Elemental Impurities

Microcrystalline Cellulose

Product group: MCC

Brand name: Pharmacel®, Pharmacel® sMCC 90

Product description: Microcrystalline Cellulose Silicified Microcrystalline Cellulose

Dear Customer,

In framework of the ICH Q3D (R2) guideline, DFE Pharma tested batches of Microcrystalline Cellulose (using Sappi and Bracell raw material, representing the brand name mentioned above) and Silicified Microcrystalline Cellulose products, originating from the production sites located in Cuddalore and Nagpur, India.

Neither the elements listed below, nor other elements classified as class 2B, are intentionally added during the production process.

DFE Pharma performed analysis on relevant elemental impurities categorized as class 1, class 2A and some class 2B, class 3 and other relevant elements by the ICH Q3D (R2) guideline (according to table 5.1: Elements to be considered in the Risk Assessment – Oral Dosage Form).

Analysis was performed using the analysis technique ICP-MS (Inductively Coupled Plasma-Mass Spectrometry) conforming to USP-NF <233> and Ph. Eur. 2.4.20.

Table 1: Table of elemental impurities following ICH Q3D (R2)

Metal	Class	Limit in ppm oral	Required for oral route	Tested at DFE Pharma
Cadmium	1	0.5	Yes	Yes
Lead	1	0.5	Yes	Yes
Arsenic	1	1.5	Yes	Yes
Mercury	1	3	Yes	Yes
Cobalt	2A	5	Yes	Yes
Vanadium	2A	10	Yes	Yes
Nickel	2A	20	Yes	Yes
Selenium	2B	15	No	Yes
Lithium	3	55	No	Yes
Antimony	3	120	No	Yes
Barium	3	140	No	Yes
Molybdenum	3	300	No	Yes
Copper	3	300	No	Yes
Tin	3	600	No	Yes
Chromium	3	1100	No	Yes
Aluminium	None	-	No	Yes
Strontium	None	-	No	Yes

*[1]: Limits are based on option 1 of the ICH Q3D (R2) guidelines, based on administration of not more than 10g of drug product per day (stated in table A.2.2).

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In the tables below the data of Pharmacel® and Pharmacel® sMCC 90 is presented. These products serve as model products for all Pharmacel® products produced in Cuddalore and Nagpur, India.

Neither the elements listed in Table 1, nor other elements classified as class 2B, are intentionally added during the production process.

Table 2: Results of elemental impurities in MCC produced in Cuddalore, India

Product and batch			Pharmacel® 101 1083CBT (ppm)	Pharmacel® 101 10B7FLG (ppm)	Pharmacel® 101 101091 (ppm)
Metal	Limit (ppm)	Report limit (ppm)			
Cadmium	0.5	0.005	<0.005	<0.005	<0.005
Lead	0.5	0.01	<0.035	<0.01	<0.01
Arsenic	1.5	0.005	<0.010*	<0.005	<0.005
Mercury	3	0.006	<0.006	<0.006	<0.006
Cobalt	5	0.005	<0.005	<0.005	<0.005
Vanadium	10	0.002	<0.002	<0.002	<0.002
Nickel	20	0.030	<0.03	<0.03	<0.03
Selenium	15	0.004	<0.004	<0.004	<0.004
Lithium	55	0.004	<0.004	<0.004	<0.004
Antimony	120	0.005	<0.005	<0.005	<0.005
Barium	140	0.005	0.011	0.011	0.012
Molybdenum	300	0.020	<0.02	<0.02	<0.02
Copper	300	0.010	0.014	<0.010	<0.010
Tin	600	0.25	<0.010*	<0.010*	<0.25
Chromium	1100	0.030	0.052	0.042	0.038
Aluminium	None	0.200	0.22	0.76	0.34
Strontium	None	0.005	0.009	0.007	0.012

*At time of measurement the reporting limit was different

Table 3: Results of elemental impurities in MCC produced in Nagpur, India

Product and batch			Pharmacel® 101 108533R (ppm)	Pharmacel® 101 10B3W1K (ppm)	Pharmacel® 101 301096 (ppm)
Metal	**Limit (ppm)**	**Report limit (ppm)**			
Cadmium	0.5	0.005	<0.005	<0.005	<0.005
Lead	0.5	0.01	0.023	<0.01	<0.01
Arsenic	1.5	0.005	<0.010*	<0.005	<0.005
Mercury	3	0.006	<0.006	<0.006	<0.006
Cobalt	5	0.005	<0.005	<0.005	<0.005
Vanadium	10	0.002	0.003	0.003	0.003
Nickel	20	0.030	0.085	<0.03	0.18
Selenium	15	0.004	<0.004	<0.004	<0.004
Lithium	55	0.004	<0.004	<0.004	<0.004
Antimony	120	0.005	<0.005	<0.005	<0.005
Barium	140	0.005	1.200	1.400	1.300
Molybdenum	300	0.020	<0.02	<0.02	<0.02
Copper	300	0.010	0.130	<0.010	0.015
Tin	600	0.25	<0.010*	<0.010*	<0.25
Chromium	1100	0.030	0.075	0.031	0.099
Aluminium	None	0.200	1.9	0.97	1.4
Strontium	None	0.005	0.055	0.17	0.091

*At time of measurement the reporting limit was different

Elemental Impurities

Microcrystalline Cellulose

Product group: MCC

Brand name: Pharmacel®
Pharmacel® sMCC 90

Product description: Microcrystalline Cellulose
Silicified Microcrystalline Cellulose

Table 4: Results of elemental impurities in sMCC90 produced in Nagpur, India

Product and batch			Pharmacel® sMCC 90 1081HB9 (ppm)	Pharmacel® sMCC 90 109SM42 (ppm)	Pharmacel® sMCC 90 10D1469 (ppm)
Metal	**Limit (ppm)**	**Report limit (ppm)**			
Cadmium	0.5	0.005	<0.005	<0.005	<0.005
Lead	0.5	0.01	<0.01	<0.01	<0.01
Arsenic	1.5	0.005	<0.010*	<0.005	<0.005
Mercury	3	0.006	<0.006	<0.006	<0.006
Cobalt	5	0.005	<0.005	0.024	<0.005
Vanadium	10	0.002	0.004	<0.002	0.005
Nickel	20	0.030	0.160	0.033	0.24
Selenium	15	0.004	<0.004	<0.004	<0.004
Lithium	55	0.004	<0.004	<0.004	<0.004
Antimony	120	0.005	<0.005	<0.005	<0.005
Barium	140	0.005	1.500	1.200	1.200
Molybdenum	300	0.020	0.029	<0.02	0.023
Copper	300	0.010	0.019	0.017	0.015
Tin	600	0.25	<0.010*	<0.010*	<0.25
Chromium	1100	0.030	0.25	0.042	0.12
Aluminium	None	0.200	1.4	1.0	2.4
Strontium	None	0.005	0.083	0.054	0.21

*At time of measurement the reporting limit was different

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Microcrystalline Cellulose

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Brand name:	Pharmacel® Pharmacel® sMCC 90
Product description:	Microcrystalline Cellulose Silicified Microcrystalline Cellulose

A risk assessment was performed. This document and raw data is available for review during audits. Conclusion of the risk assessment is that all values obtained are below 30% of the limits and thus do not need additional control, the change control procedure is the key to maintain this situation. The levels of ICH Q3D (R2) relevant elemental impurities are monitored on regular basis.

This statement substitutes all previous versions issued for the brand names mentioned above.
We trust this information, which is made up to the best of our knowledge, will be helpful to you.

With kindest regards,

Name : Peter Ebben
Job title : Global Quality Control Manager
Signature :

This document is controlled by a validated, electronic system and is valid without signature.
The above facsimile signature is only for display.

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