

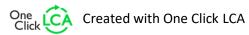
ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14021

ZND SmartWeld 2.3 Fixed Leg Barrier ZND UK



Self-declared EPD Created on 21/02/2024







GENERAL INFORMATION

MANUFACTURER

Manufacturer	ZND UK
Address	Mangham Road Barbot Hall Industrial Estate Rotherham South Yorkshire S61 4RJ
Contact details	sales@znduk.com
Website	https://www.znd.com/

EPD REFERENCES AND SCOPE

Reference standard	EN 15804+A2:2019
Sector	Manufactured product
Category of EPD	Self-declared EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Borja Bustamante Mediavilla (KLH Sustainability)

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

. Noboc:	
Product name	ZND SmartWeld 2.3 Fixed Leg Barrier
Additional labels	
Product reference	Code 01063010
Place of production	United Kingdom / Rotherham
Period for data	calendar year 2022
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	1 %

ENVIRONMENTAL DATA SUMMARY

1 kg of steel barriers										
1 kg										
3.14E+00										
3.14E+00										
32.4										
92.3										
11.9										
3.93E-02										



PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

ZND is the world's foremost manufacturer of high-quality temporary fencing, hoarding, barriers and associated products. With factories in the United Kingdom, United States, Holland and Poland, we are able to supply our industry leading products at scale to clients across the globe.

Our mission is to supply the market with the safest and most effective demarcation solution. To achieve this we are committed to the principles of Stronger Safer Smarter, which have driven us to innovate on product designs, develop new solutions to old problems and adopt new technology.

ZND products have a well-deserved reputation for excellence, which has seen them employed to provide the crowd control at some of the world's largest and most prestigious events, including the Olympic and Commonwealth Games, the funeral of HM Queen Elizabeth II and the coronation of HM King Charles III.

PRODUCT DESCRIPTION

Robust tubular frames, designed safety features and rigorous testing have ensured ZNDs SmartWeld Barriers have become a mainstay in the events and construction industry. Highly efficient state-of-the-art automated manufacturing processes ensure that SmartWeld Barriers are of consistently high quality, and able to deliver an effective and sustainable demarcation solution.

Further information can be found at https://www.znd.com/gb/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	100	Europe
Minerals		
Fossil materials		
Bio-based materials		

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	
Biogenic carbon content in packaging, kg C	

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of steel barriers
Mass per declared unit	1 kg
Functional unit	
Reference service life	

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).





PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Pro	duct st	age		embly age	Use stage End of life stage								ge	Beyond the system bounda es				
A1	A2	А3	A4	A5	B1	B2	В3	B4	B5	В6	B7	C1	C2	C3	C4		D	
x	x	x	x	x	MN D	MN D	MN D	MN D	MN D	MN D	MN D	x	x	x	x	x	x	
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Environmental considerations for the product phase encompass the production of raw materials, including the manufacturing of packaging materials and other supplementary materials. This stage also accounts for the fuels utilized by machinery, along with the management of waste generated during the production processes at manufacturing facilities. The study additionally takes into account material losses that occur throughout

the manufacturing processes, as well as losses incurred in the grid during electricity transmission.

A1:

The environmental impacts of raw material supply (A1) include emissions generated when raw materials are taken from nature, transported to industrial units for processing, along with waste handling from the various production processes. The supplied materials go over processes, such as hot and cold rolled strips, heat treated and drawn. The study also takes into account material losses that occur during the manufacturing processes, assuming a 3.2% loss for steel.

A2:

The environmental impact of the transportation of the input materials to the ZND factory (A2) has been calculated based on the distance from ZND suppliers to their factory. The distance for materials from the supplier to the factory is estimated based on the country of origin.

The materials included in the ZND product consist of metals, packaging, along with ancillary material, they are transported by truck and shipped to the production facility.

A3:

The manufacturing environmental impact (A3) covers the energy used and the waste from the production of the barriers, as well as steel strap packaging used, and fuel consumption of the forklifts used in the factory. The electricity and fuel consumption required during the manufacturing process is allocated from the annual production representative year, which is 2022. Allocation is necessary because multiple parallel production lines have different outputs and technology levels.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.





A4:

Transportation impacts resulting from the delivery of final products to the construction site (A4) encompass not only direct exhaust emissions from fuel but also extend to the environmental impacts of fuel production and associated infrastructure emissions. ZND Barriers Products are distributed across multiple European countries, with sales data from 2022 serving as the basis for calculating average shipping and truck distances. This calculation considers representative products within the averaged product system.

ZND average barriers and their packaging predominantly reach destinations within the UK while the remaining are distributed to various European countries. The combined average transportation distances amount to 415 km by truck and 800 km via sea freight. It is assumed that the vehicle capacity utilization volume factor is at 100%, indicating a full load during transportation.

A5:

The installation phase incurs no material loss, as it involves the collection of packaging materials for subsequent processing. This step comprehensively addresses the environmental impacts associated with steel recycling and the fuel required for barrier installation.

To elaborate, the environmental impact within the installation stage (A5) primarily involves the recycling of steel strap packaging waste and the assumed diesel consumption by forklifts during the unloading of barriers from the lorry.

PRODUCT USE AND MAINTENANCE (B1-B7)

Use-phase and maintenance are not investigated as actions are not needed during connector's lifespan. Air, soil, and water impacts during the use phase have not been studied.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

C1:

It is assumed that if a product is de-installed, it will be done by the forklifts (diesel consumption) while the barriers are loaded into the lorry, which will end up in waste streams as part of the deconstruction process for the barriers

The end-of-waste scenarios assumed for the ZND, are metals being separated for recycling and parts being landfilled. It is also assumed that the waste is collected separately and transported to the waste treatment center.

C2:

The transportation distance to the treatment center is assumed to be 50 km for both landfilling and recycling methods, with the transportation method being a lorry.

C3:

The recycling recovery rate for steel and aluminium is stipulated at 93%, with the selection of this based on statistics from the UK government.

C4:

7% of steel is assumed to be landfilled based on statistics from the UK government.

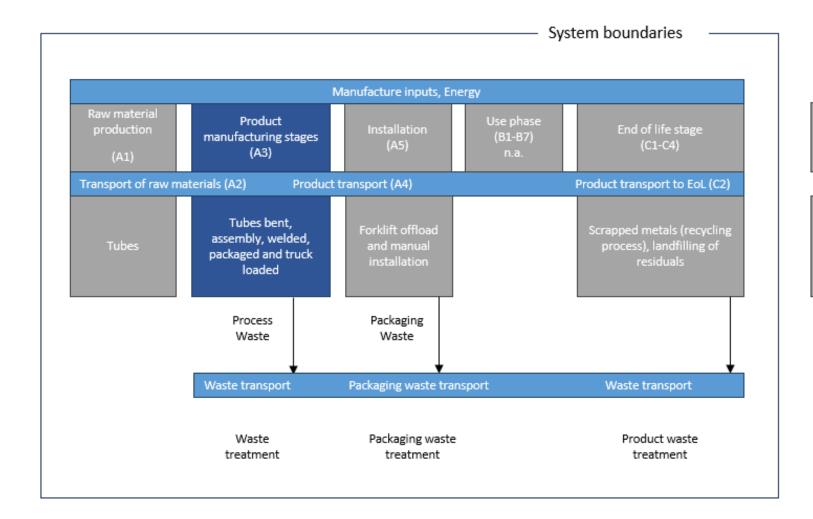
D:

The benefits and environmental impacts of recycling are included in Module D for packaging materials as well.





MANUFACTURING PROCESS



Beyond system boundaries (D)

Benefits from product and packaging material recycling.





LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	No allocation
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Representative product
Variation in GWP-fossil for A1-A3	1 %

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.





ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	А3	A1-A3	A4	A5	B1	B2	В3	B4	B5	В6	B7	C1	C2	С3	C4	D
GWP – total ¹⁾	kg CO₂e	3.05E+00	3.30E-02	5.45E-02	3.14E+00	2.45E-02	2.61E-03	MND	2.56E-03	4.69E-03	2.04E-02	3.69E-04	2.34E+00						
GWP – fossil	kg CO₂e	3.06E+00	3.30E-02	5.05E-02	3.14E+00	2.45E-02	2.61E-03	MND	2.56E-03	4.69E-03	2.04E-02	3.69E-04	2.34E+00						
GWP – biogenic	kg CO₂e	-3.91E-03	0.00E+00	3.91E-03	6.29E-18	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
GWP – LULUC	kg CO₂e	2.19E-03	1.88E-05	6.41E-05	2.28E-03	9.39E-06	3.17E-07	MND	2.55E-07	1.73E-06	2.67E-05	3.48E-07	3.15E-03						
Ozone depletion pot.	kg CFC ₋₁₁ e	1.31E-07	7.10E-09	3.76E-09	1.41E-07	5.60E-09	5.54E-10	MND	5.47E-10	1.08E-09	2.52E-09	1.49E-10	1.11E-07						
Acidification potential	mol H†e	1.31E-02	6.57E-04	2.06E-04	1.39E-02	1.31E-04	2.72E-05	MND	2.66E-05	1.99E-05	2.59E-04	3.47E-06	1.68E-02						
EP-freshwater ²⁾	kg Pe	0.00E+00	1.67E-07	1.23E-06	1.40E-06	1.96E-07	1.10E-08	MND	8.47E-09	3.84E-08	1.09E-06	3.86E-09	8.90E-05						
EP-marine	kg Ne	3.10E-03	1.65E-04	4.95E-05	3.32E-03	3.74E-05	1.19E-05	MND	1.18E-05	5.90E-06	5.46E-05	1.20E-06	2.28E-03						
EP-terrestrial	mol Ne	3.27E-02	1.83E-03	5.79E-04	3.51E-02	4.14E-04	1.31E-04	MND	1.29E-04	6.51E-05	6.32E-04	1.32E-05	2.58E-02						
POCP ("smog") ³⁾	kg NMVOCe	1.08E-02	4.86E-04	1.58E-04	1.15E-02	1.27E-04	3.59E-05	MND	3.55E-05	2.08E-05	1.74E-04	3.84E-06	5.37E-03						
ADP-minerals & metals ⁴⁾	kg Sbe	6.24E-05	6.57E-08	1.13E-06	6.36E-05	5.65E-08	7.37E-09	MND	1.30E-09	1.10E-08	2.74E-06	8.47E-10	9.79E-05						
ADP-fossil resources	MJ	3.12E+01	4.52E-01	1.16E+00	3.28E+01	3.65E-01	3.52E-02	MND	3.44E-02	7.05E-02	2.76E-01	1.01E-02	2.95E+01						
Water use ⁵⁾	m³e depr.	-2.57E-01	1.71E-03	1.31E-02	-2.42E-01	1.62E-03	1.05E-04	MND	9.25E-05	3.15E-04	5.35E-03	3.21E-05	7.29E-01						

¹⁾ GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.



ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

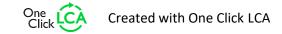
Impact category	Unit	A1	A2	А3	A1-A3	A4	A5	B1	B2	В3	B4	B5	В6	В7	C1	C2	С3	C4	D
Particulate matter	Incidence	0.00E+00	2.14E-09	2.11E-09	4.24E-09	2.74E-09	7.21E-10	MND	7.12E-10	5.41E-10	3.38E-09	6.98E-11	2.01E-07						
Ionizing radiation ⁶⁾	kBq U235e	0.00E+00	2.21E-03	3.67E-02	3.90E-02	1.74E-03	1.66E-04	MND	1.58E-04	3.36E-04	3.08E-03	4.57E-05	3.25E-01						
Ecotoxicity (freshwater)	CTUe	0.00E+00	3.30E-01	1.23E+00	1.56E+00	3.25E-01	2.36E-02	MND	2.07E-02	6.34E-02	1.25E+00	6.59E-03	7.98E+01						
Human toxicity, cancer	CTUh	0.00E+00	1.61E-11	5.75E-11	7.37E-11	8.39E-12	8.80E-13	MND	7.93E-13	1.56E-12	3.83E-11	1.65E-13	9.35E-08						
Human tox. non-cancer	CTUh	0.00E+00	2.86E-10	8.23E-10	1.11E-09	3.19E-10	1.89E-11	MND	1.50E-11	6.27E-11	1.71E-09	4.31E-12	6.62E-08						
SQP ⁷⁾	-	0.00E+00	2.56E-01	4.43E-01	6.99E-01	4.09E-01	5.86E-03	MND	4.47E-03	8.12E-02	5.55E-01	2.16E-02	1.81E+01						

⁶⁾ EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	А3	A1-A3	A4	A5	B1	B2	В3	B4	B5	В6	В7	C1	C2	С3	C4	D
Renew. PER as energy ⁸⁾	MJ	7.93E+00	4.56E-03	1.97E-01	8.13E+00	4.06E-03	3.06E-04	MND	1.97E-04	7.94E-04	4.89E-02	8.78E-05	1.02E+01						
Renew. PER as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
Total use of renew. PER	MJ	7.93E+00	4.56E-03	1.97E-01	8.13E+00	4.06E-03	3.06E-04	MND	1.97E-04	7.94E-04	4.89E-02	8.78E-05	1.02E+01						
Non-re. PER as energy	MJ	3.30E+01	4.52E-01	1.16E+00	3.46E+01	3.65E-01	3.52E-02	MND	3.44E-02	7.05E-02	2.76E-01	1.01E-02	2.95E+01						
Non-re. PER as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
Total use of non-re. PER	MJ	3.30E+01	4.52E-01	1.16E+00	3.46E+01	3.65E-01	3.52E-02	MND	3.44E-02	7.05E-02	2.76E-01	1.01E-02	2.95E+01						
Secondary materials	kg	3.24E-01	1.72E-04	5.99E-04	3.25E-01	1.04E-04	1.42E-05	MND	1.35E-05	1.96E-05	3.07E-04	2.12E-06	3.34E-01						
Renew. secondary fuels	MJ	0.00E+00	9.23E-07	2.14E-06	3.07E-06	1.00E-06	7.97E-08	MND	4.40E-08	1.97E-07	1.60E-05	5.55E-08	1.11E-03						
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
Use of net fresh water	m³	3.89E-02	4.36E-05	3.07E-04	3.93E-02	4.65E-05	2.47E-06	MND	2.09E-06	9.13E-06	1.62E-04	1.11E-05	3.05E-02						

⁸⁾ PER = Primary energy resources.





END OF LIFE – WASTE

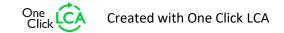
Impact category	Unit	A1	A2	А3	A1-A3	A4	A5	B1	B2	B3	B4	B5	В6	B7	C1	C2	С3	C4	D
Hazardous waste	kg	1.58E-01	5.56E-04	5.01E-03	1.63E-01	4.85E-04	5.04E-05	MND	4.60E-05	9.34E-05	1.88E-03	0.00E+00	3.68E+00						
Non-hazardous waste	kg	9.37E-01	6.79E-03	4.84E-02	9.93E-01	7.83E-03	4.59E-04	MND	3.24E-04	1.54E-03	5.99E-02	7.00E-02	4.22E+00						
Radioactive waste	kg	7.63E-04	3.16E-06	9.54E-06	7.76E-04	2.45E-06	2.47E-07	MND	2.42E-07	4.71E-07	1.62E-06	0.00E+00	1.04E-04						

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	В3	B4	B5	В6	B7	C1	C2	С3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
Materials for recycling	kg	6.41E-03	0.00E+00	3.20E-02	3.84E-02	0.00E+00	2.05E-03	MND	0.00E+00	0.00E+00	9.30E-01	0.00E+00	0.00E+00						
Materials for energy rec	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	В3	B4	B5	В6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO₂e	0.00E+00	1.91E-05	4.98E-02	4.98E-02	2.42E-02	2.58E-03	MND	2.53E-03	4.64E-03	2.00E-02	3.61E-04	2.33E+00						
Ozone depletion Pot.	kg CFC ₋₁₁ e	0.00E+00	3.51E-12	3.28E-09	3.28E-09	4.44E-09	4.39E-10	MND	4.33E-10	8.55E-10	2.04E-09	1.18E-10	8.40E-08						
Acidification	kg SO₂e	0.00E+00	6.34E-08	1.63E-04	1.63E-04	1.03E-04	1.94E-05	MND	1.89E-05	1.54E-05	2.09E-04	2.62E-06	1.42E-02						
Eutrophication	kg PO ₄ ³e	0.00E+00	1.44E-08	5.85E-05	5.85E-05	2.05E-05	4.55E-06	MND	4.39E-06	3.52E-06	6.90E-05	5.65E-07	3.67E-03						
POCP ("smog")	kg C ₂ H ₄ e	0.00E+00	2.47E-09	8.69E-06	8.69E-06	3.68E-06	4.33E-07	MND	4.14E-07	6.03E-07	7.90E-06	1.10E-07	8.49E-05						
ADP-elements	kg Sbe	0.00E+00	4.37E-11	1.13E-06	1.13E-06	5.47E-08	7.34E-09	MND	1.28E-09	1.07E-08	2.74E-06	8.35E-10	9.78E-05						
ADP-fossil	МЈ	0.00E+00	2.89E-04	1.16E+00	1.16E+00	3.65E-01	3.52E-02	MND	3.44E-02	7.05E-02	2.76E-01	1.01E-02	2.95E+01						





CORPORATE STATEMENT

This EPD is a self-declared EPD done with the support of KLH sustainability and referenced on LCA standards.

Sufficient knowledge and experience of construction and events products were employed to develop this self-declared EPD. The specific product category, the construction and events industry expertise, relevant standards, and the geographical area of this product LCA were taken into consideration.

The company specific data utilized is consistent and we are responsible for its factual integrity.

BM

Borja Bustamante Mediavilla (KLH Sustainability)

James McLean (ZND)





ANNEXE

CATALOGUE OF PRODUCTS

The results shown above are based on the representative case that is highlighted in the table below.

Name of Product	Code of Product	Kg/Unit	Size
2.3 Fixed Leg Trade Barrier	01062910	8.1	2262x1100
SmartWeld 2.3 Bar Barrier	01062010	8.7	2262x1100
SmartWeld 2.3 Fixed Leg Barrier	01063010	10	2262x1100
SmartWeld 2.5 Bar Barrier	01064010	10.1	2517x1100
SmartWeld 2.5 Fixed Leg Barrier	01065010	10.8	2510x1100
Bar Barrier 2.3 HDG	01062490	13.7	2404x1100
Fixed Leg Barrier 2.3 HDG	01063015	15	2404x1100
Bar Barrier 2.3 HDG Reflective Board	01062500	15.2	2404x1100
Fixed Leg Barrier 2.3 HDG Reflective Board	01063020	16.5	2404x1100

