HA Offshore Master Links and Quad Assemblies

William Hackett

williamhackett.co.uk

The William Hackett UK lifting centre of excellence provides world class capabilities in the design, certification and distribution of industrial chain and lifting products into the oil and gas, marine, renewables, utility and construction sectors.

Our ethos is one of integrity and achieving excellence in all that we do.

William Hackett

williamhackett.co.uk

HA Links DNV Type Approval

DNV

TYPE APPROVAL CERTIFICATE

Certificate No:
TAS00003J2
Revision No:
1

This is to certify:

That the lifting set component for offshore containers and portable offshore units

with type designation(s)
Master link
Intermediate link
Quad assembly

Issued to
WILLIAM HACKETT LIFTING PRODUCTS LIMITED
ALNWICK, United Kingdom

is found to comply with
DNV standard DNV-ST-E271 – 2.7-1 Offshore containers, January 2021 (Amended October 2021)
DNV standard DNV-ST-E273 – 2.7-3 Portable offshore units, April 2016 (Amended October 2021)
ISO 10855-2:2018 Offshore containers and associated liftings sets – Part 2: Design, manufacture and testing of lifting sets
IMO/MSC Circular 860
EN 1677-4 Components for slings – Safety – Part 4: Links, Grade 8

Application :

Grade 8 links for lifting sets for offshore containers and portable offshore units

Issued at **Aberdeen** on **2022-10-04**

This Certificate is valid until **2026-06-30** .
DNV local unit: **Newcastle**

Approval Engineer: **Elisabeth Legg**

for DNV
Satya Shyamala Kuppili
Team Lead - Containers

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Form code: TA 281 Revision: 2021-10 www.dnv.com Page 1 of 5

DNV

TYPE APPROVAL CERTIFICATE

Certificate No:
TAS00003J4
Revision No:
1

This is to certify:

That the lifting set component for offshore containers and portable offshore units

with type designation(s)
Master link (Zinc Tough)
Intermediate link (Zinc Tough)
Quad assembly (Zinc Tough)

Issued to
WILLIAM HACKETT LIFTING PRODUCTS LIMITED
ALNWICK, United Kingdom

is found to comply with
DNV standard DNV-ST-E271 – 2.7-1 Offshore containers, January 2021 (Amended October 2021)
DNV standard DNV-ST-E273 – 2.7-3 Portable offshore units, April 2016 (Amended October 2021)
ISO 10855-2:2018 Offshore containers and associated liftings sets – Part 2: Design, manufacture and testing of lifting sets
IMO/MSC Circular 860
EN 1677-4 Components for slings – Safety – Part 4: Links, Grade 8

Application :

Grade 8 links with corrosion protection for lifting sets for offshore containers and portable offshore units

Issued at **Aberdeen** on **2022-10-04**

This Certificate is valid until **2026-06-30** .
DNV local unit: **Newcastle**

Approval Engineer: **Elisabeth Legg**

for DNV
Satya Shyamala Kuppili
Team Lead - Containers

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Form code: TA 281 Revision: 2021-10 www.dnv.com Page 1 of 5

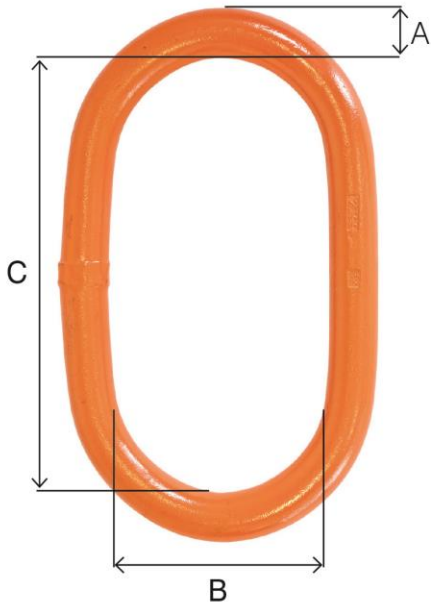
HA range of offshore links: industry leaders

The HA range is the industry leading range of DNV master links based on:

- Approvals: EN, DNV, ASME, API, AS
- Charpy values, including hardness values on certification
- WLL
- Dimensions
- Large Stock Holdings
- Documentation
- Traceability
- Globally recognised

HA: OS+ TAS Revision 3 Changes

Description	Diameter (A) mm	Width (B) mm	Length (C) mm	WLL tonnes		Mass kg	
					OS+		OS+
HA16ML OS+	16.0	75	150	-	4.10	0.72	**0.68**
HA22MLS OS+	22.0	90	162	8.83	**11.00**	1.50	**1.47**
HA22ML OS+	22.0	140	270	5.80	**7.00**	2.30	**2.28**
HA25ML OS+	25.5	140	270	8.83	**9.30**	2.70	**3.11**
HA28MLS OS+	28.0	110	200	14.50	**19.50**	3.00	**2.95**
HA28ML OS+	28.0	140	270	-	14.50	3.80	**3.78**
HA32ML OS+	32.0	140	270	17.10	**19.00**	5.10	**5.02**
HA36ML OS+	36.0	140	270	23.00	**26.00**	6.50	**6.46**
HA40ML OS+	40.0	155	280	28.10	**30.50**	8.50	**8.46**
HA45ML OS+	45.0	175	320	38.30	**40.00**	12.20	**12.18**
HA50ML OS+	50.0	195	350	45.00	**51.00**	16.60	**16.54**
HA65ML OS+	65.0	220	410	-	75.00	33.20	**33.02**
HA75ML OS+	75.0	250	450	-	100.00	49.30	**48.98**

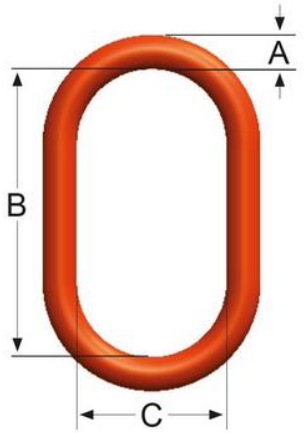


Average impact energy (charpy)
42 Joules minimum impact resistance
at -40°C up to 50mm diameter

Operational temperature range is -40°C to 200°C

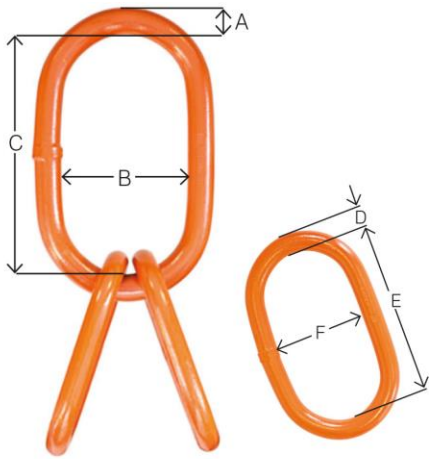
HA: OS+ Master Links

Part Code	Description	A mm	B mm	C mm	WLL t	MPF kN	MBL kN	Mass Kg
330.160+	HA16ML 8 OS+	16.0	150	75	4.10	101	201	0.68
330.22S+	HA22MLS 8 OS+	22.0	162	90	11.00	270	540	1.47
330.220+	HA22ML 8 OS+	22.0	270	140	7.00	172	343	2.28
330.250+	HA25ML 8 OS+	25.5	270	140	9.30	229	456	3.11
330.28S+	HA28MLS 8 OS+	28.0	200	110	19.50	479	956	2.95
330.280+	HA28ML 8 OS+	28.0	270	140	14.50	356	711	3.78
330.320+	HA32ML 8 OS+	32.0	270	140	19.00	466	932	5.02
330.360+	HA36ML 8 OS+	36.0	270	140	26.00	638	1275	6.46
330.400+	HA40ML 8 OS+	40.0	280	155	30.50	749	1496	8.46
330.450+	HA45ML 8 OS+	45.0	320	175	40.00	981	1962	12.18
330.500+	HA50ML 8 OS+	50.0	350	195	51.00	1251	2502	16.54
330.650+	HA65ML 8 OS+	65.0	410	220	75.00	1840	3679	33.02
330.750+	HA75ML 8 OS+	75.0	450	250	100.00	2453	4905	48.98
330.900	HA90ML*	90.0	510	300	150.00	2943	7360	86.00
330.1200	HA120ML*	120.0	610	410	250.00	4905	12260	197.00



HA: OS+ TAS Revision 3 Changes

MASTER LINK				COUPLING LINK						ASSEMBLY			
Description	Dia. (A) mm	Width (B) mm	Length (C) mm	Dia. (D) mm		Width (F)mm		Length (E) mm		WLL (t)		Mass (kg)	
					OS+		OS+		OS+		OS+		OS+
HA16QA OS+	16.0	75	150	-	14.5	-	60	-	125	-	4.10	1.30	1.62
HA22QA OS+	22.0	90	162	20	**22**	70	**90**	140	**162**	8.83	**11.00**	3.56	**4.41**
HA23QA OS+	22.0	140	270	16	**22**	75	**90**	150	**162**	5.80	**7.00**	3.84	**5.22**
HA25QA OS+	25.5	140	270	20	**22**	70	**90**	140	**162**	8.83	**9.30**	5.30	**6.05**
HA26QA OS+	28.0	140	270	20	**22**	70	**90**	140	**162**	-	14.50	-	5.89
HA28QA OS+	28.0	110	200	-	22	70	**90**	140	**162**	-	14.50	5.53	**6.73**
HA32QA OS+	32.0	140	270	25.5	**28**	102	**110**	190	**200**	17.10	**19.00**	9.67	**10.92**
HA36QA OS+	36.0	140	270	-	28	100	**110**	190	**200**	23.00	**26.00**	11.90	**12.35**
HA40QA OS+	40.0	155	280	-	32	-	140	-	270	28.10	**30.50**	18.60	**18.50**
HA45QA OS+	45.0	175	320	-	36	-	140	-	270	38.30	**40.00**	25.40	**25.09**
HA50QA OS+	50.0	195	350	40	**45**	130	**175**	260	**320**	45.00	**51.00**	32.30	**40.89**
HA65QA OS+	65.0	220	410	-	50	-	195	-	350	-	75.00	66.50	**66.10**
HA75QA OS+	75.0	250	450	-	65	-	220	-	410	-	100.00	115.70	**115.02**

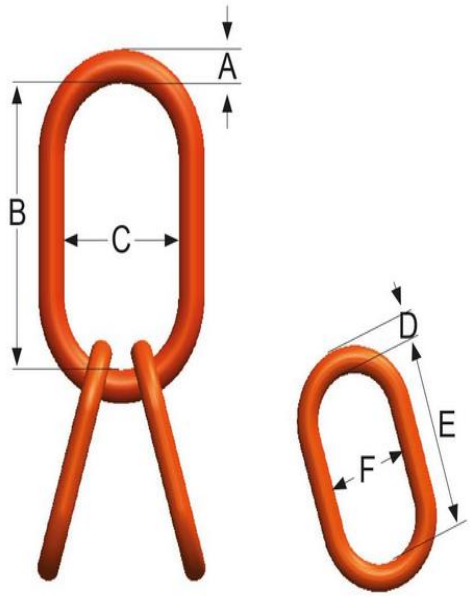


Average impact energy (charpy)
42 Joules minimum impact resistance
at -40°C up to 50mm diameter

Operational temperature range is
-40°C to 200°C

HA: OS+ Master Link Assemblies

Part Code	Description	A mm	B mm	C mm	D mm	E mm	F mm	WLL t	MPF kN	MBL kN	Mass Kg
350.160+	HA16QA 8 OS+	16.0	150	75	14.5	125	60	4.10	101	201	1.62
350.220+	HA22QAS 8 OS+	22.0	162	90	22.0	162	90	11.00	270	540	4.41
350.230+	HA23QA 8 OS+	22.0	270	140	22.0	162	90	7.00	172	343	5.22
350.250+	HA25QA 8 OS+	25.5	270	140	22.0	162	90	9.30	229	456	6.05
350.260+	HA26QA 8 OS+	28.0	270	140	22.0	162	90	14.50	356	711	6.73
350.320+	HA32QA 8 OS+	32.0	270	140	28.0	200	110	19.00	466	932	10.92
350.360+	HA36QA 8 OS+	36.0	270	140	28.0	200	110	26.00	638	1275	12.35
350.400+	HA40QA 8 OS+	40.0	280	155	32.0	270	140	30.50	749	1496	18.50
350.450+	HA45QA 8 OS+	45.0	320	175	36.0	270	140	40.00	981	1962	25.09
350.500+	HA50QA 8 OS+	50.0	350	195	45.0	320	175	51.00	1251	2502	40.89
350.650+	HA65QA 8 OS+	65.0	410	220	50.0	350	195	75.00	1840	3679	66.10
350.750+	HA75QA 8 OS+	75.0	450	250	65.0	410	220	100.00	2453	4905	115.02
350.900	HA90QA*	90.0	510	300	70.0	400	200	150.00	3679	7358	164.10



McKinnon Chain

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161 A Ring Road Duncanville
Vereeniging South Africa
PO Box 61721 Marshalltown
Gauteng, 2107, South Africa
Tel: +27 16 428-6000
Fax: +27 16 428-1089/1212/1420
E-mail: chainsec@scaw.co.za
Website: www.mckinnonchain.co.za

Test Certificate for Oblong Master Links/Sub-assemblies according to EN 10204 2.2 & ISO 10474 2.2
Declaration of conformity according to Directive 2006/42/EC, Annex II 1. B

Certificate number **CC20 0050**

Supplied To:	**William Hackett Lifting Products Limited**						
Customer Order No.:	**602002**						
Scaw Order No.:	**917534**						
Order date:	**04 March 2020**						
Dispatch date:	**09 March 2020**						
Commodity No.:	**OML360DNV**						
Product Description:	**HA-36ML OS+ Oblong Master Link to DNV 2.7-1 - Orange Powder Coated**						
Total Quantity:	**160 Each**						
Batch number:	**19L**	**19E**					
Drum number:	**38,40**	**39**					
Quantity per batch:	**122**	**38**					
Date of manufacture:	**December 2019**	**May 2019**					
Date tested:	**January 2020**	**June 2019**					
Markings:	**HA-36ML OS+ & Batch Number**						
Intended for:	**Lifting slings**						

Mechanical properties:	***Metric:***			***Imperial:***		
Working Load Limit:	**26 tonne**			**57319 lbs**		
Proof Force Minimum:	**638 kN**	*Proof Force:*	**638 kN**	**143428 lbf**	*Proof Force:*	**143428 lbf**
Break Force Minimum:	**1275 kN**	*Break Force Exceeds:*	**1275 kN**	**286630 lbf**	*Proof Force Exceeds:*	**286630 lbf**
Safety Factor:	**5 : 1**			**5 : 1**		
Charpy V-notch Impact value:	**≥42 Joule**	***at -40°C***		**≥31 ft-lb**	***at -40°F***	
Typical Hardness:	**34-36**	HRC				

Chemical analysis of steel:

		C	*Si*	*Mn*	*P*	*S*	*Ni*	*Cr*	*Mo*	*Al*
Specification	*Min*	**0.20**	**0.15**	**1.10**	**0**	**0**	**0.90**	**0.40**	**0.28**	**0.025**
	Max	**0.25**	**0.25**	**1.30**	**0.025**	**0.020**	**1.10**	**0.60**	**0.32**	**0.080**

Notes:

100% of components are proof tested in accordance with EN1677-4 and in addition the products are also 100% MPI tested.
100% of DNV GL components are then heat treated post proof testing and MPI to minimize the risk of hydrogen embrittlement and stress corrosion cracking.
Typical grain size ≥6 in accordance to ASTM E112 and ISO 643.

Manufacturer's certificate refers to EN 1677-4.

ISO 9001:2015 approval by SGS (Certificate ZA17/209870) - Address: Harrowdene Office Park, Building 1, Western Service Road, Woodmead, Johannesburg, 2191, South Africa
Company Representative: C. Djordjevic (General Manager - McKinnon Chain a division of Scaw South Africa (PTY) Ltd)
Technical file compiled and certificate signed off by: F. Strydom (Technical Manager) - Use company address above

After treatment of chain : This certificate is only applicable to goods properly used in the condition supplied by McKinnon Chain a division of Scaw South Africa (PTY) Ltd. Further processing by, or on behalf of, the user (involving: cold working, heating, electroplating, hot-dip galvanizing or other treatments) is entirely the user's responsibility and invalidates this certificate and the manufacturer`s product warranty obligations. This certificate is invalidated by any alterations and/or deletion to the content of the original certificate.

The components are designed, approved, tested and certified in accordance with the following specification / standard:
DNV GL 2.7-1 and DNV GL 2.7-3
This certificate is based on DNV GL type approval no. TAS000013Z Revision 3.

Vereeniging, Gauteng, RSA

Authorized Person	F. Strydom (Technical Manager)	**Signature**		2020-04-07

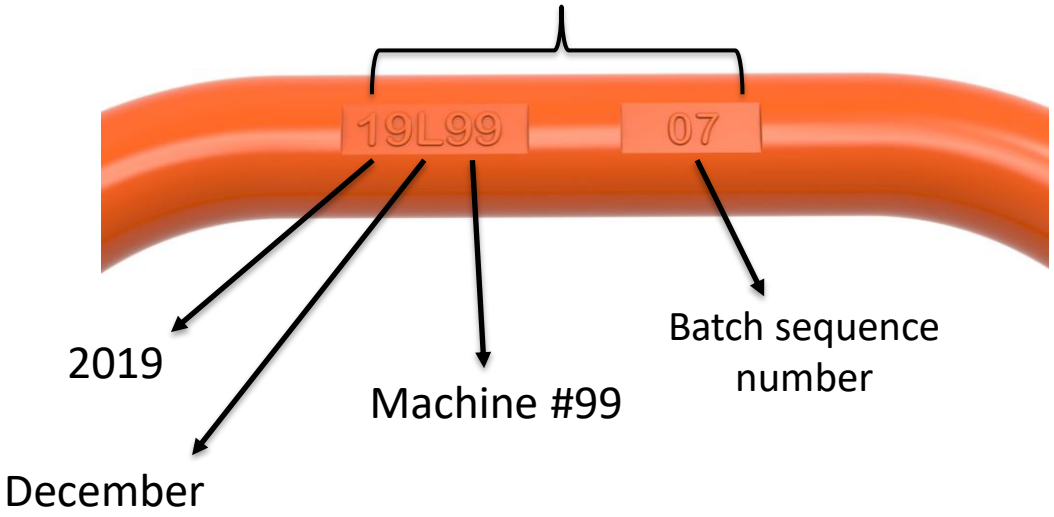
GEN-TST-001-F-02-00

Test certificate

- Quality control: 100% of links are proof tested and MPI inspected and provided with a secondary heat treatment process to remove the stresses in the product from the proof loading process.
- This combination of process produces the perfect product that is delivered to the customer.
- The product is then supported through its lifespan with by WHLP and Assure with regard to its certification and traceability.

Product specific traceability

Batch number: traceable throughout the manufacturing process to the raw material cast number



All McKinnon links are marked HA followed by two digits and a series of letters to denote masterlink or quad. This product is a 32mm master link. This format is unique to the HA links.

Master Links with Handles

The William Hackett range of HA master links c/w handles are designed specifically for the lifting and lowering of lifeboats, with a working load limit range of 7t to 26t.

The master links are manufactured from triple alloy steel in accordance with EN1677, they are individually proof load tested to 2.5 times working load limit in accordance with EN1677 and they are all supplied with charpy impact values of in excess of 42 Joules at -40°C.

Links come as Zinc Tough as standard

Test Certificate

McKinnon Chain

DNVGL-ST-E271 • DNVGL-ST-E273 LIFTING SET COMPONENTS

INSPECTION CERTIFICATE

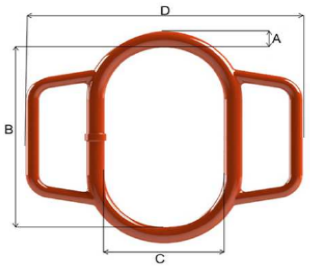
acc. to EN10204 3.1 & ISO10474 3.1

TYPE APPROVED MASTER LINKS, MASTER LINK ASSEMBLIES AND INTERMEDIATE LINKS FOR USE WITH OFFSHORE CONTAINER WIRE ROPE LIFTING SETS

McKinnon Chain
161 A Ring Road Duncanville
Vereeniging South Africa
PO Box 61721 Marshalltown
Gauteng, 2107, South Africa
Tel: +27 16 428-6000
E-mail: chainsec@scaw.co.za
Website: www.scawmetals.com

Certificate Date	2021/03/04	Manufacture Date	April 2021	Certificate No	CC21 0345
Supplied To:		William Hackett Lifting Products Limited			
Customer Order No.		602606	Order Date	27 July 2021	
McKinnon Order No.		965307	Shipment Date	27 July 2021	
Commodity No.		OML220DNVHZT	Quantity	10	
Batch No.		21D9856	Safety factor	5 : 1	
Working Load Limit		7.0			
Description		HA-22 H8 OS+ Oblong Master Link to DNV 2.7-1 coupled with handles - Zinc Tough			

Components	
Masterlink	
Dimensions	
A	22mm
B	270mm
C	140mm
With Handles	
Dimension	
D	326mm



Notes:

The Master link is based on DNV Type Approval TAS0000333.

Master Link and Master Link Assemblies comply with:

DNVGL 2.7-1-ST-E271-2.7-1 Offshore containers (Jan 2021)

DNVGL 2.7-3-ST-E273-2.7-3 Portable offshore units (Dec 2016)

EN1677-4 Components for slings - Safety - Part 4: Links, Grade 8

ISO 10855-2:2018 Offshore containers and associated lifting sets - Part 2: Design and manufacture and testing of lifting sets

IMO / MSC Circular 860

Zinc Thermal Diffusion in accordance with BS EN ISO 17668:2016/SANS 53881, SABS permit no. 8009/12763

Complies with Explosive Atmospheres standards 80079 - 36/37 for Non-Sparking, codes Ex h IC Mb, Ex h IIC Gb, Ex IIIC Db.

CHEMICAL ANALYSIS OF STEEL

Component	Cast No.	C	P	S	Si	AL	Cr	Ni	Mo
Masterlink	2003300	0.20	0.008	0.003	0.25	0.036	0.50	0.99	0.31

IMPACT RESISTANCE (CHARPY IMPACT V-NOTCH JOULES)

Component	Charpy Test Ref	Charpy 1	Charpy 2	Charpy 3	Average	Test Temperature	Required Min. Average
Masterlink	2003300-1902	140	134	140	138	-40°C	≥ 42 Joule

MECHANICAL PROPERTIES

Component	Cast No.	Proof Force kN		Break Force kN		Elongation	Hardness			
		Actual	Required	Actual	Required	Actual	Hardness 1	Hardness 2	Hardness 3	Average
Masterlink	2003300	> 172	172	674	343	≥ 20%	35.3	35.8	36.4	35.8

Crack Detection (NDT):	Magnetic Particle Inspection - No Defects Found
Zinc Thermal Diffusion:	Average ≥ 45µ thickness

ISO 9001:2015 approval by SGS (Certificate ZA17/209870) - Address Harrowdene Office Park, Building 1, Western Service Road, Woodmead, Johannesburg, 2191, RSA

Technical file complied by the Technical department and certificate signed off by M.Human (Export Manager)

Company Representative: C.Djordjevic (General Manager - McKinnon Chain a division of Scaw South Africa (PTY) Ltd

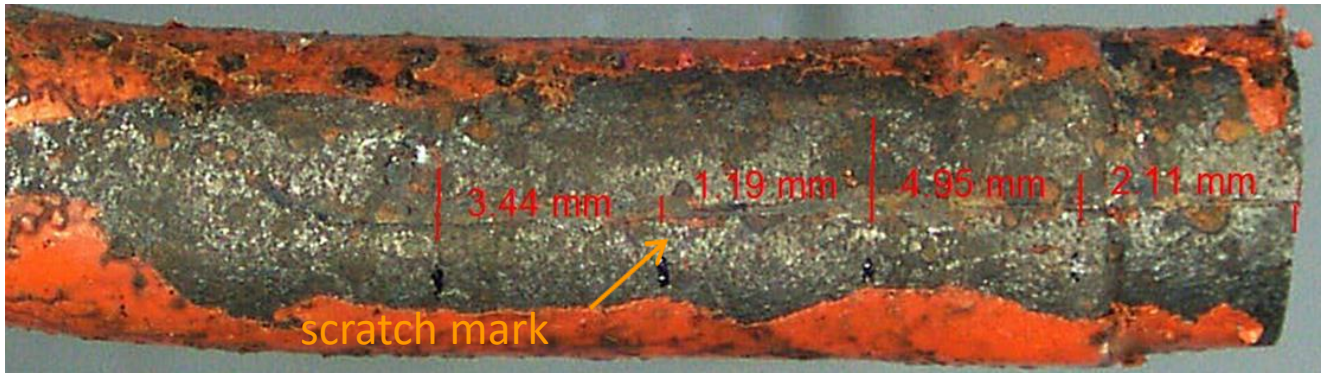
After treatment of components: This certificate is only applicable to goods properly used in the condition supplied by McKinnon Chain a division of Scaw South Africa (PTY) Ltd. Further processing by, or on behalf of, the user (involving: Cold Working, Heating, Electroplating, Hot-dip Galvanizing or other treatments) is entirely the user's responsibility and invalidates this certificate and the manufacturers warranty obligations. This certificate is invalidated by any alterations/or deletion.

Declaration of Conformity:

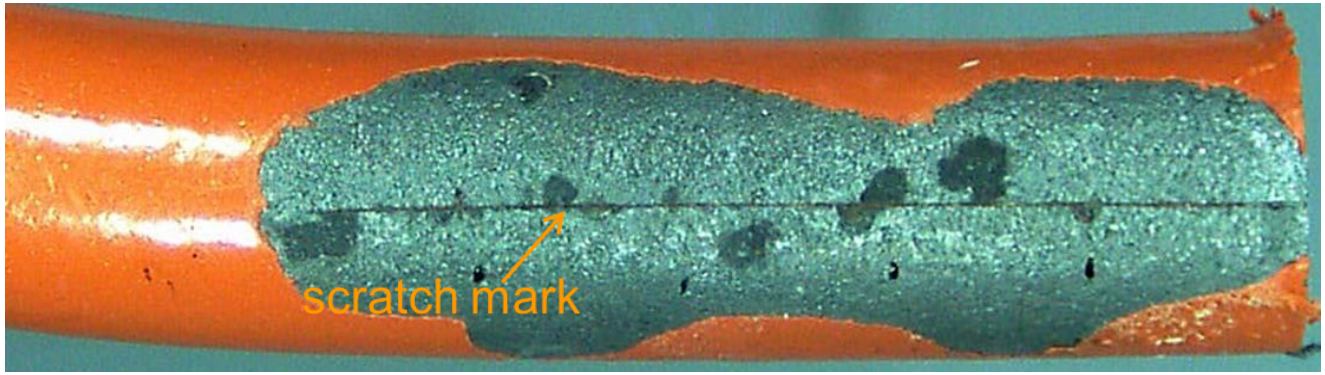
We declare that the product as specified in the certificate, fulfils the applicable essential Health and Safety requirements of the machinery directive, 2006/42/EC

Authorized Person	M.Human (Export Manager)	Signature		2021/02/27

Zinc Tough Master Links



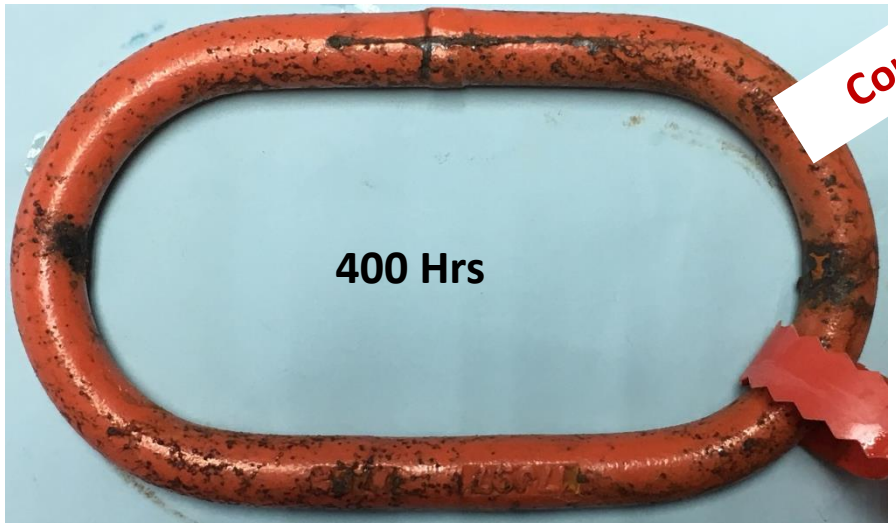
Corrosion creeps beneath the powder coated layer. The powder coating flakes off easily.



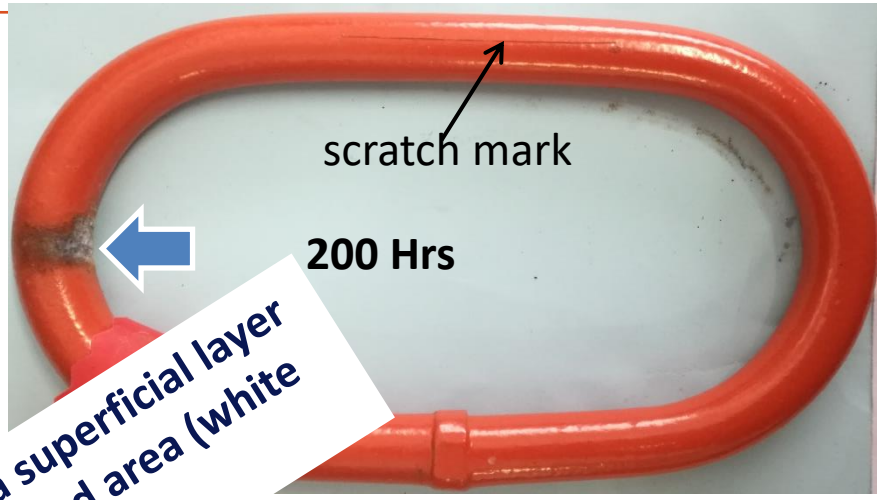
No Corrosion creepage. The powder coat layer remains intact.

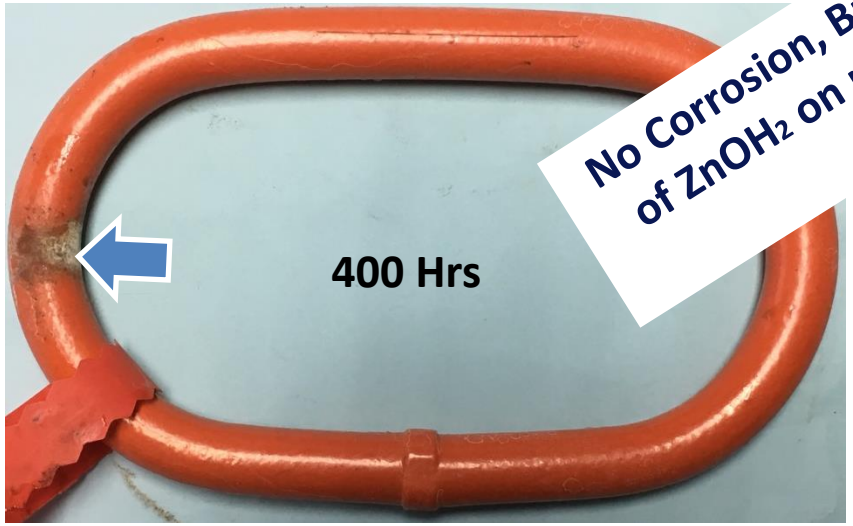
Standard link - Powder coated surface

Corroded



Zinc thermal diffused + Powder coated surface





No Corrosion, But a superficial layer of $ZnOH_2$ on uncoated area (white rust stain)

Summary: HA Range of offshore links

1) 100% of our steel come from a single integrated steel mill at AreclorMittal (http://corporate.arcelormittal.com/). This is essential for global consistency of the product.
   - ✓ The McKinnon Technical manager was the chief metallurgist at AreclorMittal and has designed a specific composition of steel for offshore lifting. The plant has 4 metallurgists employed.

2) 100% of McKinnon DNV links and chain is manufactured in one integrated plant with none of the manufacturing processes outsourced.

3) The links are manufactured and after the initial tempering and quenching process:
   - ✓ 100% of links are proof tested to 2.5 times WLL using a 70% saddle
   - ✓ 100% of links are magnetic particle inspected
   - ✓ 100% of links are then re tempered at a secondary temperature , 30˚C lower than the first temperature

4) All links are embossed with a code that identifies individual production batches, production machines and operatives. Full product traceability back to the billet of steel.

5) The standard range of HA DNV links is the world's leading range based on:
   - ✓ Our range of master links and assemblies are the highest rated size for size in the world
   - ✓ Average Impact Energy (Charpy) 42 Joules (31ft-lb). Minimum impact resistance at -40˚C (-40˚f) up to 50mm (2") diameter.
   - ✓ Physical dimensions of the DNV GL HA Masters and Quad Assemblies.