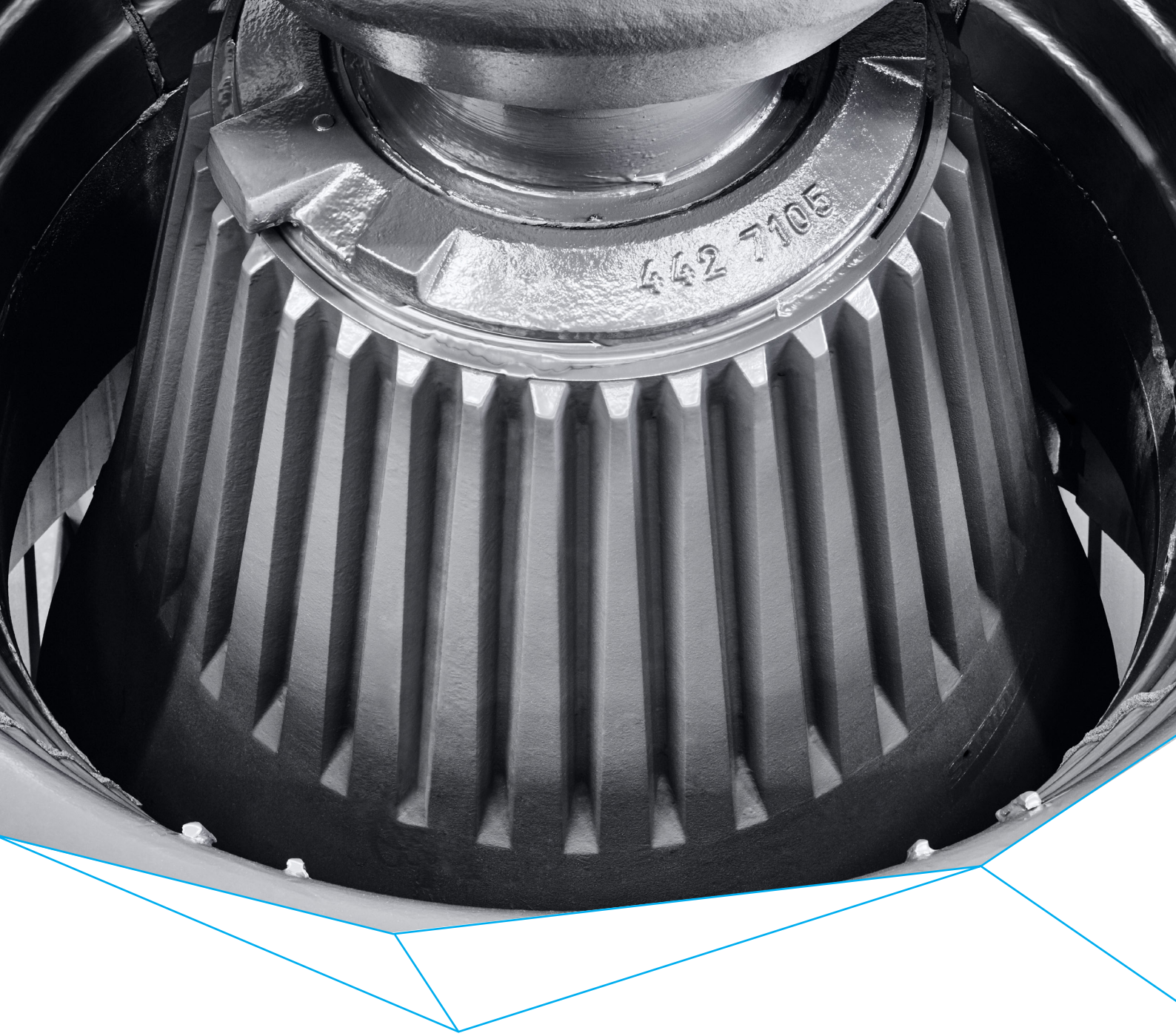

MANGANESE STEEL

ENVIRONMENTAL PRODUCT DECLARATION (EPD)
IN ACCORDANCE WITH ISO 14025 AND PCR 2015:03

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-03045
Publication date:	2021-05-05
Valid until:	2026-05-05

EPD®

SANDVIK

ROCKPROCESSING.SANDVIK

CONTENT

SANDVIK´S VISION – WE SET THE INDUSTRY STANDARD

Sandvik Crushing & Screening is a global market-leading manufacturer of equipment and tools, services and technical solutions for the mining and construction industries. We are your long-term partner providing safe and more sustainable solutions to optimize productivity through proven expertise for any size-reduction and classification challenges.

Our Application expertise can cover individual or multi-equipment replacement or expansion projects. We also supply components, extensive training, service solutions and a wide range of crushing and screening wear parts.

MAKE THE SHIFT – OUR 2030 SUSTAINABILITY GOALS & TARGETS

We will lead the shift in our industry and build a successful long-term business that advances the world through engineering. Our aim is to be the innovative business partner for our customers by making sustainability part of every aspect of business, delivering value for everyone. Our full lifecycle approach means we work relentlessly in our operations, across our supply chain and through our customer offerings to drive more sustainable, resilient business. .

WE BUILD CIRCULARITY – MORE THAN 90% CIRCULAR

We will drive the shift to more circular business models and use of resources, finding ways to close loops and generate new revenue streams from the processes and materials we use.

- Material and resource efficiency improvement part of all development projects
- Develop business models for recycling/ circularity for our customers
- Our products including packaging material shall have at least 90% material circularity
- Halve waste in our production processes
- Require 90% circularity for key suppliers

WE SHIFT CLIMATE – HALVE THE CO^2 IMPACT

We will deliver on our commitments to reduce impact on the climate. We are aiming to shift mindsets and outcomes in our own business, for our customers and with our suppliers to help reach our targets.

- CO_2 improvement part of all product development projects
- Value proposition to our customers shall always include verified CO_2 reduction potential
- Halve the CQ, foot print from our own production
- Halve the CO_2 foot print for transportation of people and products
- Require halving of CO_2 foot print from our key suppliers

PROGRAMME INFORMATION

PROGRAMME

The International EPD® System

EPD International AB
Box 210 60
SE-100 31 Stockholm
Sweden

www.environdec.com
info@environdec.com

Product category rules (PCR): PCR 2015:03 Basic iron or steel product & special steels, except construction steel products, Version 2.0, 2020-03-27

PCR review was conducted by: The Technical Committee of the International EPD® System
Chair: Hudai Kara
Contact via info@environdec.com

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ EPD process certification ☒ EPD verification

Third party verifier: David Althoff Palm, Ramboll Sweden AB
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:
☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable.

COMPANY INFORMATION

OWNER OF THE EPD

Sandvik Rock Processing Solutions, Sandvik SRP AB
Post / Visiting address: Stationsplan 1, 233 81 Svedala, Sweden
Phone: +46 40-40 93 75
E-mail: anders.akesson@sandvik.com

DESCRIPTION OF THE ORGANISATION

Sandvik Crushing & Screening is a global manufacturer of equipment and tools, services and technical solutions for the mining and construction industries. Sandvik manufactures manganese steel at Svedala in Sweden.

NAME AND LOCATION OF PRODUCTION SITE

Svedala, Sweden.

PRODUCT INFORMATION

PRODUCT NAME

Sandvik Svedala manganese steel (M1, M2, M7 and M9).

PRODUCT DESCRIPTION

Manganese steels are widely used in wear applications in mining- and construction industry as well as other applications with similar conditions. The manganese steel products covered by this EPD (M1, M2, M7 and M9) varies especially concerning the content of manganese (Mn), but there are also small variations of carbon (C) and chromium (Cr), see "Raw material inputs" below.

Different qualities of scrap are used for the four steel grades to optimize the requirements of different elements such as Mn, Cr, C etc. It is especially the amounts of virgin manganese raw material inputs that vary between the grades and this is also the main raw material used. For other elements the amounts of virgin raw material inputs are more or less equal for the steel grades.

MANUFACTURING PROCESS

The manganese steel (Mn steel) is produced from steel scrap and virgin alloy raw materials in an Electric Arc Furnace (EAF) process, followed by casting, heat treatment and machining (including painting). The energy sources used are; electricity from nuclear power, natural gas and diesel.

UN CPC CODE

412

GEOGRAPHICAL SCOPE

Sweden

LCA INFORMATION

FUNCTIONAL UNIT / DECLARED UNIT

1 tonne of manganese steel

TIME REPRESENTATIVENESS

Site-specific data from Sandvik Svedala are based on 2019.
Other background data applied are less than 10 years old.

SYSTEM BOUNDARIES

UPSTREAM		CORE
RAW MATERIAL SUPPLY Production of raw materials used at the manufacturing site	TRANSPORT Transport of raw materials to the manufacturing site	MANUFACTURING Manufacturing at Sandvik site in Svedala, Sweden

Cradle-to-gate which includes production of raw materials, transport of raw materials to the production site and manufacturing of manganese steel at the production site. Production and transportation of raw materials are defined as upstream processes and the production of electricity and production and combustion of fuels etc. used at the manufacturing site belong to the core process. .

DATABASE AND LCA SOFTWARE USED

GaBi LCA software with corresponding database 2020.2 was used for production of raw materials, transportation, production of electricity as well as production and combustion of fuels.

INFORMATION ABOUT THE SCOPE AND DATA

Data for material composition and manufacturing have been collected by Sandvik directly from the production site in Svedala. Four manganese steel products are declared in this EPD (M1, M2, M7 and M9), and these differ concerning the inputs of the manganese raw material ferro manganese (FeMn), while all other raw materials (e.g. internal and external scrap, ferro silicon (FeSi), ferro chromium (FeCr) and calcium oxide (CaO) are used in equal amounts. The data for the use of FeMn did not destinguish between the four steel grades, but were provided as total amounts per year for all four products. Recipes could however be provided per tonne of each product and when up-scaling these data to total FeMn per year, it showed that the acutal total amounts of FeMn used per year were 1.6 times larger than the amounts calculated based on the recipes. Therefore the recipes for each of the four steel grades were multiplied with 1.6 to obtain the actual use for each steel grade.

The electricity mix used for the calculation is 100% Swedish nuclear power.

Cut off has been applied for two inputs; an additive (0.03% of the total inputs) and water based paint (0.04% of the total inputs).

No allocations have been made, since not relevant.

MORE INFORMATION

The underlying LCA study has been conducted by Lisa Hallberg at IVL Swedish Environmental Research Institute.

CONTENT DECLARATION

PRODUCT

CONTENT OF SUBSTANCES

The manganese steel does not contain substances of very high concern (SVHC) as defined and listed in the European Chemicals Agency (ECHA) Candidate List of substances of very high concern for Authorization, in levels above 0.01% by weight for the products.

RAW MATERIAL INPUTS

The actual composition of the products are not declared, but the main raw material is steel scrap (internal and external) followed by FeMn. Minor raw materials are e.g. FeSi, FeCr and CaO. All raw materials except FeMn are used in equal amounts per tonne of steel and for the M1 product no FeMn at all is used. A table of contents is not declared due to confidentiality.

INFORMATION ABOUT RECYCLED MATERIALS

Both internal and external scrap are used as raw material input. The external scrap is accounted for as use of secondary material, see the table for "Use of resources". The use of external scrap is in average 850 kg per tonne for all steel products.

PACKAGING

The only relevant packaging material is plastic bands (polyester) used in very small amounts corresponding to only 0.01 % in relation to 1 tonne of steel. The production of the packaging material is covered in the LCA model. I.

ENVIRONMENTAL PERFORMANCE

POTENTIAL ENVIRONMENTAL IMPACT

			MANGANESE STEEL (M1)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Global warming potential (GWP)	Fossil (GWP-F)	kg CO2 eq	5,59E+02	2,62E+02	8,21E+02
	Biogenic (GWP-B)	kg CO2	3,27E+01	4,30E+00	3,70E+01
	Land use and land transformation (GWP-LULUC)	kg CO2 eq	7,32E-01	2,04E-01	9,36E-01
	TOTAL (GWP-T)	kg CO2 eq	5,92E+02	2,67E+02	8,59E+02
Acidification potential (AP)		kg SO2 eq	1,04E+00	2,40E-01	1,28E+00
Eutrophication potential (EP)		kg PO4 eq	1,00E-01	3,62E-02	1,37E-01
Photochemical oxidant formation potential (POFP)		kg NMVOC eq	7,92E-01	2,64E-01	1,06E+00
Abiotic depletion potential for non fossil resources (ADPE)		kg Sb eq	2,68E-03	5,02E-05	2,73E-03
Abiotic depletion potential for fossil resources (ADPF)		MJ	4,51E+03	4,30E+03	8,82E+03
Water scarcity potential, AWARE (WDP)		m³ world eq	2,10E+01	1,88E+01	3,99E+01

			MANGANESE STEEL (M2)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Global warming potential (GWP)	Fossil (GWP-F)	kg CO2 eq	1,97E+03	2,62E+02	2,23E+03
	Biogenic (GWP-B)	kg CO2	3,94E+01	4,30E+00	4,37E+01
	Land use and land transformation (GWP-LULUC)	kg CO2 eq	9,29E-01	2,04E-01	1,13E+00
	TOTAL (GWP-T)	kg CO2 eq	2,01E+03	2,67E+02	2,28E+03
Acidification potential (AP)		kg SO2 eq	1,15E+01	2,40E-01	1,17E+01
Eutrophication potential (EP)		kg PO4 eq	6,74E-01	3,62E-02	7,10E-01
Photochemical oxidant formation potential (POFP)		kg NMVOC eq	5,81E+00	2,64E-01	6,08E+00
Abiotic depletion potential for non fossil resources (ADPE)		kg Sb eq	3,88E-03	5,02E-05	3,93E-03
Abiotic depletion potential for fossil resources (ADPF)		MJ	1,81E+04	4,30E+03	2,24E+04
Water scarcity potential, AWARE (WDP)		m³ world eq	1,46E+02	1,88E+01	1,65E+02

			MANGANESE STEEL (M7)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Global warming potential (GWP)	Fossil (GWP-F)	kg CO2 eq	1,27E+03	2,62E+02	1,54E+03
	Biogenic (GWP-B)	kg CO2	3,61E+01	4,30E+00	4,04E+01
	Land use and land transformation (GWP-LULUC)	kg CO2 eq	8,32E-01	2,04E-01	1,04E+00
	TOTAL (GWP-T)	kg CO2 eq	1,31E+03	2,67E+02	1,58E+03
Acidification potential (AP)		kg SO2 eq	6,31E+00	2,40E-01	6,55E+00
Eutrophication potential (EP)		kg PO4 eq	3,91E-01	3,62E-02	4,27E-01
Photochemical oxidant formation potential (POFP)		kg NMVOC eq	3,33E+00	2,64E-01	3,60E+00
Abiotic depletion potential for non fossil resources (ADPE)		kg Sb eq	3,28E-03	5,02E-05	3,33E-03
Abiotic depletion potential for fossil resources (ADPF)		MJ	1,14E+04	4,30E+03	1,57E+04
Water scarcity potential, AWARE (WDP)		m³ world eq	8,44E+01	1,88E+01	1,03E+02

			MANGANESE STEEL (M9)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Global warming potential (GWP)	Fossil (GWP-F)	kg CO2 eq	1,04E+03	2,63E+02	1,30E+03
	Biogenic (GWP-B)	kg CO2	3,49E+01	4,30E+00	3,92E+01
	Land use and land transformation (GWP-LULUC)	kg CO2 eq	7,98E-01	2,04E-01	1,00E+00
	TOTAL (GWP-T)	kg CO2 eq	1,07E+03	2,66E+02	1,34E+03
Acidification potential (AP)		kg SO2 eq	4,55E+00	2,41E-01	4,79E+00
Eutrophication potential (EP)		kg PO4 eq	2,94E-01	3,63E-02	3,30E-01
Photochemical oxidant formation potential (POFP)		kg NMVOC eq	2,49E+00	2,64E-01	2,75E+00
Abiotic depletion potential for non fossil resources (ADPE)		kg Sb eq	3,08E-03	5,02E-05	3,13E-03
Abiotic depletion potential for fossil resources (ADPF)		MJ	9,08E+03	4,30E+03	1,34E+04
Water scarcity potential, AWARE (WDP)		m³ world eq	6,33E+01	1,88E+01	8,21E+01

USE OF RESOURCES

			MANGANESE STEEL (M1)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Use of primary energy resources - Renewable	Energy (PERE)	MJ	5,45E+02	3,80E+01	5,83E+02
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	5,45E+02	3,80E+01	5,83E+02
Use of primary energy resources - Non-renewable	Energy (PERE)	MJ	4,73E+03	1,57E+04	2,05E+04
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	4,73E+03	1,57E+04	2,05E+04
Use of secondary material (SM)		kg	0,00E+00	8,50E+02	8,50E+02
Use of renewable secondary fuels (RSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water (FW)		m^3	1,51E+00	3,51E+00	5,02E+00

			MANGANESE STEEL (M2)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Use of primary energy resources - Renewable	Energy (PERE)	MJ	9,99E+02	3,80E+01	1,04E+03
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	9,99E+02	3,80E+01	1,04E+03
Use of primary energy resources - Non-renewable	Energy (PERE)	MJ	1,88E+04	1,58E+04	3,45E+04
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	1,88E+04	1,58E+04	3,45E+04
Use of secondary material (SM)		kg	0,00E+00	8,50E+02	8,50E+02
Use of renewable secondary fuels (RSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water (FW)		m^3	5,40E+00	3,52E+00	8,92E+00

			MANGANESE STEEL (M7)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Use of primary energy resources - Renewable	Energy (PERE)	MJ	7,74E+02	3,80E+01	8,12E+02
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	7,74E+02	3,80E+01	8,12E+02
Use of primary energy resources - Non-renewable	Energy (PERE)	MJ	1,18E+04	1,58E+04	2,76E+04
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	1,18E+04	1,58E+04	2,76E+04
Use of secondary material (SM)		kg	0,00E+00	8,50E+02	8,50E+02
Use of renewable secondary fuels (RSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water (FW)		m^3	3,48E+00	3,52E+00	7,00E+00

			MANGANESE STEEL (M9)		
PARAMETER		**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Use of primary energy resources - Renewable	Energy (PERE)	MJ	6,98E+02	3,80E+01	7,36E+02
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	6,98E+02	3,80E+01	7,36E+02
Use of primary energy resources - Non-renewable	Energy (PERE)	MJ	9,47E+03	1,57E+04	2,52E+04
	Raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00
	TOTAL (PERT)	MJ	9,47E+03	1,57E+04	2,52E+04
Use of secondary material (SM)		kg	0,00E+00	8,50E+02	8,50E+02
Use of renewable secondary fuels (RSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Use of non renewable secondary fuels (NRSF)		MJ	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water (FW)		m^3	2,82E+00	3,51E+00	6,34E+00

WASTE

		MANGANESE STEEL (M1)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Hazardous waste disposed (HWD)	kg	4,69E-05	1,65E-05	6,34E-05
Non-hazardous waste disposed (NHWD)	kg	1,37E+01	2,91E+02	3,05E+02
Radioactive waste disposed (RWD)	kg	8,33E-02	4,77E+00	4,86E+00

		MANGANESE STEEL (M2)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Hazardous waste disposed (HWD)	kg	6,21E-05	1,65E-05	7,86E-05
Non-hazardous waste disposed (NHWD)	kg	1,62E+01	2,91E+02	3,07E+02
Radioactive waste disposed (RWD)	kg	2,77E-01	4,78E+00	5,05E+00

		MANGANESE STEEL (M7)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Hazardous waste disposed (HWD)	kg	5,46E-05	1,65E-05	7,11E-05
Non-hazardous waste disposed (NHWD)	kg	1,49E+01	2,91E+02	3,06E+02
Radioactive waste disposed (RWD)	kg	1,81E-01	4,78E+00	4,96E+00

		MANGANESE STEEL (M9)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Hazardous waste disposed (HWD)	kg	5,21E-05	1,65E-05	6,85E-05
Non-hazardous waste disposed (NHWD)	kg	1,45E+01	2,91E+02	3,05E+02
Radioactive waste disposed (RWD)	kg	1,49E-01	4,77E+00	4,92E+00

OUTPUT FLOWS

		MANGANESE STEEL (M1)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Components for re-use (CRU)	kg	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00
Material for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE)	MJ	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ	0,00E+00	0,00E+00	0,00E+00

		MANGANESE STEEL (M2)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Components for re-use (CRU)	kg	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00
Material for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE)	MJ	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ	0,00E+00	0,00E+00	0,00E+00

		MANGANESE STEEL (M7)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Components for re-use (CRU)	kg	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00
Material for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE)	MJ	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ	0,00E+00	0,00E+00	0,00E+00

		MANGANESE STEEL (M9)		
PARAMETER	**UNIT**	**UPSTREAM**	**CORE**	**TOTAL**
Components for re-use (CRU)	kg	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	kg	0,00E+00	0,00E+00	0,00E+00
Material for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE)	MJ	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ	0,00E+00	0,00E+00	0,00E+00

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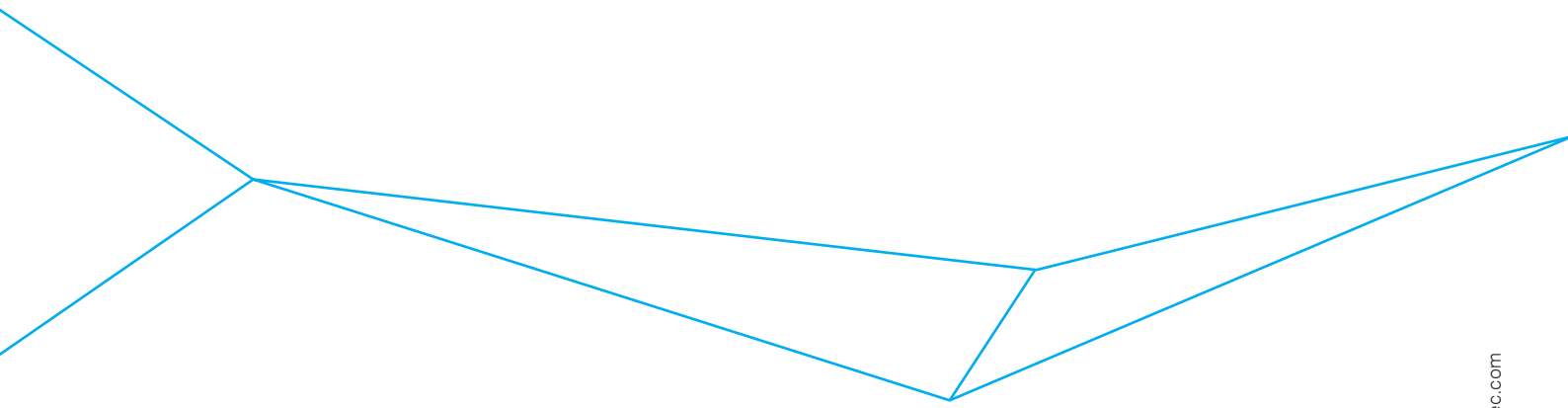

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