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EPD®

THE INTERNATIONAL EPD® SYSTEM

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Environmental Product Declaration

in accordance with ISO 14025 and GPI 4.0 for:

3M™ Aura™ Particulate Respirator, FFP3, Valved, 9332+

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

3M Sustainability, Hermeslaan 7, 1831 Diegem, Belgium

Programme: The International EPD® System
Programme operator: EPD International AB
www.environdec.com

Contents

1 Programme Information

EPD operator	EPD International AB (info@environdec.com) Box 210 60, SE-100 31 Stockholm, Sweden
Product Category Rules (PCRs)	International norms, standard and PCR: ISO 14025:2006, Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. General Programme Instructions for the International EPD® System (GPI) 4.0. The current EPD methodology is based on the forthcoming/draft product category rules (PCR) that will be published by the International EPD® System (IES) after public consultation and review: PCR 2023:XX v1.0 - Respiratory Protective Devices (RPDs) (CPC 27190 - Filtering facepieces FFP (according to EN149).
PCR review conducted by	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Comparisons of EPD	EPDs within the same product category but from different programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.
Third-party verification	■ EPD verification by accredited certification body ☐ EPD verification by individual verifier ☐ EPD verification by EPD Process Certification
Verified and approved by	SGS Italia S.p.A. Via Caldera, 21, Milan 20153, Italy is an approved certification body accountable for the third-party verification. The certification body is accredited by: ACCREDIA Accreditation number DAP N° 006H.
Data follow-up	Procedure for follow-up of data during EPD validity involves third-pary verifier: ☐ Yes ■ No
Goal of the study	Cradle-to-grave assessment including modules A1 - A3, A4 - A5, B1 and C1. The Life Cycle Assessment (LCA) study supporting this EPD has been conducted in accordance with ISO 14040:2006 and ISO 14044:2006 and the requirements stated in the General Programme Instructions by The International EPD® System and the EPD methodology is based on the draft PCR mentioned above. The goal of the LCA study is to assess the potential environmental impact for 3M™ Aura™ Respirator 9332+ specifically available in this EPD.
Disclaimer	Life cycle assessment accountability: Detlef Tibax, 3M. This is a pre-certified EPD with a validity until 2024-09-25. The owner of the EPD is 3M and has the sole ownership, liability and responsibility of the EPD. All values provided in this EPD are a direct result from the use of characterisation factors and calculation rules as defined in the LCA for Experts™ software from sphera™, and the requirements of the product category rules as mentioned above. For more information about this EPD or its contents, contact Detlef Tibax, EPD publisher and process owner, at dtibax@mmm.com. Address: 3M Belgium BV, Hermeslaan 7, 1831 Machelen, Belgium.

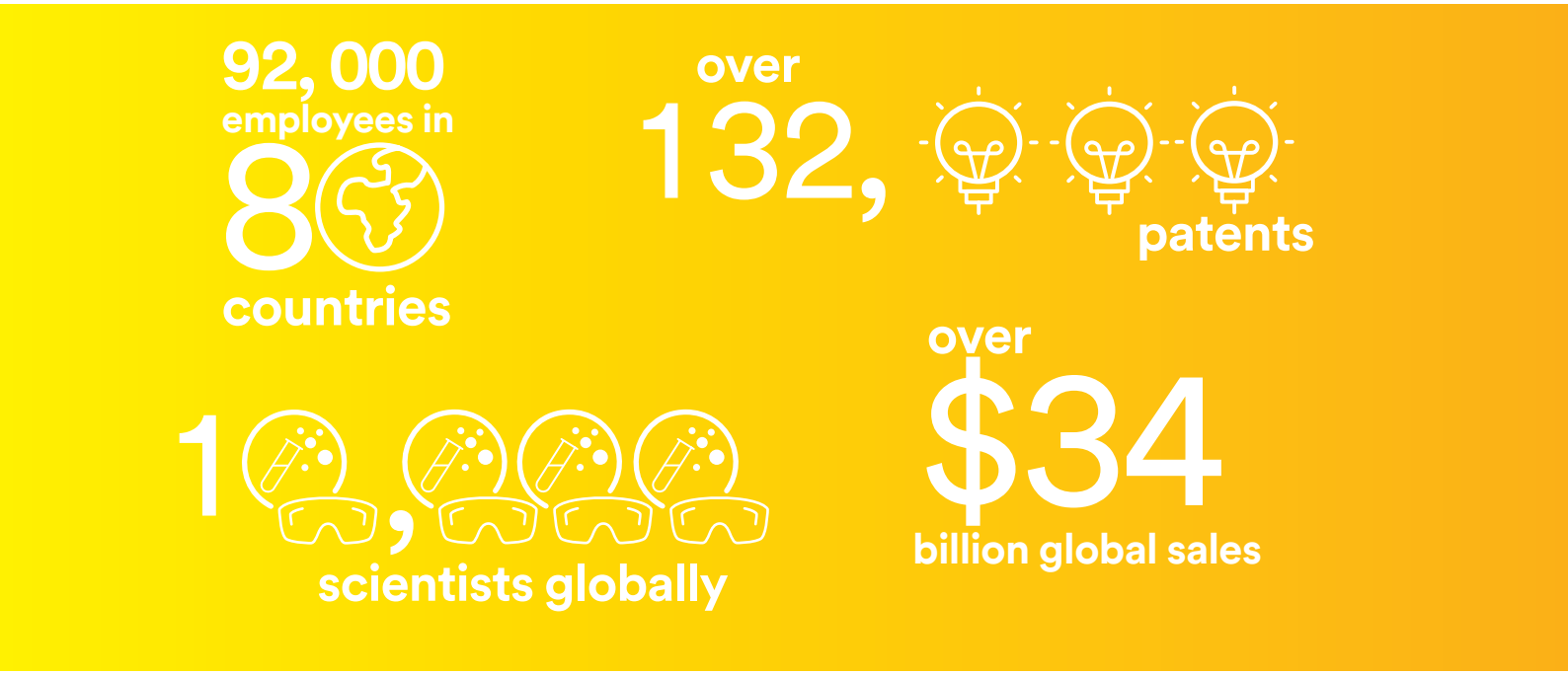
2 Company Information

Over the last century 3M has grown into a global powerhouse, developing products that improve lives around the world. It began life as a small-scale mining venture in Northern Minnesota back in 1902, then named Minnesota Mining and Manufacturing Company.

3M's success and longevity weren't apparent from the start. Our five founders were looking for corundum, a mineral ideal for making sandpaper and grinding wheels. It turns out, what they thought was corundum was really a low-grade mineral. Despite the early setback they persevered with their operation, gained the trust of important investors and built up sales, giving birth to the spirit of innovation and collaboration that still shapes 3M today.

Over the following decades scientific, technical and marketing innovations produced success upon success, eventually making 3M a constant name on the Fortune 500 list. Today, more than 55,000 3M products are used in homes, businesses, schools, hospitals and other industries.

With operations employing almost 92,000 employees in 80 different countries, and products sold in nearly 200 countries, 3M is a diverse technology company with global sales in excess of $34 billion. 3M's commitment to innovation is reflected by the 10,000 scientists and engineers working around the world. The company now has well over 132,000 patents in its name, with an average of 3,500 new patents added every year.



3M brings solutions to different markets through four separate business groups, each one represents a core area of the company, with ideas and innovations shared between them. This collaborative approach has led to unexpected solutions by enabling designers to see problems from different perspectives.

Safety & Industrial is our biggest earning business group, with a vast range of products used in industrial production, electrical and safety markets. This includes automotive, bonding and protecting surfaces in construction, securing things together and developing lightweight parts to help reduce weight and increase efficiency, whilst protecting people at work, and enhancing visual and design communication.

Transportation & Electronics provides solutions for improving road safety and creating a more connected world, such as developing global telecommunications and power grids, restoring underground pipelines and locating key underground infrastructure. It's known for interacting with customers to create innovative solutions and providing opportunities for energy conservation and generation.

Healthcare provides innovations which are pioneering medical advancements in hospitals, emergency rooms and dental clinics around the world. It features a range of products designed for preventing infections and protecting wounds, improving oral health and ensuring food quality.

And finally, Consumer business group features many of our most familiar products and brands, including Post-It®, Scotch® and Command™. It develops solutions to make life easier and more productive at home and in the office, such as simplifying communication, cleaning and protecting surfaces, making home improvement easy and inspiring hobbies, crafts and creativity.[1]

[1]Company information mentioned in this section are included in 3M's 2023 Global Impact report that is referenced in section 6.6.

At 3M, we innovate with purpose. We empower individuals to address issues they want to impact, and collaborate with our customers and communities to take on shared global challenges – bringing value to both our business and society as a whole. We call this purpose-driven business. It's an exciting path forward because we know that with creativity, collaboration and a shared sense of purpose, no problem is unsolvable. Working together, we can improve every life.

We look at sustainability in terms of shared global needs and the future of our business. As the population grows, particularly in emerging economies, challenges like energy availability and security, raw material scarcity, human health and safety, education, and development must be addressed to ensure people across the world can live healthy, fulfilling lives. Every day, 3M innovations aim to tackle some of the world's most pressing areas of concern: raw materials, water, energy and climate, health and safety, education and development.

Setting goals to drive sustainability progress is nothing new at 3M. We have been setting global environmental goals since 1990. A strong part of our company history, these goals have helped dramatically reduce our own environmental footprint and established us as a leader in environmental stewardship.

3M's iconic Pollution Prevention Pays (3P) programme has been running since 1975. The programme has prevented more than 2.88 million short tons of pollutants and saved over $2.37 billion based on aggregated data from the first year of each 3P project.

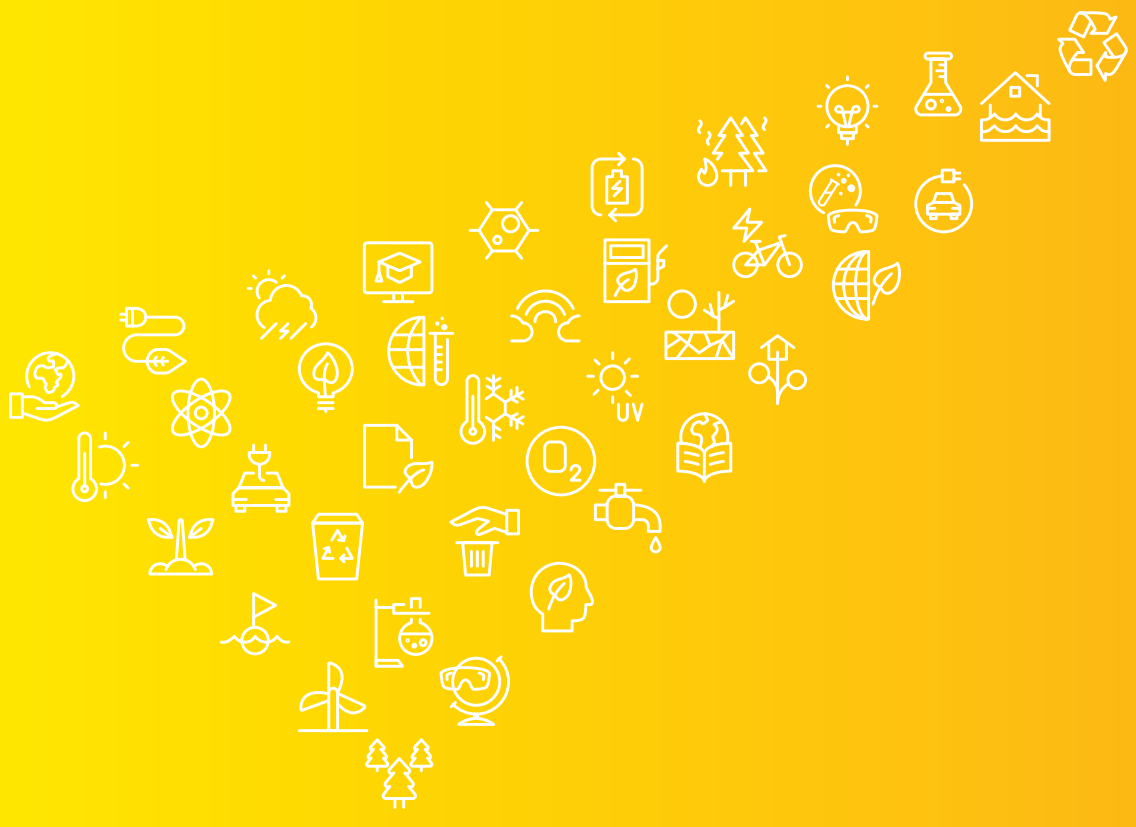
Since 2021, we achieved a 54.2 million pound reduction in the use of virgin fossil-based plastic in our packaging and products toward our goal of 125 million pounds by 2025.

We've incorporated recycled and bio-based materials and reduced plastic use in products and packaging such as tapes and dispensers, sponges, packaging, workspace solutions, insulation, optical films, floor pads, sorbents, and more.

Over the last two decades, while 3M's revenues have doubled, we have reduced our greenhouse gas emissions by 78.8 %, and moved 44.9 % of our manufacturing sites to zero landfill waste. At the same time, we've intensified our focus on creating a range of innovative solutions that help our customers be more sustainable — from glass bubbles that enable lower vehicle weight and improved fuel economy, to films that make homes, businesses, and electronics more energy efficient. In 2021 alone, 3M Science helped our customers avoid 20.6 million metric tons of emissions, which is the equivalent of taking more than three million cars off the road.

Another initiative led by 3M is the Sustainability Value Commitment, which ensures that every new product made by 3M from 2019 onwards is manufactured with sustainability in mind. It commits our product developers to focus on reusability, recyclability, energy, waste, water savings, responsible sourcing, and/or renewable materials appropriate to the specific product, from the beginning to the end of each product's lifecycle.

Since February 2014, 3M has become a signatory of the United Nations Global Compact. While 3M has always acted in accordance with the core values represented by the Compact, we are proud to formalise our commitment to its 10 principles in the areas of human rights, labour, environmental and anti-corruption and to grow our partnership with the organisation.




3M
Aura ™ 9332+
EN149:2001 FFP3 NR D
CE 0086

3 Product Information

3.1 Product description

The 3M™ Aura™ Particulate Respirator 9332+ provides an FFP3 NR D protection level and provides effective respiratory protection for use in industries where workers will be exposed to particles. The respirator is CE Approved to EN 149:2001+A1:2009. Featuring our Aura™ 3-panel design, it's engineered to accommodate facial movement during speech, and the high-performance filter material is engineered to let you breathe more easily. The 3M™ Cool Flow™ Exhalation Valve helps release warm and moist exhaled breath from inside the respirator. The adjustable nose clip curved low profile design and sculpted nose panel help ensure not only a secure seal and snug fit, but also a good field of vision and improved compatibility with 3M eyewear. The embossed top panel is designed to further minimise eyewear fogging, for clearer visibility with eyewear.

The Chin tab increases ease of donning and adjustment, and red colour-coded headbands indicate the performance level.

These respirators meet the requirements of European Standard EN 149:2001 + A1:2009, filtering facepiece respirators for use against particles. They help respiratory protection in industries where workers will be exposed to solid (dust) particles and/or non-volatile liquid particles. They are classified under code CPC 27190 – "Filtering facepieces FFP" (according to EN 149) as described in the United Nations Central Product Classification (CPC) System.

3.2 Content declaration

3.2.1 Product composition

The Aura 9332+ respirator covered by this EPD does not contain Substances of Very High Concern (SVHC) as defined by article 59 (10) of Regulation (CE) n° 1907/2006 (dated 2023-01-17), also known as the REACH candidate list, at a concentration at or above 0.1% in weight. The tables below report respectively the product composition (in absolute and relative values, and % recycled content) and the product packaging (absolute values, function and % recycled content). Weight in kg is presented following the declared unit (i.e., one respirator unit).

Materials	Weight [kg]	Weight [wt%]	Recycled content(1) [wt%]
Aluminium	8.72E-04	6.1%	0%
EVA	8.42E-05	0.6%	0%
Hotmelt adhesive	2.76E-04	1.9%	0%
Polyisoprene	1.30E-03	9.1%	0%
Polyurethane	4.96E-04	3.5%	0%
Polypropylene	1.08E-02	75.5%	0%
Steel	4.82E-04	3.4%	95% pre-consumer
Total	**1.43E-02**	**100%**	**N/A**

(1) Accounts for both pre-consumer and post-consumer waste (scraps) as recovered material

Packaging components	Weight for 1 RPD [kg]	Function	Recycled content(2)
Cardboard box	3.13E-03	Distribution packaging	76%
Shrink wrap	1.04E-04	Distribution packaging	0%
Paper	1.03E-02	Consumer packaging: user instructions, paper board box, labels	100% (65% post-consumer, 35% pre-consumer) (paper board box)
Polypropylene	1.20E-03	Consumer packaging	0%
Pallet	4.17E-03	Distribution packaging	0%
Total	**1.89E-02**	**N/A**	**N/A**

(2) Accounts for both pre-consumer and post-consumer waste (scraps) as recovered material

3.2.2 Recycling

3M has been recycling since 1975 when we established the Corporate Environmental Policy and adopted a voluntary Pollution Prevention Pays (3P) program based on the then-novel idea that pollution prevention is more environmentally effective, technically sound and economically advantageous than pollution control.

Today 3M practices responsible waste management at every company location to reduce the amount of waste materials generated, and deal with hazardous waste in the most efficient way possible.

Every location has a Waste Management Coordinator and is required to manage all returned, recycled and waste materials from the time of generation until reused, recycled, treated or disposed.

During the manufacturing of the Aura 9332+ respirator, some materials are recycled or reused:

- Valve production waste
- Process water used
- Staple wire reels

During the end-of-life, the product does not require specific treatment.

3.3 Manufacturing

At 3M, we approach our sustainability goals and strategy by delivering excellence in operations and across our supply chain, innovating to improve lives with our customers and partners, and enriching the communities where we live and work. Our ambition, working collaboratively, is to realise a world where every life is improved, where natural resources are reliably available, where people everywhere have access to education and opportunity, and where communities are safe, healthy, connected and thriving.

When it comes to fabrication, assembly or processing, 3M understands that increasing efficiency is vital for our selling partners and their bottom line. From ultra-strong abrasives that keep processes running smoothly to futuristic materials that can literally lighten your workload, we provide innovative solutions that help businesses and employees improve efficiency.

3M's International Environmental Operations group enhances and integrates our global environmental management system which guarantees compliance with environmental regulations and prepares facilities to meet the requirements of international standards.

The RPD covered by this EPD are manufactured by 3M's Personal Safety Division (PSD), a division of the Safety and Industrial Business Group (SIBG) within the 3M Company. The 3M manufacturing site that is part of the supply chain is: 3M Aycliffe (Heighington Ln, Aycliffe Village, Newton Aycliffe DL5 6AF, United Kingdom), operating under ISO 9001:2015 and 14001:2015 certifications.

4 Life Cycle Assessment

4.1 Declared unit

The declared unit is one respirator including its packaging that fulfills the technical performance (single-use, reference service life of +/- 8 hours) and protection intended by the product design. This equals to a reference flow of 0.0332 kg product including packaging, 0.0143 kg product excluding packaging, 0.00740 kg distribution packaging and 0.0115 kg product packaging.

4.2 System boundaries

The LCA study supporting this EPD is a cradle-to-grave assessment including modules A1 - A3, A4 - A5, B1 and C1. The included modules and life cycle stages are listed in the table below and are based on the draft PCR. In addition to the declared modules, the table below lists the geographical location per module and the share of the GWP-total indicator results in A1 - A3 coming from product-specific LCI data. This LCI data is defined as measured data, representative data or data that can be proven to be conservative.

All other data is regarded as proxy data and identified as estimates during data collection.

The geographical scope of this study is Europe.

Life cycle phase	**Up**	**Core**		**Downstream**										
Life cycle module group	**Product stage**			**Distribution stage**		**Use stage**					**End-of-life stage**				
Life cycle module name	Raw material supply	Transportation	Manufacturing	Transportation	Waste treatment of distribution packaging	Waste treatment of main RPD system packaging	Filters	Hoods or replaceable masks	Battery power supply	Air supply	Main RPD system disposal	Filter disposal	Hood or replaceable mask disposal	Disposable battery disposal	Cylinder disposal
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
Declared	X	X	X	X	X	X	ND	ND	ND	ND	X	ND	ND	ND	ND
Geography	(1)	(2)	UK	(3)	EU	EU	-	-	-	-	EU	-	-	-	-
Specific data	> 90% [4]			-	-	-	-	-	-	-	-	-	-	-	-
Variation products[5]	0%			-	-	-	-	-	-	-	-	-	-	-	-
Variation sites[6]	0%			-	-	-	-	-	-	-	-	-	-	-	-

X = declared module; ND = not declared
A1 = Upstream module; A2 - A3 = Core module; A4 - C5 = Downstream module

(1) US, UK, EU, IN
(2) US, EU, AS
(3) UK, EU
(4) The share of specific data is calculated for GWP in A1-A3, by substracting the share of estimated data in the study.
(5) Relative difference of GWP in A1-A3 between reported average and the results for the underlying product(s)
(6) Relative difference of GWP in A1-A3 between reported average and the results of the underlying sites

4.2.1 Product stage (A1 - A3)

For the upstream processes, raw material supply includes material extraction from nature to create usable intermediates as well as the packaging used to ship these raw materials (most of the time, raw materials need to be packed for transportation), and the recycling processes of secondary materials from other product life cycles (A1). Final product packaging materials are regarded as part of the raw material supply as well.

For the core processes, all raw materials are transported from the source to the 3M manufacturing site by truck and/or boat (A2). Loading and unloading of raw materials, as well as on-site transport of the raw materials and components are excluded from the study.

The manufacturing includes all steps carried out at 3M manufacturing sites to produce the finished product including the packaging/converting process, emissions, ancillaries, the production and treatment of waste, and core process utilities (electricity, compressed air, etc.) (A3). Electricity in manufacturing is generated with a specific electricity mix demonstrated by a Guarantee of Origin. The environmental profile of these energy carriers is modelled for local conditions. Machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

4.2.2 Distribution stage (A4 - A5)

Transportation of the main product system to the retailer/consumer is included (A4) and the waste treatment of distribution packaging including transportation to the disposal/recovery site (A5).

For transportation (A4), the scope of the study is Europe, and as such the assumption of a distribution distance of 432 km by EU truck (LC[1] 22,000 kg, FCFC[2] 55.7 l diesel/100 km, CU[3] 61%) from the production site (3M Aycliffe (UK)) to the port in Felixstowe (UK) is made, a distance of 268 km by boat (LC[1] 43,000 dwt, FCFC[2] 9,900 l heavy fuel oil/100 km, CU[3] 70%) from Felixstowe to the port of Rotterdam (NL) and a distance of 2,500 km by EU truck to any EU customer.

The distribution stage also includes the disposal of the distribution packaging (pallet, shrink wrap, shipper box) including its transportation to the disposal site (A5).

4.2.3 Use stage (B1 - B5)

The use stage (B1) in this study is characterised by the waste treatment of the foreground/product packaging (plastic wrap, paper board carton, leaflets, etc.). The disposal of this packaging includes transportation to the disposal site as well (a distance of 100 km is assumed).

Information modules (B2-B5) are excluded from the study because the product in scope does not have filters, hoods/replaceable masks, batteries/power supply or air supply components.

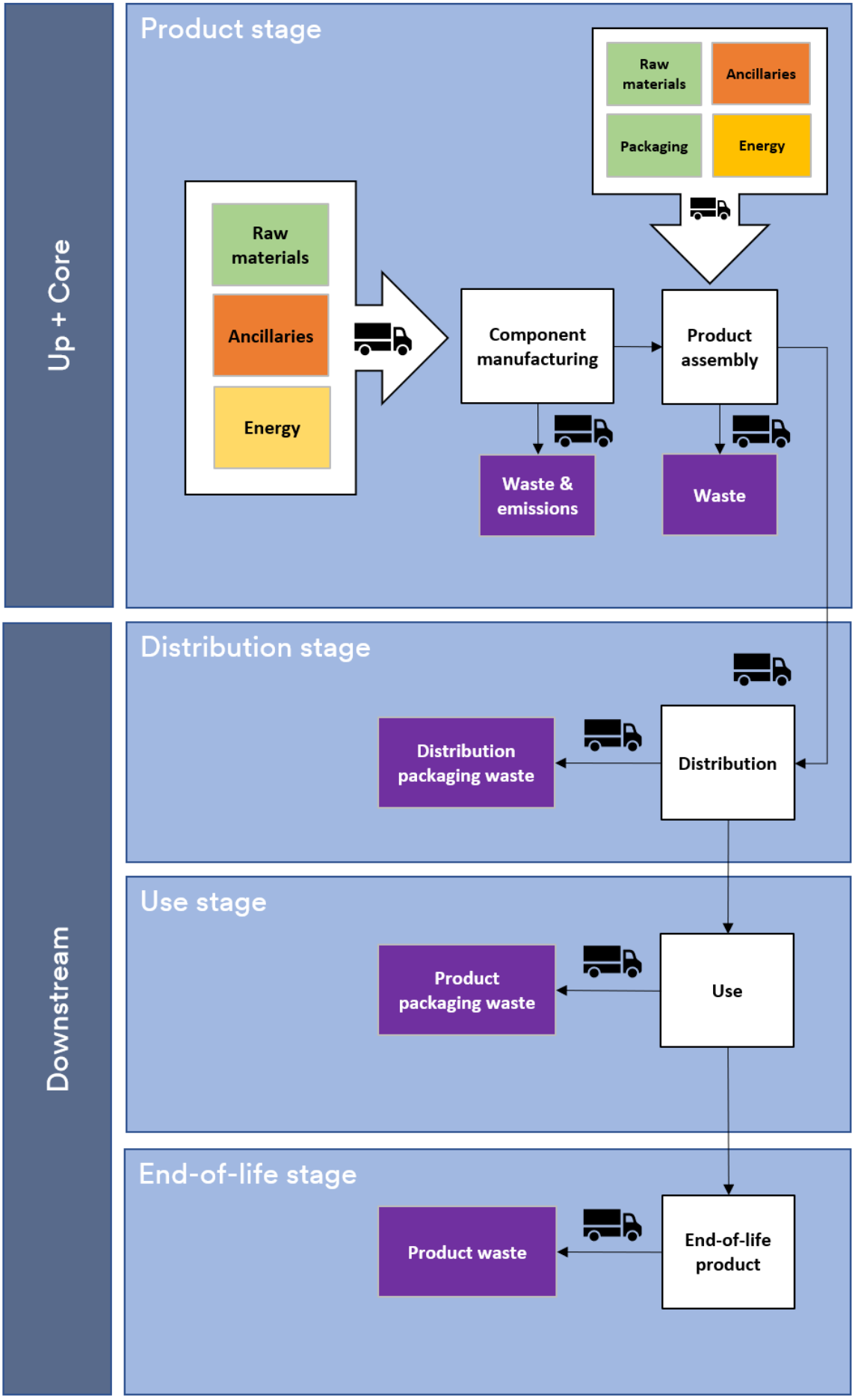
4.2.4 End-of-life stage (C1 - C5)

The end-of-life stage (C1) includes the disposal of the main product system (i.e., the respirator), including transportation to the disposal site (a distance of 100 km is assumed).

Information modules (C2-C5) are excluded from the study because the product in scope does not have filters, hoods/replaceable masks, batteries/power supply or air supply components.

(1) LC = load capacity (kg or dwt)
(2) FCFC = full capacity fuel consumption (l/100 km)
(3) CU = capacity utilisation, including empty returns (%)

4.2.5 Flow diagram



4.3 Data collection and quality

Specific data was gathered by 3M for the core processes and are based on 2021 production volumes and extrapolations of measurements on specific machines.

Generic data for upstream and downstream processes are used as available in the LCA for Experts™ software from sphera™ and databases and are representative of the years 2018-2021.

Both specific and generic data are modelled to be specific to the technologies or technology mixes under analysis. Where technology-specific data are unavailable, proxy data are used.

The technological representativeness is considered to be good. All data are collected specific to the countries or regions under analysis. Where country or region specific data are unavailable, proxy data are used. The geographical representativeness is considered to be good.

Data quality analysis is performed based on the EU Product Environmental Footprint (PEF) Guidance. The overall data quality score is at least 'very good' meaning that the data meet the criterion to a high degree, with a little significant need for improvement. Consequently, the results for each impact indicator can be used appropriately in this EPD.

4.4 Calculation procedure

The LCA model was created using the LCA for Experts™ software (LfE) (version 10.6.1.35, DB 8.7, 2022.1) system for life cycle engineering. The modelling process used both primary data collected from the actual manufacturing process, and secondary data available in the LfE databases including industry-average data, data available from literature studies and data available from published databases.

All relevant process steps for each scenario are considered and modelled to represent each specific situation. The process chain is considered sufficiently complete with regard to the goal and scope of this study. Cross-checks concerning the plausibility of mass and energy flows are carried out on the data received. Similar checks are made on the software model developed during the study. To ensure consistency, all primary data are collected with the same level of detail, while all background data are selected from the LfE databases.

4.4.1 Key assumptions

Key assumptions made in this study relate to energy input (selection of renewable technology mixes), product waste data for certain manufacturing process steps (based on main material components in waste, and the % waste water evaporation in certain processes).

Next to key assumptions, some general assumptions are included on different levels in the model:

- When no specific data for the raw material is available it is modelled based on the material content information in combination with generic production data.
- When specific raw material packaging data is not provided, a default packaging is assumed based on professional judgement and the type of raw material.
- Packaging waste of raw materials is assumed to be landfilled. When the type of process waste disposal is unknown, it is assumed to be landfilled.
- Distances between raw material suppliers and 3M sites on the same continent are assumed to be 2500 km (or 1553 miles) whilst a distance of 1000 km (or 621 miles) is taken when located in the same country. 100 km (or 62.1 miles) transportation distance is assumed for the disposal of materials.
- Eurostat data was used to model product and packaging disposal in the downstream processes.

4.4.2 Cut-off criteria

All available data from the product production processes are considered, i.e. all pre-products/raw materials used, packaging material and relevant energy flows using best available LCI datasets (including data contributing <1% to mass or energy). Transport processes for raw material packaging as well as internal transport in the facilities is excluded. Production and/or energy consumption of machines, facilities and infrastructure/ capital goods required during manufacture are excluded. In addition, the use of energy and water of any non-strictly manufacturing processes is excluded from the study. Energy credits generated during waste disposal are excluded and a worst-case approach is applied. For recycling processes, a cut-off is applied before the recycling facility gate (i.e., Polluter Pays).

4.4.3 Allocation rules

For energy consumption during manufacturing, allocation by mass and runtime per workcenter is applied depending on the manufacturing process considered. Process water consumption is mass-allocated based on respirator production volumes. No co-products are created in the production processes.

5 Environmental Performance

The environmental parameters are declared for upstream, core and downstream processes. The overall impact of the product is divided into potential environmental impacts, use of resources and other indicators. All environmental impacts are reported per declared unit.

5.1 Potential environmental impact

The reported environmental impacts, based on draft PCR 2023:XX v1.0 result from characterisation models applied to the life cycle stages considered in the study.

Total pollutant emissions from the operations included in the system boundaries are reported as potential environmental impacts, using the version 2.0 core environmental impact indicators of EN15804:2012+A2:2019 based on EF 3.0 (Nov. 2019 EC-JRC characterisation factors). Data refer to the declared unit as mentioned in section 4.1.

Next to the mandatory indicators some optional indicators are reported (SM, RSF, NRSF, FW, and the waste and output flows indicators) to gain more insights in the waste characteristics, secondary material use and water consumption during the life cycle.

	Default list environmental performance indicators IES						
	Up	Core		Downstream			
	Product stage			Distribution stage		Use stage	End-of-Life stage
	A1	A2	A3	A4	A5	B1	C1
GWP-total [kg CO2 eq.]	6.05E-02	1.65E-02	1.96E-02	7.58E-03	1.53E-02	1.69E-02	9.13E-03
GWP-fossil [kg CO2 eq.]	9.14E-02	1.64E-02	9.49E-03	7.51E-03	1.69E-04	6.97E-04	9.13E-03
GWP-biogenic(2) [kg CO2 eq.]	-3.10E-02	3.64E-05	1.01E-02	2.62E-05	1.51E-02	1.62E-02	8.21E-07
GWP-luluc [kg CO2 eq.]	5.98E-05	6.79E-05	4.86E-05	5.02E-05	3.91E-07	6.03E-07	7.74E-07
ODP [kg CFC-11 eq.]	2.91E-12	1.52E-15	5.60E-11	7.36E-16	3.24E-16	1.41E-16	4.69E-16
AP [Mole of H+ eq.]	2.17E-04	1.36E-04	7.06E-05	1.81E-05	7.14E-07	3.18E-07	1.28E-06
EP-freshwater [kg P eq.]	6.12E-07	5.57E-08	2.66E-07	2.66E-08	4.17E-10	1.24E-09	1.08E-08
EP-marine [kg N eq.]	6.82E-05	4.49E-05	1.75E-05	7.10E-06	2.54E-07	1.16E-07	3.16E-07
EP-terrestrial [Mole of N eq.]	7.11E-04	4.96E-04	1.64E-04	8.06E-05	3.38E-06	1.45E-06	5.63E-06
POCP [kg NMVOC eq.]	2.15E-04	1.07E-04	5.05E-05	1.57E-05	6.49E-07	2.77E-07	8.71E-07
ADP-min&met(3) [kg Sb eq.]	1.95E-07	2.92E-09	5.59E-08	7.54E-10	1.35E-11	1.23E-11	2.42E-11
ADP-fossils(3) [MJ]	2.46E+00	2.12E-01	5.70E-02	9.87E-02	1.63E-03	1.50E-03	3.27E-03
WDP(3) [m³ world equiv.]	2.07E-02	3.62E-04	8.73E-03	8.35E-05	4.28E-04	7.89E-05	8.28E-04

See section 6.5 for a list acronyms used in this table

(2) The negative values for GWP-biogenic can be attributed to the production of the paper and/or wood products. Trees, used for the production of the paper, absorb CO_2 during the growth process which therefore gives a negative impact on CO_2 emissions.

(3) The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

5.2 Use of resources

The main resource consumption contributors for the Aura 9332+ respirator are reported in the table below. Use of resources without energy content is expressed in kg or m³ per declared unit. Energy data are expressed in MJ per declared unit and as net calorific value. The net calorific value or lower heating value is calculated by subtracting the heat of vaporisation of water from the higher heating value. The results from the tables should be interpreted over the different modules and as they are calculated by the LfE software.

	Use of resources according to EN 15804+A2						
	Up	Core		Downstream			
	Product stage			Distribution stage		Use stage	End-of-Life stage
	A1	A2	A3	A4	A5	B1	C1
PERE [MJ]	5.77E-01	1.12E-02	1.54E+00	6.78E-03	2.55E-04	1.54E-04	4.10E-04
PERM [MJ]	2.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT [MJ]	8.44E-01	1.12E-02	1.54E+00	6.78E-03	2.55E-04	1.54E-04	4.10E-04
PENRE [MJ]	1.81E+00	2.19E-01	5.71E-02	9.91E-02	1.64E-03	1.50E-03	3.27E-03
PENRM [MJ]	6.77E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [MJ]	2.48E+00	2.19E-01	5.71E-02	9.91E-02	1.64E-03	1.50E-03	3.27E-03
SM [kg]	3.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m³]	9.04E-04	1.86E-05	2.75E-04	7.84E-06	1.01E-05	1.94E-06	1.95E-05

See section 6.5 for a list acronyms used in this table

5.3 Output flows and waste categories

The important output flows and waste categories for the Aura 9332+ respirator are reported in the tables below. All material flows are expressed in kg per declared unit while the exported energy data is expressed in MJ per declared unit and as net calorific value. CRU, MFR, MER, EEE and EET are to be optionally reported per draft PCR 2023:XX v1.0. It should be noted that 3M processes do not generate radioactive waste and the values are presented as calculated in the LfE software.

	Waste categories according to EN 15804+A2						
	Up	Core		Downstream			
	Product stage			Distribution stage		Use stage	End-of-Life stage
	A1	A2	A3	A4	A5	B1	C1
HWD [kg]	6.90E-04	1.03E-12	2.70E-04	5.23E-13	9.13E-14	4.04E-14	2.27E-13
NHWD [kg]	1.43E-02	2.72E-05	1.34E-01	1.61E-05	7.45E-03	1.16E-02	7.56E-03
RWD [kg]	5.29E-05	4.67E-07	1.78E-06	1.83E-07	5.25E-08	1.50E-08	7.56E-08

See section 6.5 for a list acronyms used in this table

	Output flows according to EN 15804+A2						
	Up	Core		Downstream			
	Product stage			Distribution stage		Use stage	End-of-Life stage
	A1	A2	A3	A4	A5	B1	C1
CRU [kg]	0.00E+00	0.00E+00	1.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	4.52E-04	0.00E+00	5.10E-03	1.11E-02	1.07E-02
MER [kg]	0.00E+00	0.00E+00	1.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

See section 6.5 for a list acronyms used in this table

6 Additional Information

6.1 Other environmental information

6.1.2 Uncertainty on the environmental indicators

Data quality and uncertainty are mutually dependent. The precision of the data depends on measuring tolerance, assumptions, completion, comprehensiveness of the considered system and the representativeness of the data. Uncertainty is also introduced in the impact assessment phase of the study, and will vary according to the impact categories considered.

To get an idea of the uncertainty of the potential environmental impact, it is calculated for each reference and midpoint based on a pedigree matrix, using six different data quality indicators, and Monte Carlo analysis. The uncertainty results are presented below and are calculated for the default list of environmental performance indicators from IES.

Each impact indicator has an uncertainty ranging from -10% to -24% for the lower Δ% and 10% - 29% apart from GWP-luluc and ODP where the uncertainty reaches percentages of 34% and -50% to 88% respectively.

The percentages can be explained by the significant contribution of a number of datasets with lower data quality scores.

As a conclusion the results of these indicators should be interpreted carefully, but can nevertheless be justified because correct data selection rules were followed, uncertainty is biased by these datasets and the weight of certain data quality indicators that were scored lower for these data is highest. In addition, data quality for these indicators is overall very good which typically results in a low and acceptable uncertainty.

	Min	Max	Base	Lower Δ%	Upper Δ%
GWP-total	9.99E-02	1.24E-01	1.11E-01	-10%	12%
GWP-fossil	1.25E-01	1.47E-01	1.35E-01	-10%	10%
GWP-biogenic	8.24E-03	1.35E-02	1.05E-02	-22%	29%
GWP-luluc	1.73E-04	3.05E-04	2.28E-04	-24%	34%
ODP	2.96E-11	1.11E-10	5.89E-11	-50%	88%
AP	3.84E-04	5.32E-04	4.44E-04	-14%	20%
EP-freshwater P	8.84E-07	1.07E-06	9.72E-07	-10%	10%
EP-marine	1.21E-04	1.65E-04	1.38E-04	-12%	20%
EP-terrestrial	1.27E-03	1.73E-03	1.46E-03	-13%	18%
POCP	3.46E-04	4.54E-04	3.90E-04	-11%	16%
ADP-min&met	2.22E-07	2.92E-07	2.55E-07	-13%	15%
ADP-fossil	2.62E+00	3.10E+00	2.84E+00	-10%	10%
WDP	2.78E-02	3.53E-02	3.12E-02	-11%	13%

6.2 Social and economic aspects

As a company which operates around the world, including many underdeveloped areas, 3M has grown into a global leader in helping others. For many years we have been investing our people and resources to make a positive impact through schemes like 3M gives, focusing on helping improve education, communities and the environment.

3M gives improves lives and builds sustainable communities through social investments and thoughtful engagement of 3Mers worldwide. 3M was one of the first companies to establish a foundation in 1953, and since then we have invested over $1.98 billion in cash and product contributions in communities where 3M operates.

Our employees regularly take on challenges to raise money through charity events and share their skills through 3M's Impact programme, with diverse teams of 3Mers travelling to communities around the world to spend two immersive weeks collaborating with a local non-profit organisation, social enterprise or government agency to contribute to a solution for a pressing social or environmental issue.

3M also has a strong culture of inclusion and diversity, which is an essential driver of our continual innovation. To encourage this, we regularly form strategic partnerships with many professional associations, colleges and universities to help identify diverse candidates and regularly participate in campus recruiting activities.[1]

6.3 Validity of the EPD and changes versus previous version

This version of the EPD is valid until 2024-09-25.

A yearly follow-up procedure to assess the EPD's data validity does not apply as this document is a pre-certified EPD with a limited validity period.

6.4 Information related to pre-certified EPD

This document is a pre-certified EPD with a validity period of maximum 1 year (i.e., the validity period cannot be renewed), and expires on 2024-09-25. This type of EPD is published because the PCR of this product category (PCR 2023:XX, v1.0) is currently under development.

[1]Social and economic aspects mentioned in this section are included in 3M's 2023 Global Impact report that is referenced in section 6.6.

6.5 Acronyms

Acronym	Meaning
3M	Minnesota Mining and Manufacturing Company
3P	Polluter Prevention Pays
ADP-fossil	Abiotic depletion potential for fossil resources
ADP-min&met	Abiotic depletion potential for non fossil resources (elements)
AP	Acidification potential
CE	Conformité Européenne
CPC	Central Product Classification
CRU	Components for re-use
CU	Capacity utilisation
DB	Database
EEE	Exported electrical energy
EET	Exported thermal energy
EN	European norm
EPD ®	Environmental Product Declaration
EP-freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment
EP-marine	Eutrophication potential, fraction of nutrients reaching marine end compartment
EP-terrestrial	Eutrophication potential, Accumulated Exceedance
Eq	Equivalent(s)
ET-freshwater	Potential Comparative Toxic Unit for ecosystem
EU	European union
FCFC	Full capacity fuel consumption
FFP	Filtering Facepiece
FW	Fresh water consumption
GaBi	Ganzheitliche Bilanzierung (German for holistic balancing)
GEN3	Third Generation
GPI	General Programme Instructions
GWP-biogenic	Global Warming Potential biogenic
GWP-fossil	Global Warming Potential fossil fuels
GWP-GHG	Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology
GWP-luluc	Global Warming Potential land use and land use change
GWP-total	Global Warming Potential total
HWD	Hazardous waste disposed
IES	International EPD System
IPCC	International Panel on Climate Change
IRP	Potential Human exposure efficiency relative to U235
ISO	International Organisation of Standardisation
LCA	Life cycle assessment
LCI	Life Cycle Inventory
LfE	LCA for Experts™
MER	Materials for energy recovery
MFR	Materials for recycling
ND	Not declared
NHWD	Non hazardous waste disposed
NRSF	Use of non renewable secondary fuels
ODP	Depletion potential of the stratospheric ozone layer

PCR	Product Category Rules
PEF	Product Environmental Footprint
PE	Polyethylene
PU	Polyurethane
PENRE	Use of non renewable primary energy as energy carrier
PENRM	Use of non renewable primary energy as raw materials
PENRT	Total use of non renewable primary energy (PENRE + PENRM)
PERE	Use of renewable primary energy as energy carrier
PERM	Use of renewable primary energy as raw materials
PERT	Total use of renewable primary energy (PERE + PERM)
POCP	Formation potential of tropospheric ozone
PSD	Personal Safety Division
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RDW	Resource depletion (water)
RPD	Respiratory Protective Device
RSF	Use of renewable secondary fuels
RSL	Reference service life
RWD	Radioactive waste disposed
TM	Trade Mark
SGS	Société Générale de Surveillance
SVHC	Substances of Very High Concern
SM	Use of secondary material
SQP	Potential soil quality index
US	United States
WDP	Water (user) deprivation potential, deprivation-weighted water consumption

6.6 References

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