832

If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.

For further information on the assessment method, see: http://www.advancedreachtool.com

Additional good practice advice beyond the REACH Chemical Safety Assessment

Take care for general good hygiene and housekeeping.



COMPANY INFORMATION DISTRIBUTOR

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QUALITY SYSTEMS			
ISO 9001	Yes	Yes	
ISO 14001	Yes	Yes	
ISO 22000	Yes	Yes	
FSSC 22000	Yes	Yes	
GMP+ -feed	Yes	Yes	
OHSAS18001	-	Yes	
ESAD	Yes	Yes	
other	-	AEO	

