



Container Hoardings Africa t/a Twistlock Africa  
100, 8<sup>TH</sup> Avenue/ P.O.Box 3585  
Edenvale  
1609  
Gauteng  
South Africa  
Tel: +27 (0)11 609 7873  
[www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)  
[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

05 March 2025

**PO# 103376 Fabrication data pack**

To whom it may concern.

Herewith the data pack for the above Purchase Order.

In the data pack, the technical information and the record of fabrication are contained.

The data pack has been prepared by the Twistlock Africa appointed fabricator – Northreef Engineering, who has the necessary ISO certifications and quality standards.

The standard items that are part of the scope of supply are issued with DNV-GL certificates. These confirm that the twistlocks comply with the DNV-GL standard and that the fabricator that produces these products follows the minimum requirements to ensure the stated work and maximum loads can be achieved.

If there any questions, please contact me directly.

Kind regards

---

Ralph A. Siebenhaar

Technical Director



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[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

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  - 2. DELIVERY NOTE**
  - 3. DRAWINGS**
  - 4. TWISTLOCK CERTIFICATE**
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- A. NORTHREEF ENGINEERING**



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[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

# 1.Purchase order



Loesche SA (Pty) Limited  
 Old Trafford 1  
 36 Boundary Rd  
 Isle of Houghton, Office 106  
 1st Floor  
 Houghton Estate

REG NO 1975/002969/07  
 VAT NO. 4290103086  
 TEL NO. 011-0329360  
 TELEFAX NO 011-482-2940

**PURCHASE ORDER**

**PO103376**

Please mention this number in all correspondence

Date: 18/02/2024  
 Project No: P0126  
 Contact Person: Warren  
 Page: 1

COD- SUPPLIER

Supplier/Delivery details:

Twistlock Africa (PTY) Ltd  
 61 Erasmus Road  
 Edenvale  
 1610  
 T: 011 609 7873

Contract Number	Vendor Quote Ref.	Delivery Condition	Required Delivery Date
P0126	E-MAIL DD 21-01-2025	Road EXW	28/02/2024

Quantity	Description	Unit Price	Disc.	Tax	Nett Price
----------	-------------	------------	-------	-----	------------

6.00	Boltable & Weldable Twistlocks 200 x 200mm (single)	1,795.00		15.00%	R10,770.00
1.00	Boltable & Weldable Twistlocks 368 x 236 (double)	3,395.00		15.00%	R3,395.00
10.00	Bridge Clamp 280mm	595.00		15.00%	R5,950.00

QA Reqs's:  
 -Item 1-DNV-GL certificate (Type cert  
 (Type certificate issued by the manf)  
 -Item 2 - Full fabrication data pack  
 -Item 3 - DNV-GL certificate  
 (Type certificate issued by the manuf)

1. Payment Terms: Current

2. Conditions of Purchase  
 Acceptance of order signifies acceptance of Loesche SA (Pty) Ltd, Conditions of Purchase, 1979 (available on request).  
 The only acceptance variations to these conditions shall be those authorised in writing, either in the above or prior acceptance of order.

Amount Excl Tax	R20,115.00
Tax	R3,017.25
<b>Total</b>	<b>R23,132.25</b>

Authorised for Loesche SA (Pty) Ltd by:  Date: 18/02/2024



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[www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)  
[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

## 2.Delivery Note



**Container Hoardings Africa Pty Ltd  
T/A Twistlock Africa**

17 Simone Street De Tijger Parow Western Cape,  
7500  
100 8th Avenue, Edenvale  
Gauteng 1610  
+27116097873  
accounts@twistlockafrica.co.za  
www.twistlockafrica.co.za  
VAT Registration No. 4110273101

*Delivery Note*

**BILL TO**  
Warren Brothers  
Loesche SA (Pty) Limited  
Old Trafford 1  
36 Boundary Road  
Isle of Houghton, Office 106  
1st Floor  
Houghton Estate  
VAT Registration No. 42901013086

**SHIP TO**  
Warren Brothers  
Loesche SA (Pty) Limited  
Old Trafford 1  
36 Boundary Road  
Isle of Houghton, Office 106  
1st Floor  
Houghton Estate

**INVOICE** 1525  
**DATE** 2025/02/20

**SALES REP**  
JHB

	DESCRIPTION	
STOCK:TWISTLOCKS:BTL (JHB)	Boltable Twistlock (BD-D1/BOLT)	6
Boltable Twistlock - double- CADG	CADG - double boltable twistlock - 368 x 236mm	1
STOCK:TWISTLOCKS:BC-260 (JHB)	BRIDGE CLAMP 260mm (JHB)	10

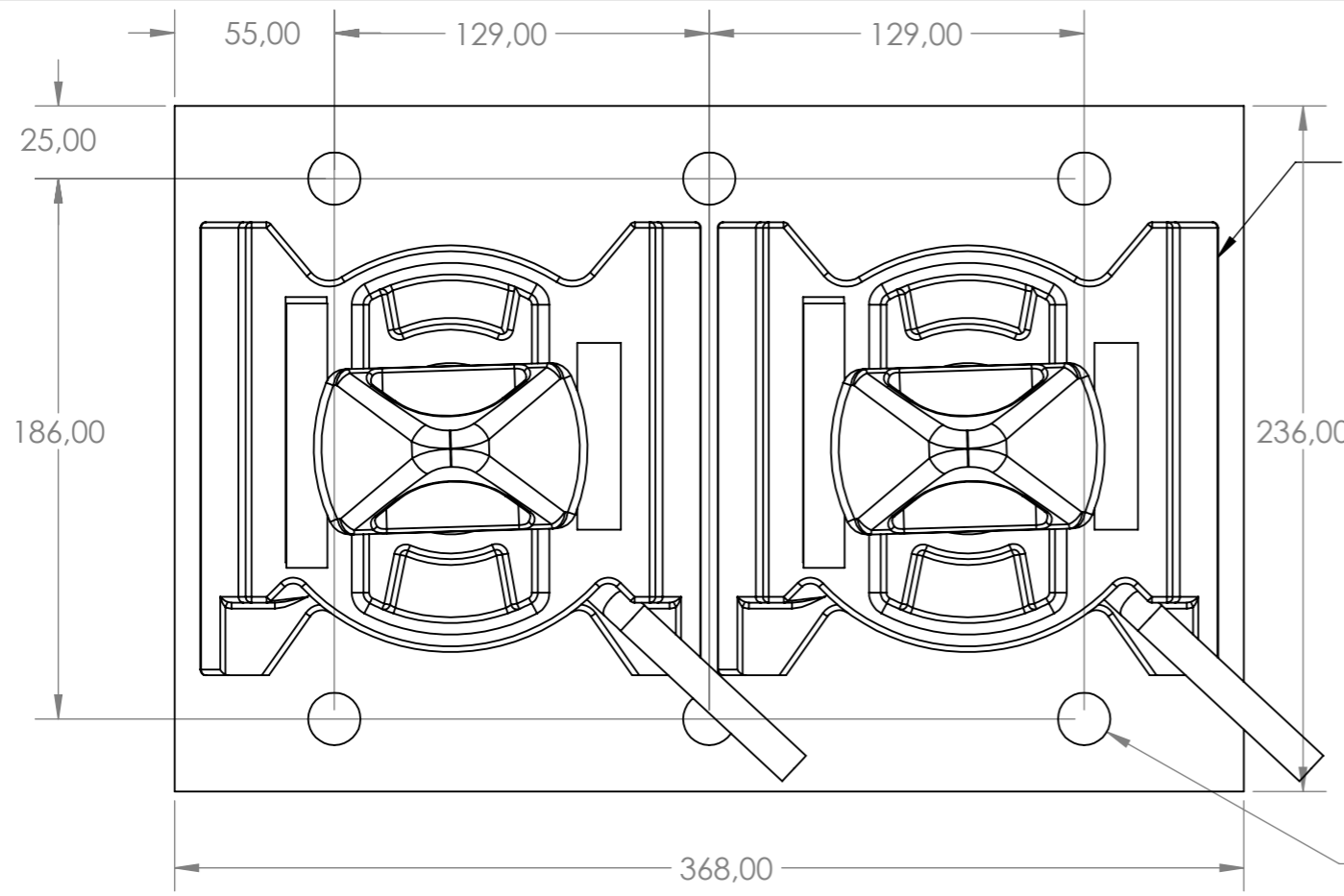
*UB*  
*28/02/25*  
*KR 67 SR 9P*



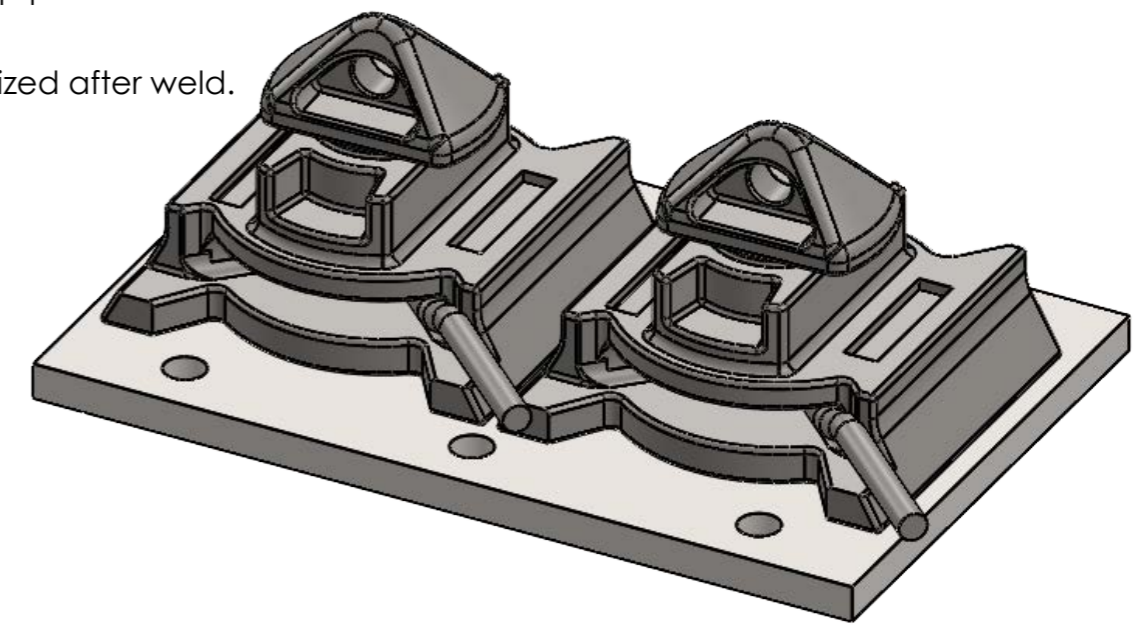
Container Hoardings Africa t/a Twistlock Africa  
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[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

## 3. Drawings

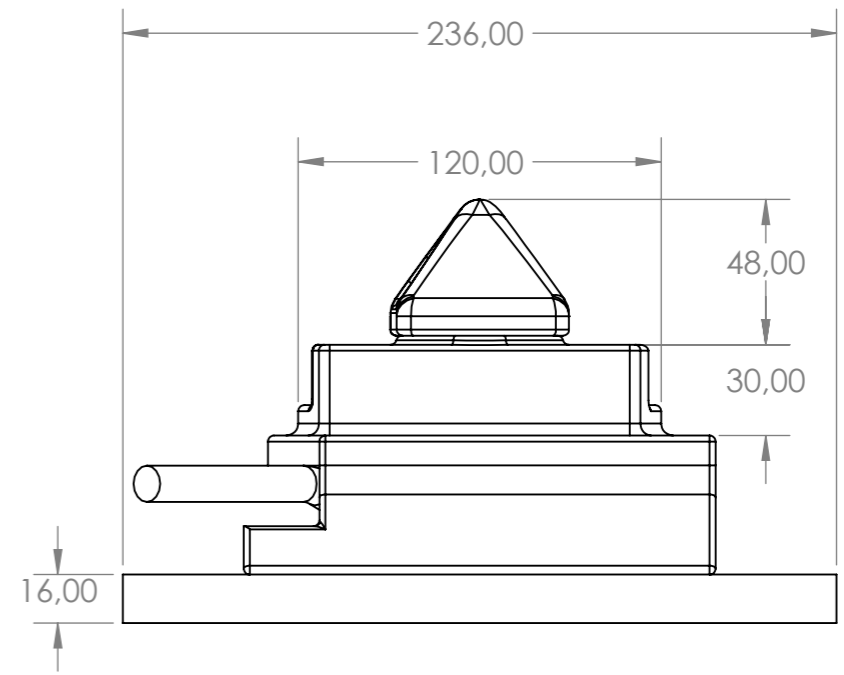
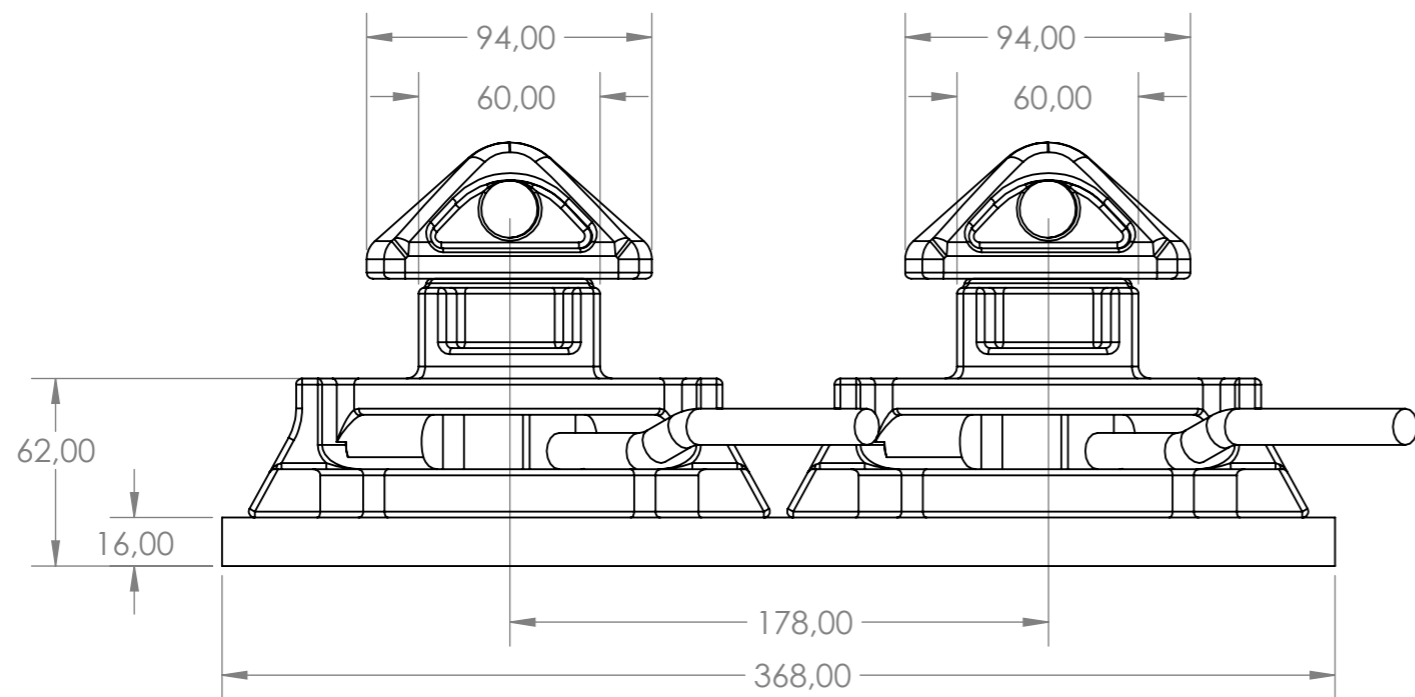
8 7 6 5 4 3 2 1



Min 8mm weld all round twistlock.  
Galvanizing: Full strip prior to weld.  
100% dye pen.  
WPS NRE 010.  
Hot dipped galvanized after weld.



Ø 18,00  
6 off

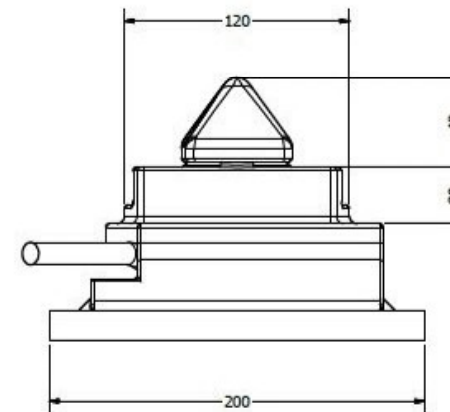
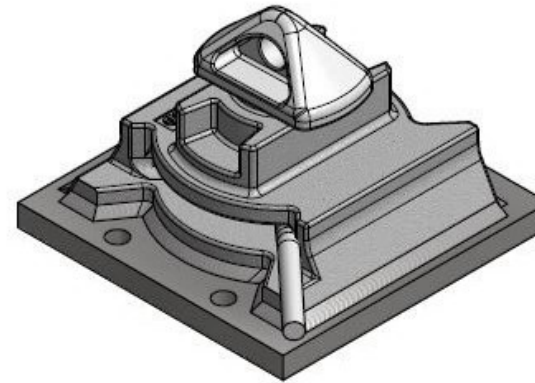
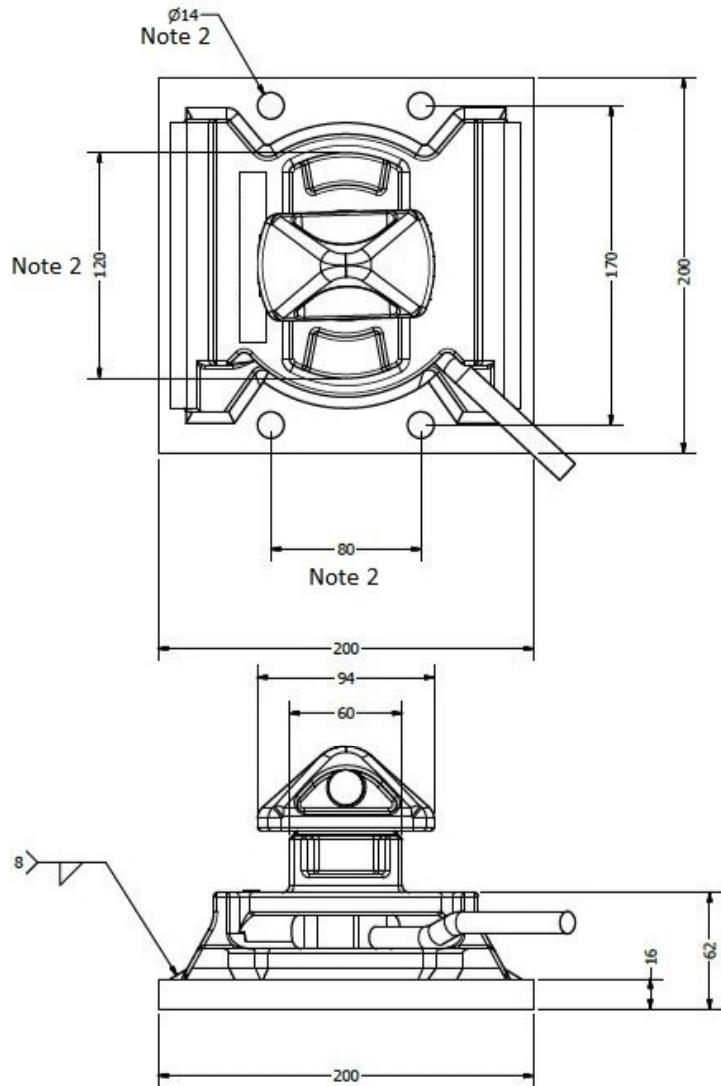


**Address (JHB):** 100 8th Avenue, Edenvale, 1610, Gauteng, South Africa  
**Address (CPT):** 17 Simone Street, DeTijger, Parow, 7500, Cape Town, South Africa  
**Website:** [www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)  
**Email:** [info@twistlockafrica.co.za](mailto:info@twistlockafrica.co.za)  
**Tel:** +27 11 609 7873

**Mass:** 21 kg  
**Material (Twistlock):** ZG270 - 500 (Cast)  
**Material (Plate):** S355JR +N (Hot Rolled)  
**Twistlocks:** GLS BD-D1 45° Dovetail  
**Finish:** Hot Dipped Galvanized  
**SWL Tension:** 250 kN  
**SWL Shear:** 210 kN  
**SWL Compression:** 1000 kN  
**MBL Tension:** 500 kN  
**MBL Shear:** 420 kN  
**MBL Compression:** 2000 kN

				DO NOT SCALE DRAWING		REVISION 0	
				TITLE: Assembly Drawing: Boltable Twistlock (368 x 236 x 16)			
				DWG NO. Boltable Twistlock 368 x 236			
				SCALE:1:2.5			
				SHEET 1 OF 1			
				A3			

8 7 6 5 4 3 2 1



Mass: 10.8 kg  
 Material: ZG270-500  
 Finish: Hot dipped Galvanised  
 SWL Tension: 135 kN  
 SWL Shear: 130 kN  
 SWL Compression: 1000 kN  
 MBL Tension: 270 kN  
 MBL Shear: 260 kN  
 MBL Compression: 2000 kN

Notes:

1. Available as Left and Right Handed
2. Pitch and size of holes can be changed to suite client requirements, additional charges and lead times will apply

**Hot Dipped Galvanised finish**

DRAWN		TITLE		
User				
CHECKED	RAS	BOLTABLE TWISTLOCK		
QA	EK			
MFG	RAS	SIZE	DWG NO	REV
APPROVED	RAS	15.03.2020	TLABTL	01
		SCALE	SHEET 1 OF 1	



**TWISTLOCK**  
africa

Address (JHB): 100 8<sup>th</sup> Avenue, Edenvalle, 1610, Gauteng, South Africa

Address (CPT): 17 Simone Street, De Tiiiger, Parow, 7500, Cape Town, South Africa

Website: [www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)

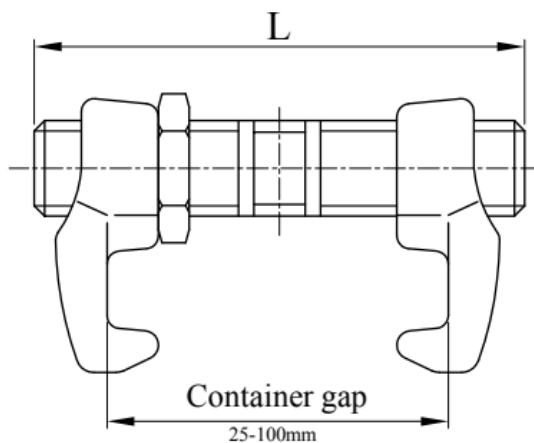
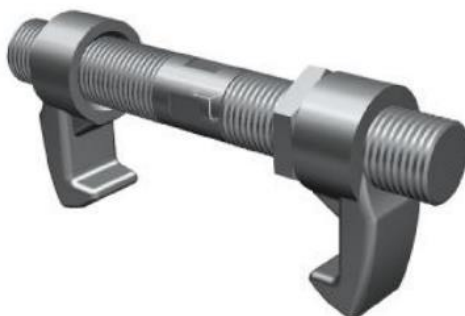
Email: [info@twistlockafrica.co.za](mailto:info@twistlockafrica.co.za)

Tel: +27 11 609 7873



## BRIDGE FITTING

BE-A1



### 产品规格 | Product Specifications

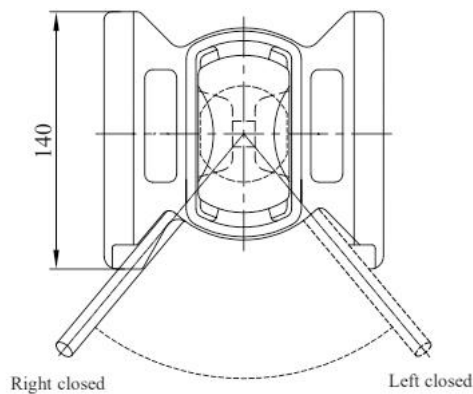
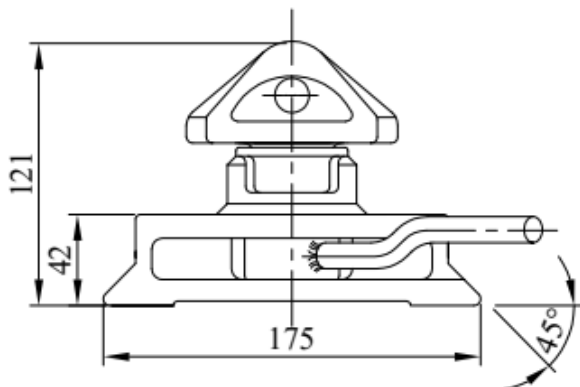
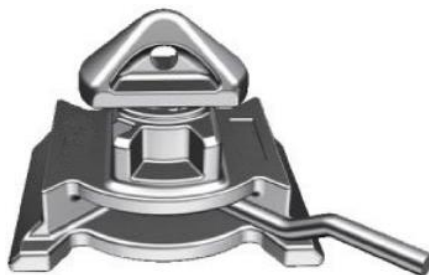
Type	L	Weight	
ABE-A1/260	260	3.0 KG	
ABE-A1/380	380	3.6 KG	
LOADS	TENSION [KN]		TENSION [KN]
BREAKING LOAD	-		100
SAFE WORKING LOAD	-		50



# DOVETAIL TWISTLOCK 45°

BD-D1/L

BD-D1/R



## 产品规格 | Product Specifications

LOADS	SHEAR [KN]	TENSION [KN]
BREAKING LOAD	420	500
SAFE WORKING LOAD	210	250
TOTAL WEIGHT	5.8 KG	
MATERIAL	HEAT TREATABLE STEEL	
FINISH	HOT DIP GALVANISED	



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[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

## 4. Twistlock certificate

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Cargo Securing Devices**with type designation(s)  
**Bridge Fitting BE-A1/X**

Issued to

is found to comply with  
**DNV GL rules for classification – Ships****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****SWL, tension (kN) 50**  
**SWL, shear (kN) -**  
**SWL, compr. (kN) -**Issued at **Hamburg** on **2018-08-01**This Certificate is valid until **2023-07-31**.DNV GL local station: **Ningbo**Approval Engineer: **Mark-Oliver Wobig****for DNV GL**Digitally Signed By:  
Abt, Daniel

Signing Date: Donnerstag, 2. August 2018

Location: Hamburg, Germany

**Andree Orth**  
**Head of Section**

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.



## Product description

Bridge Fitting BA-A1/1  
Bridge Fitting BA-A1/2

## Application/Limitation

<u>Load</u>	<u>Tension [kN]</u>
Test Load	63
Breaking Load	100

Tests to be carried out:

- Production testing: At least 2% of the items delivered are to be selected and subjected to the test load.
- Material tests are to be included energy testing at -20°C, with the impact energy requirements acc. to DNVGL-CP-0068. The material shall be according to the approved drawings. Material certificates shall be 3.1 acc. to ISO 10474:2013.

## Type Approval documentation

<u>Drawing No.</u>	<u>Rev.</u>	<u>Title</u>
BE-A1/X		Bridge Fitting
Z-DTS		Threaded Shaft
Z-BEF-3		End Fitting
Z-LN-3A		Lock Nut

Drawing Approval: Ref. No. 07-134241 dated 2007-11-20

## Tests carried out

The prototype test was carried out in Ningbo, P.R. China, dated 2018-07-13 in accordance with the DNVGL-CP-0068.

## Marking of product

Each item shall be marked by manufacturer for traceability.

## Periodical Assessment

For retention of the Type Approval, a DNVGL surveyor shall perform a survey after 2 and 3.5 years, to verify that the Type Approval is complied with.

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Cargo Securing Devices**

with type designation(s)  
**Dovetail Twistlock 45° BD-D1**

Issued to

is found to comply with  
**DNV rules for classification – Ships**

## Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.**

**SWL, tension (kN) 250**  
**SWL, shear (kN) 210**  
**SWL, compr. (kN) 1000**

Issued at **Hamburg** on **2023-08-23**

This Certificate is valid until **2028-08-22**.

DNV local unit: **Ningbo FIS**

Approval Engineer: **Aadil Wafdi**

for **DNV**



Digitally Signed By: Abt, Daniel  
Location: DNV Hamburg, Germany  
Signing Date: 2023-08-25 , on behalf of

**Andree Orth**  
**Head of Section**

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.



## Product description

Dovetail Twistlock

## Application/Limitation

Load	Tension [kN]	Shear [kN]	Compression [kN]
Test Load	313	263	1250
Breaking Load	500	420	2000

Tests to be carried out:

- Production testing: At least 2% of the items delivered are to be selected and subjected to the test load.
- Material tests are to be included energy testing at -20°C, with the impact energy requirements acc. to DNV-CP-0068. The material shall be according to the approved drawings. Material certificates shall be 3.1 acc. to ISO 10474:2013.

## Type Approval documentation

Drawing No.	Rev.	Title
BD-D1/R		Dovetail Twistlock (45°)
BD-D1/L		Dovetail Twistlock (45°)
BD-D1/01		Slide Twistlock Base
BD-D1/E/03		Shaft
BD-D1/02		Handle
BD-D1/(04) (05)		Part

Drawing approval: Ref.No. 262.1-028785-8, dated 2023-08-16  
 Test report No.: DNV-CP-0068 dated 2023-07-20

## Tests carried out

The prototype test was carried out in Nanjing, P.R. China, dated 2023-07-20 in accordance with the DNV-CP-0068.

## Marking of product

Each item shall be marked by manufacturer for traceability.

## Periodical Assessment

For retention of the Type Approval, a DNV surveyor shall perform a survey after 2 and 3.5 years, to verify that the Type Approval is complied with.

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Cargo Securing Devices**with type designation(s)  
**Slide Twistlock BD-D1**

Issued to

is found to comply with  
**DNV GL rules for classification – Ships****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****SWL, tension (kN) 250**  
**SWL, shear (kN) 210**  
**SWL, compr. (kN) 1000**Issued at **Hamburg** on **2018-08-01**This Certificate is valid until **2023-07-31**.DNV GL local station: **Ningbo**Approval Engineer: **Mark-Oliver Wobig****for DNV GL**Digitally Signed By: Orth,  
Andree

Signing Date: Dienstag, 14. August 2018

**Andree Orth**  
**Head of Section**

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.



Job Id: **262.1-028785-1**  
Certificate No: **TAS00001KY**  
Revision No: **1**

## Product description

Twistlock

## Application/Limitation

Load	Tension [kN]	Shear [kN]	Compression [kN]
Test Load	313	263	1250
Breaking Load	500	420	2000

Tests to be carried out:

- Production testing: At least 2% of the items delivered are to be selected and subjected to the test load.
- Material tests are to be included energy testing at -20°C, with the impact energy requirements acc. to DNVGL-CP-0068. The material shall be according to the approved drawings. Material certificates shall be 3.1 acc. to ISO 10474:2013.

## Type Approval documentation

Drawing No.	Rev.	Title
BD-D1		Slide Twistlock
BD/01		Shaft
BD-D1/01		Twistlocks
BD/05		Handlebar

Drawing Approval: Ref. No. 07-134241 dated 2007-11-20

## Tests carried out

The prototype test was carried out in Ningbo, P.R. China, dated 2018-07-13 in accordance with the DNVGL-CP-0068.

## Marking of product

Each item shall be marked by manufacturer for traceability.

## Periodical Assessment

For retention of the Type Approval, a DNVGL surveyor shall perform a survey after 2 and 3.5 years, to verify that the Type Approval is complied with.



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[ralph@twistlockafrica.co.za](mailto:ralph@twistlockafrica.co.za)

## 5.Fabrication data book

### a.Northreef Engineering



**NORTH REEF**  
ENGINEERING (Pty) Ltd

REG. NO: 2016/144504/7  
6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## Supplier Quality Control Index

<b>Quality Control Index</b>
<b>Customer: Container Hoardings Africa (Pty) Ltd</b>
<b>Shop Order No: 30881 &amp; 30882</b>
<b>Client Purchase Order No: RALPH (1221)</b>
<b>Sub-contractor Name: North Reef Engineering</b>
<b>Equipment Description: DOVETAIL TWISTLOCK 45-1 &amp; 45-2</b>
<b>Part No: TLA/001 &amp; TLA/02</b>

Section	Description of Contents
1.1	<b>QUALITY CONTROL PLAN</b> <ul style="list-style-type: none"><li>▪ QCP APPROVAL</li><li>▪ DRAWING APPROVAL</li></ul>
1.2	<b>MATERIAL CERTIFICATES</b> <ul style="list-style-type: none"><li>▪ MECHANICAL AND CHEMICAL PROPERTIES</li></ul>
1.3	<b>BLASTING PROFILE REPORTS</b> <ul style="list-style-type: none"><li>▪ SHOT BLASTING (TONE BLAST)</li></ul>
1.4	<b>WELDING DOCUMENTATION</b> <ul style="list-style-type: none"><li>▪ WPS</li><li>▪ PQR</li><li>▪ WQR</li></ul>
1.5	<b>DESTRUCTIVE &amp; NON-DESTRUCTIVE TESTING</b> <ul style="list-style-type: none"><li>▪ LIQUID PENETRANT REPORT</li><li>▪ MAGNETIC PARTICLE INSPECTION REPORT</li><li>▪ PULL TEST REPORT</li></ul>
1.6	<b>MANUFACTURING PROGRESS REPORTS</b> <ul style="list-style-type: none"><li>▪ VISUAL INSPECTION REPORTS</li><li>▪ DIMENSIONAL REPORTS</li><li>▪ CALIBRATION CERTIFICATES</li></ul>
1.7	<b>CORROSION AND PROTECTION</b> <ul style="list-style-type: none"><li>▪ GALVANIZING CERTIFICATE (N/A)</li><li>▪ GALVANIZING REPORTS (N/A)</li><li>▪ PAINTING (IN HOUSE)</li></ul>

*[Handwritten signature]*  
10/10/2023

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1.8	<b>TWISTLOCK &amp; CUSTOMER INSPECTION REPORTS</b>
1.9	<b>FINAL INSPECTION, RELEASE AND PACKAGING</b>

	<b>Complier</b>	<b>Checker</b>	<b>Approver</b>
Name:	M. Khoza	D. Muhoni	G. Shepherd
Position:	QC Control	QC Manager	Project Manager





Reg. No. 2005/044807  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

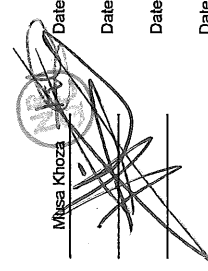
6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

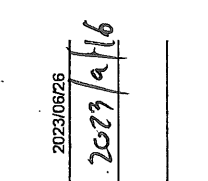
## 1.1 QUALITY CONTROL PLAN

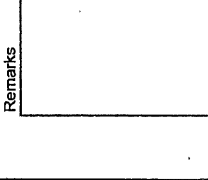
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- DRAWING APPROVAL

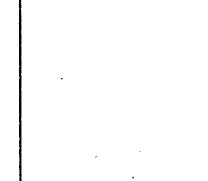
# NORTH REEF ENGINEERING


QUALITY CONTROL PLAN				QCP No. A - 00 1								
Customer Order Number		SO0000723		Customer		TWISTLOCK AFRICA						
North Reef Job Number		TLA/002 (30882)		PROJECT		SINGLE DOVETAIL TWISTLOCK						
Item Description		SINGLE DOVETAIL TWISTLOCK		Drawing Number		TLA/002						
End user		CADG - 1-32		Control points		Date						
Key				H		2023/06/06						
Properties :		1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.IE		W		1 OF 1						
Welding :		6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding		Y		509						
Inspection :		10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection										
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures			Drawing
				NR	BV	TLA	Client		NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H								
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H				Yes				
3	Removal of Galvanizing	11	Galvanizing to be shot-blasted (out Toneblast)	H				Yes				
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H				Yes				Inspect Welding
5	Destructive & Non-Destructive test. 2 per Batch; (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A:1-32; 33-65; 165; 265etc.	H				Yes				Verify Test Certificates per Batch
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H								100% Dimensional check
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing. Std Cert required	H				Yes				
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H			H					
9	Component Sequential Markings	11	As per Client	H								
10	Data book Review	11	As per PO and Data Book Index	H								
11	Final release	11	As per purchase order & Release Note,	H								
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H			H					


Approved by:  Date: 2023/06/26


North Reef Engineering:  Date: 2023/06/26

Twistlock Africa:  Date: 2023/06/26

Bureau Veritas:  Date: 2023/06/26

Client:  Date: 2023/06/26

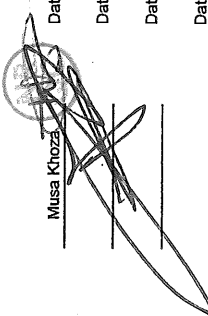
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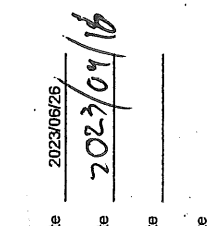
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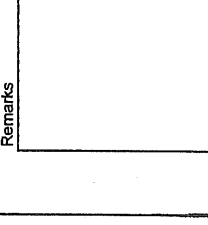
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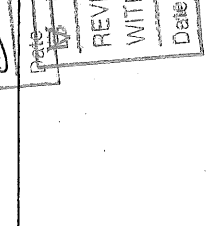
# NORTH REEF ENGINEERING

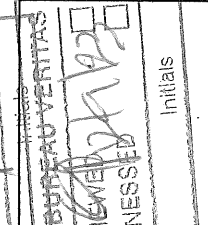
QUALITY CONTROL PLAN				QCP No. B - 001							
Customer Order Number	SO0000723	Customer	TWISTLOCK AFRICA	Date	2023/06/06						
North Reef Job Number	TLA001 (30881)	PROJECT	DOUBLE DOVETAIL TWISTLOCK	PAGE	1 OF 1						
Item Description	DOUBLE DOVETAIL TWISTLOCK	Drawing Number	TLA001	QTY	255						
End user	CADG 1-32										
Key		Control points									
Properties:		H	Hold Point	S	Surveillance	Client					
Welding:		W	Witness	NR	North Reef	R-Review Docs					
Inspection:		V	Verification	TLA	Twistlock Africa	PO - Purchase Order					
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)		Document / Certificate / Report Required.	Certificate / Report Number.	Signatures		Drawing	
				NR	BV	TLA	Client	NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA001	H	R/V						
2	Material Certificate Verification & Items Inspection	11	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	R/V						
3	Removal of Galvanizing	11	Galvanising to be shot-blasted (out Toneblast)	H	V						
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE-10	H	H						Inspect Welding
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: B1-32; 33-65; 165; 265etc.	H	R/V						Verify Test Certificates per Batch
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H						100% Dimensional check
7	Corrosion Protection	14	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H						
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H	H				
9	Component Sequential Markings	11	As per Client	H							
10	Data book Review	11	As per PO and Data Book Index	H							
11	Final release	11	As per purchase order & Release Note.	H							
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H	H				


Approved by:  Date: 2023/06/26


North Reef Engineering:  Date: 2023/06/26

Twistlock Africa:  Date: 2023/06/26

Bureau Veritas:  Date: 2023/06/26

Client:  Date: 2023/06/26

REVIEWED:  DATE: 2023/06/26

WITNESSED:  DATE: 2023/06/26

INITIALS: \_\_\_\_\_

2023/06/26




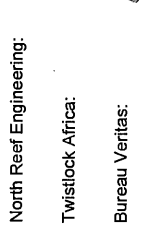
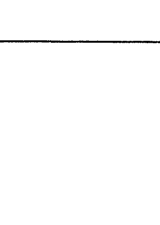
# NORTH REEF ENGINEERING

QUALITY CONTROL PLAN				QCP No. A - 001	
Customer Order Number	SO0000723	Customer	TWISTLOCK AFRICA	Date	2023/06/06
North Reef Job Number	TLA002 (30882)	PROJECT	SINGLE DOVETAIL TWISTLOCK	PAGE	1 OF 1
Item Description	SINGLE DOVETAIL TWISTLOCK	Drawing Number	TLA002	QTY	509
End user	CADG	Batch-B	33-64		
<b>Key</b>		<b>Control points</b>		<b>Client</b>	
Properties : 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E		H	Hold Point	S	Surveillance
Welding : 6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding		W	Witness	NR	North Reef
Inspection : 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection		V	Verification	TLA	Twistlock Africa
					R-Review Docs PO - Purchase Order

Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures			
				NR	BV	TLA			Client	NR	BV	TLA
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H	RV							
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV		Yes					
3	Removal of Galvanizing	11	Galvanising to be shot-blasted (out Toneblast)	H	V		Yes					
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes					
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A1-32; 33-65; 165; 265etc.	H	RV		Yes					
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H		Yes					
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing. Std Cert required	H	H		Yes					
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H						
9	Component Sequential Markings	11	As per Client	H								
10	Data book Review	11	As per PO and Data Book Index	H								
11	Final release	11	As per purchase order & Release Note.	H								
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H						

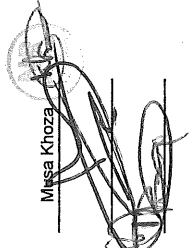
Approved by:	Musa Khoza	Date	2023/06/26
North Reef Engineering:		Date	17/08/25
Twistlock Africa:		Date	2027/09/16
Bureau Veritas:		Date	
Client:		Date	


Remarks	
Initials	
Date	
REVIEWED	<input checked="" type="checkbox"/>
WITNESSED	<input checked="" type="checkbox"/>
Date	
Initials	


# NORTH REEF ENGINEERING

QUALITY CONTROL PLAN				QCP No. B - 001							
Customer Order Number		SO0000723		Customer		TWISTLOCK AFRICA					
North Reef Job Number		TLA001 (30881)		PROJECT		DOUBLE DOVETAIL TWISTLOCK					
Item Description		DOUBLE DOVETAIL TWISTLOCK		Drawing Number		TLA001					
End user		CADG		Batch: B 33-64		Date					
Key		Control points		Surveillance		Client					
Properties :		1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E		H		S					
Welding :		6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding		W		NR					
Inspection :		10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection		V		TLA					
				TLA		North Reef Twistlock Africa					
				Client		R-Review Docs PO - Purchase Order					
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)		Document / Certificate Required.	Certificate / Report Number	Signatures		Remarks	
				NR	BV	TLA	Client	NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Draw up & Submitted - Approval - Drawing	11	As per purchase order. TLA001	H	RV						
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV			Yes			
3	Removal of Galvanizing	11	Galvanising to be shot-blasted (out Toneblast)	H	V			Yes			
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H			Yes			
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: B1-32; 33-65;165;265etc.	H	RV			Yes			
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H						
7	Corrosion Protection	14	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H			Yes			
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H	H				
9	Component Sequential Markings	11	As per Client	H							
10	Data book Review	11	As per PO and Data Book Index	H							
11	Final release	11	As per purchase order & Release Note.	H							
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H	H				

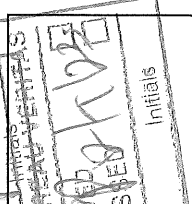
Approved by:  Misa Khoza Date: 2023/06/26

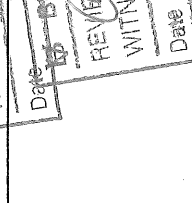
North Reef Engineering:  Date: 2023/06/26

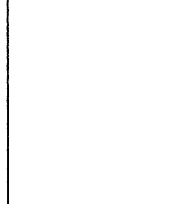
Twistlock Africa:  Date: 2023/06/26

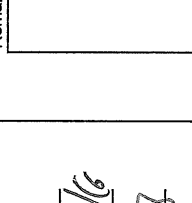
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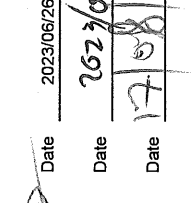
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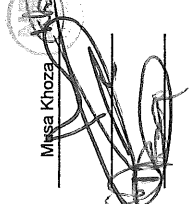
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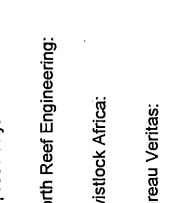
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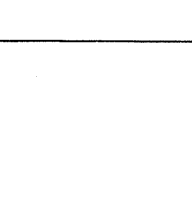
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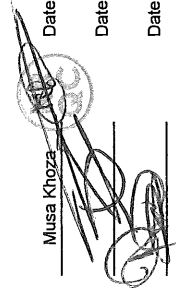
Witnessed:  Date: 2023/06/26


# NORTH REEF ENGINEERING

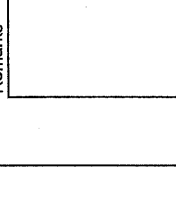
QUALITY CONTROL PLAN		QCP No. A - 001	
Customer Order Number	SO0000723	Customer	TWISTLOCK AFRICA
North Reef Job Number	TLA/002 (30882)	PROJECT	SINGLE DOVETAIL TWISTLOCK
Item Description	SINGLE DOVETAIL TWISTLOCK	Drawing Number	TLA/002
End user	CADG	65-164 Bench -C	
		Control points	
		H	Hold Point
		W	Witness
		V	Verification
		S	Surveillance
		NR	North Reef
		TLA	Twistlock Africa
			Client
			R-Review Docs
			PO - Purchase Order
Customer Order Number	SO0000723	Date	2023/06/06
North Reef Job Number	TLA/002 (30882)	PAGE	1 OF 1
Item Description	SINGLE DOVETAIL TWISTLOCK	QTY	509

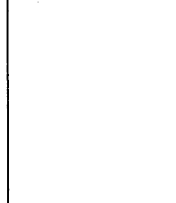
Key: 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E  
 Welding: 6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding  
 Inspection: 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection

Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures			
				NR	BV	TLA			Client	NR	BV	TLA
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H	RV							
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV		Yes	5				
3	Removal of Galvanizing	11	Galvanizing to be shot-blasted (out Toneblast)	H	V		Yes	2				
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes	2				
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A1-32; 33-65;165;265etc.	H	RV		Yes	3				
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H							
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H		Yes					
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H						
9	Component Sequential Markings	11	As per Client	H								
10	Data book Review	11	As per PO and Data Book Index	H								
11	Final release	11	As per purchase order & Release Note,	H								
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H						


Approved by:  Date: 2023/06/26

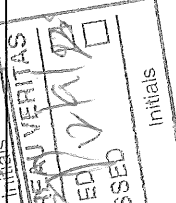
North Reef Engineering:  Date: 2023/06/16


Twistlock Africa:  Date: 17/08/23

Bureau Veritas:  Date: \_\_\_\_\_

Client: \_\_\_\_\_ Date: \_\_\_\_\_

RECEIVED BY:  Date: \_\_\_\_\_

REVIEWED BY:  Date: \_\_\_\_\_

WITNESSED BY:  Date: \_\_\_\_\_

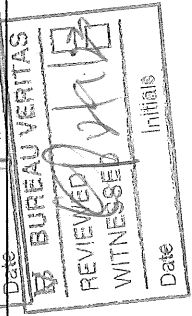
# NORTH REEF ENGINEERING

QUALITY CONTROL PLAN				QCP No. B-001			
Customer Order Number	SO0000723	Customer	TWISTLOCK AFRICA	Date	2023/06/06		
North Reef Job Number	TLA/001 (30881)	PROJECT	DOUBLE DOVETAIL TWISTLOCK	PAGE	1 OF 1		
Item Description	DOUBLE DOVETAIL TWISTLOCK	Drawing Number	TLA/001	QTY	255		
End user	CADG	65-164 Batch: C					
Key		Control points					
Properties :		H Hold Point		S Surveillance		Client	
Welding :		W Witness		NR North Reef		R-Review Docs	
Inspection :		V Verification		TLA Twistlock Africa		PO - Purchase Order	

Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures				
				NR	BV	TLA			Client	NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/001	H	RV								
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV		Yes						
3	Removal of Galvanizing	11	Galvanising to be shot-blasted (out Toneblast)	H	V		Yes						
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes						
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: B1-32; 33-65; 165; 265etc.	H	RV		Yes						
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H								
7	Corrosion Protection	14	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H		Yes						
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H							
9	Component Sequential Markings	11	As per Client	H									
10	Data book Review	11	As per PO and Data Book Index	H									
11	Final release	11	As per purchase order & Release Note,	H									
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H							

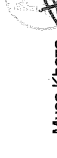
Approved by:				Remarks
North Reef Engineering:	Muna Khoza	Date	2023/06/26	
Twistlock Africa:		Date	2023/06/16	
Bureau Veritas:		Date	15/08/22	
Client:		Date		

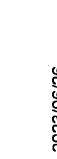
# NORTH REEF ENGINEERING

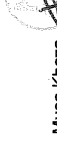
<b>QUALITY CONTROL PLAN</b>		QCP No. A - 001
Customer Order Number	SO0000723	Customer TWISTLOCK AFRICA
North Reef Job Number	TLA/002 (30882)	PROJECT SINGLE DOVETAIL TWISTLOCK
Item Description	SINGLE DOVETAIL TWISTLOCK	Drawing Number TLA/002
End user	CADG 165-264 Bench -D	

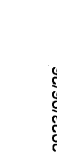
Properties : 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E Welding : 6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding Inspection : 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection	Control points H Hold Point W Witness V Verification
Surveillance North Reef Twistlock Africa	Client R-Review Docs PO - Purchase Order

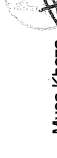
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures		
				NR	BV	TLA			TLA	Client	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H	R/V						
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	R/V		Yes				
3	Removal of Galvanizing	11	Galvanizing to be shot-blasted (out Toneblast)	H	V		Yes				
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes				
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A1-32; 33-65;165;265etc.	H	R/V		Yes				
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H						
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H		Yes				
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H					
9	Component Sequential Markings	11	As per Client	H							
10	Data book Review	11	As per PO and Data Book Index	H							
11	Final release	11	As per purchase order & Release Note,	H							
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H					

Approved by:  Date: 2023/06/26


North Reef Engineering:  Date: 2023/07/16


Twistlock Africa:  Date: 2023/07/16

Bureau Veritas:  Date: 2023/07/16

Client:  Date: 2023/07/16

BUREAU VERITAS

REVIEWED 

WITNESSED 

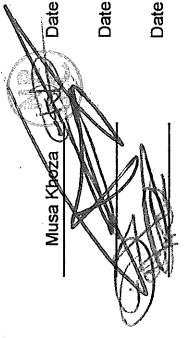
Date: \_\_\_\_\_ Initials: \_\_\_\_\_

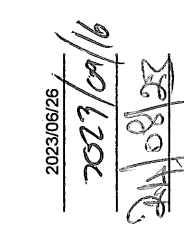
# NORTH REEF ENGINEERING

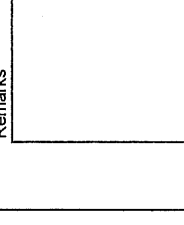
<b>QUALITY CONTROL PLAN</b>		QCP No. B-001
Customer Order Number	SO0000723	Customer TWISTLOCK AFRICA
North Reef Job Number	TLA001 (30881)	PROJECT DOUBLE DOVETAIL TWISTLOCK
Item Description	DOUBLE DOVETAIL TWISTLOCK	Drawing Number TLA001
End user	CADG	165-255 Batch: D
Key		

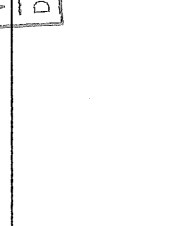
Properties : 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E Welding : 6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding Inspection : 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection	Control points H Hold Point W Witness V Verification
---	---

Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures				
				NR	BV	TLA			Client	NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/001	H	RV								
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV		Yes						
3	Removal of Galvanizing	11	Galvanizing to be shot-blasted (out Toneblast)	H	V		Yes						
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes						
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: B1-32; 33-65; 165; 265etc.	H	RV		Yes						
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H								
7	Corrosion Protection	14	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H		Yes						
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H							
9	Component Sequential Markings	11	As per Client	H									
10	Data book Review	11	As per PO and Data Book Index	H									
11	Final release	11	As per purchase order & Release Note,	H									
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H							

Approved by:  Date: 2023/06/26

North Reef Engineering:  Date: 2023/09/16

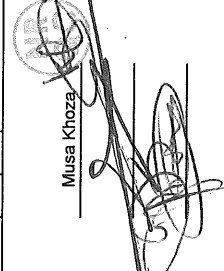
Twistlock Africa:  Date: 2023/09/23

Bureau Veritas:  Date: \_\_\_\_\_

Client: \_\_\_\_\_ Date: \_\_\_\_\_

Date: \_\_\_\_\_  
 REVENUED  
 WITNESSED  
 Date: \_\_\_\_\_  
 Initials: \_\_\_\_\_

# NORTH REEF ENGINEERING

QUALITY CONTROL PLAN				QCP No. A - 001													
Customer Order Number		SO0000723		Customer		TWISTLOCK AFRICA											
North Reef Job Number		TLA/002 (30882)		PROJECT		SINGLE DOVETAIL TWISTLOCK											
Item Description		SINGLE DOVETAIL TWISTLOCK		Drawing Number		TLA/002											
End user		CADG		265-364 Bench -E		QTY 509											
Date		2023/06/06		PAGE		1 OF 1											
Key: 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E Welding: 6. WPS/PQR 7. Welder Qualification 8. Fit Up 9. Inspect Welding Inspection: 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection				Control points: H Hold Point W Witness V Verification S NR TLA				Surveillance: North Reef Twistlock Africa Client: R-Review Docs PO - Purchase Order									
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)			Document / Certificate Required.	Certificate / Report Number	Signatures								
				NR	BV	TLA			Client	NR	BV	TLA	Client				
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H	R/V												
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	R/V		Yes										
3	Removal of Galvanizing	11	Galvanising to be shot-blasted (out Toneblast)	H	V		Yes										
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H		Yes										
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A1-32; 33-65; 165; 265 etc.	H	R/V		Yes										
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H		Yes										
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing, Std Cert required	H	H		Yes										
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H											
9	Component Sequential Markings	11	As per Client	H													
10	Data book Review	11	As per PO and Data Book Index	H													
11	Final release	11	As per purchase order & Release Note,	H													
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H											
Approved by:												Remarks:					
North Reef Engineering: 				Date: 2023/06/26				Initials:									
Twistlock Africa:				Date: 2023/09/18				Date:									
Bureau Veritas:				Date: 08/09/23				Date:									
Client:				Date:				Date:									



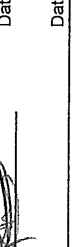

**BUREAU VERITAS**

REVIEWED

WITNESSED

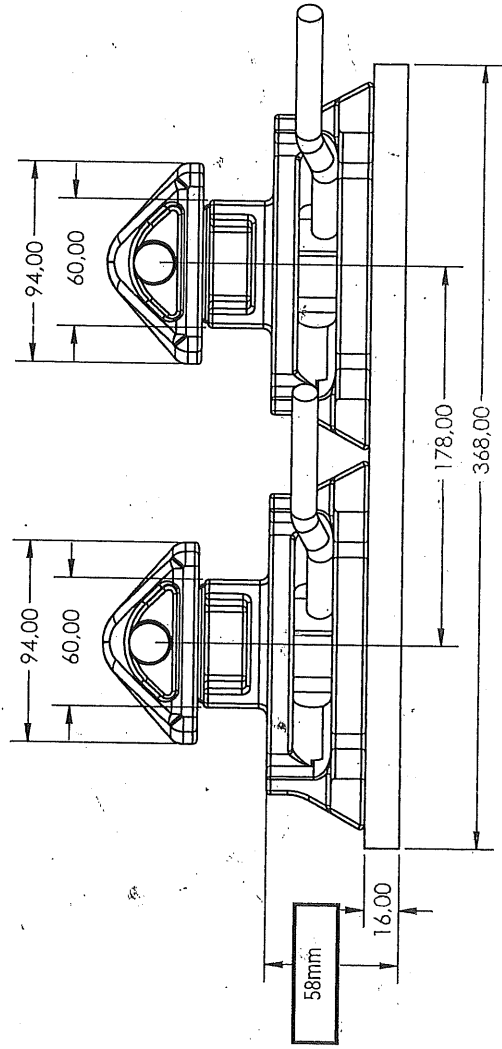
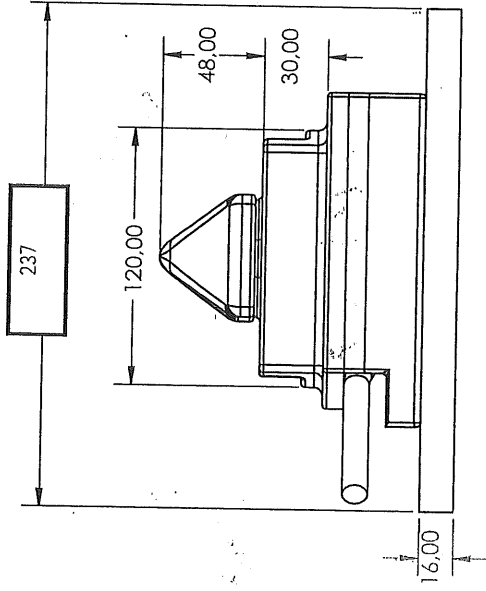
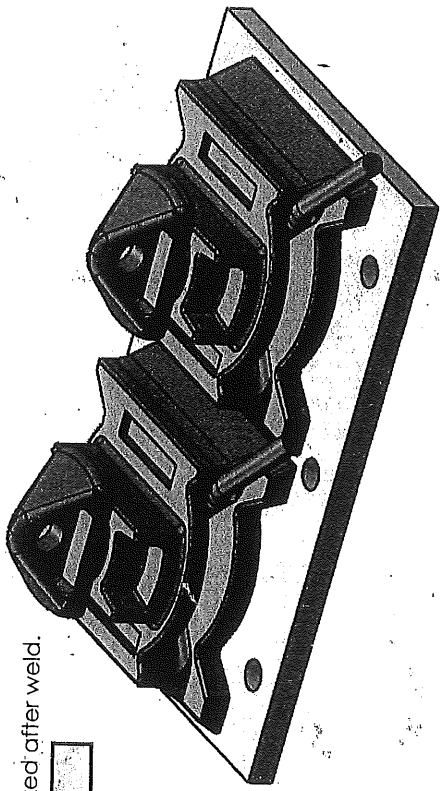
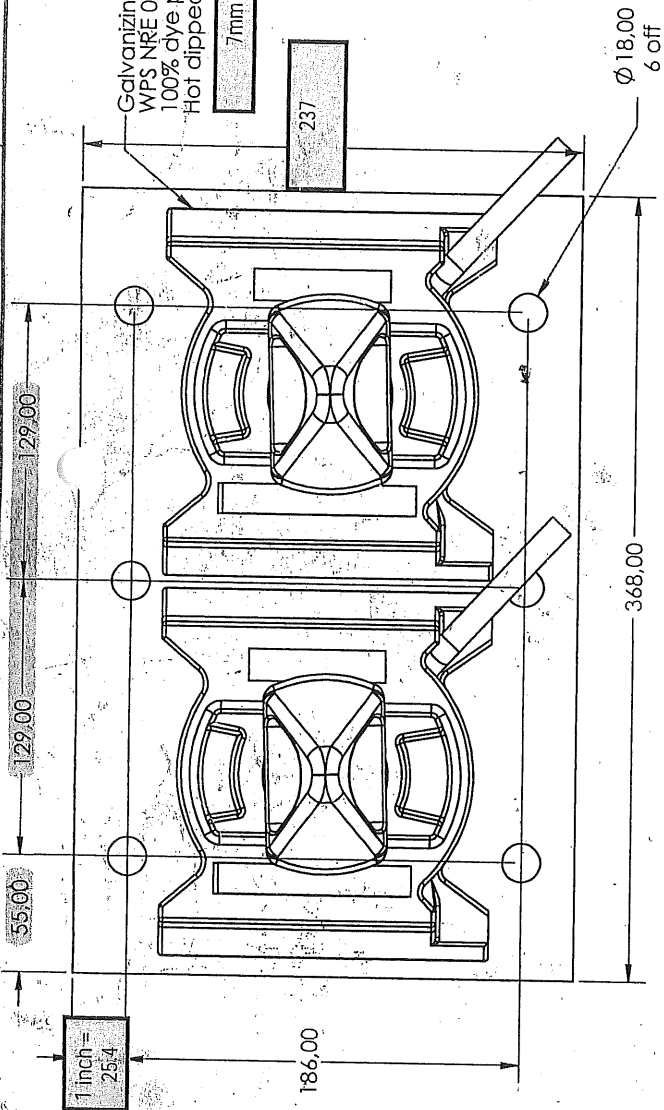
Date

# NORTH REEF ENGINEERING

QUALITY CONTROL PLAN				QCP No. A-001							
Customer Order Number	SO0000723	Customer	TWISTLOCK/AFRICA								
North Reef Job Number	TLA/002 (30882)	PROJECT	SINGLE DOVETAIL TWISTLOCK								
Item Description	SINGLE DOVETAIL TWISTLOCK	Drawing Number	TLA/002								
End user	CADG	365-509 Bench -F									
Key		Control points									
		H	Hold Point	S	Client						
		W	Witness	NR	North Reef						
		V	Verification	TLA	Twistlock/Africa						
					PO - Purchase Order						
Properties: 1. Chemical 2. Heat Treatment 3. Hardness 4. Mechanical 5. N.D.E Welding: 6. WPS/PQR 7. Welder Qualification & Fit Up 9. Inspect Welding Inspection: 10. Pull Test 11. Visual 12. Dimensional 13. Paint 14. Corrosion Protection											
Op	Operation/Activity	Inspection	Specification/Acceptance	Inspection (H, W, V, S)		Document / Certificate Required.	Certificate / Report Number	Signatures			
				NR	BV	TLA	Client	NR	BV	TLA	Client
1	QCP and DATA BOOK INDEX Approval - Drawn up & Submitted - Approval - Drawing	11	As per purchase order. TLA/002	H	RV						
2	Material Certificate Verification & Items Inspection	1	As per Drawing-S355JR & Casting. Ensure GLS is marked.	H	RV			5			
3	Removal of Galvanizing	11	Galvanizing to be shot-blasted (out Toneblast)	H	V			5			
4	Welding	6,7	Weld base plate to twist lock as per drawing & as per WPS NRE 017 & WPQR NRE10	H	H			5			
5	Destructive & Non-Destructive test. 2 per Batch: (1 Tensile & 1 Shear)	5	Pull test & dye pen (To be done in batches: A1-32; 33-65; 165; 265etc.	H	RV			5			
6	Interim Inspection	11	As per Drawing / Complete Doc. of all components	H	H			5			
7	Corrosion Protection	13	Galvanizing: Hot Dip Galvanizing. Std Cert required	H	H			5			
8	Final Inspection & Release for Marking	11	TLA to do the engraving of each lock per batch	H	H	H	H				
9	Component Sequential Markings	11	As per Client	H							
10	Data book Review	11	As per PO and Data Book Index	H							
11	Final release		As per purchase order & Release Note,	H							
12	Packaging	11	NR to pack & document boxes in batches, weight up to 2Tonnes.	H	H	H	H				
Approved by:										Remarks	
North Reef Engineering: Musa Khoza  Date 2023/06/26 Twistlock Africa:  Date 2021/07/16 Bureau Veritas:  Date 08/09/23 Client:  Date										Date 2023/06/06 PAGE 1 OF 1 QTY 509	

Galvanizing: Full strip prior to weld.  
WPS NRE 010.  
100% dye pen.  
Hot dipped galvanized after weld.

7mm fillet weld

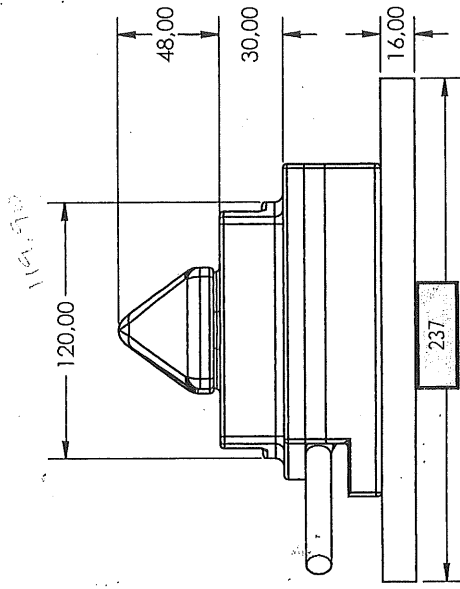
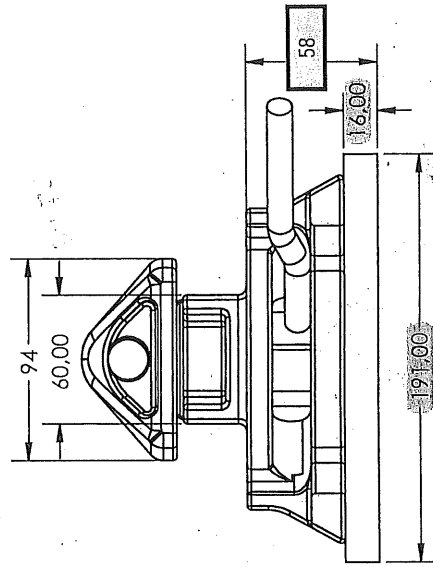
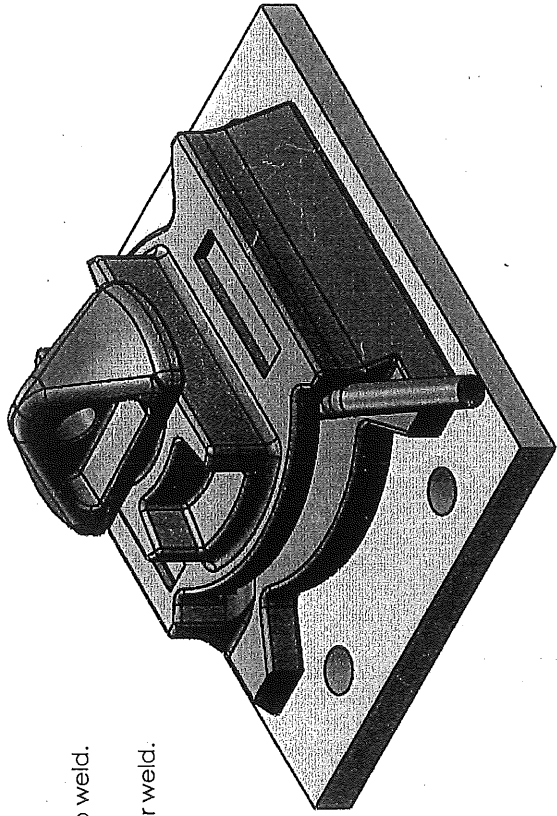
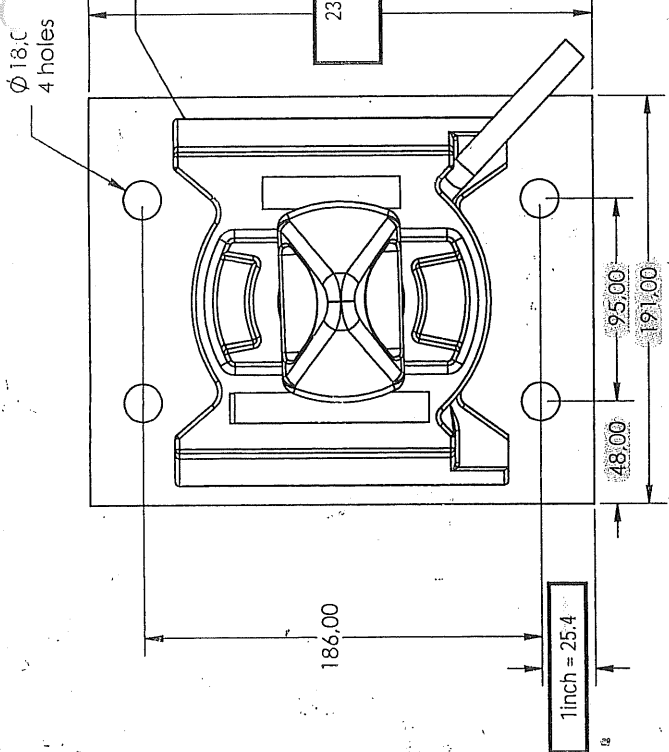


Mass: 21 kg  
Material (Twistlock): ZG270 - 500 (Cast)  
Material (Plate): S355JR +N (Hot Rolled)  
Twistlocks: GLS BD-D1 45° Dovetail  
Finish: Hot Dipped Galvanized  
SWL Tension: 250 kN  
SWL Shear: 210 kN  
SWL Compression: 1000 kN  
MBL Tension: 500 kN  
MBL Shear: 420 kN  
MBL Compression: 2000 kN

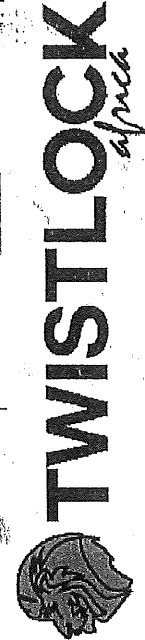
**TWISTLOCK**  
*africa*

Address (JHB): 100 8th Avenue, Edenvale, 1610, Gauteng, South Africa  
Address (CPT): 17 Simone Street, DeTijger, Parow, 7500, Cape Town, South Africa  
Website: [www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)  
Email: [info@twistlockafrica.co.za](mailto:info@twistlockafrica.co.za)  
Tel: +27 11 609 7873

DO NOT SCALE DRAWING		REVISION	
NAME	SIGNATURE	DATE	TITLE
DRAWN: R. Siebenhaar	R.A.S.	25/03/23	Assembly Drawing:
CHKD: R. Siebenhaar	R.A.S.	25/03/23	Boltable Twistlock (368 x 237 x 16)
APPR: R. Siebenhaar	R.A.S.	25/03/23	
MFG			
D.A.			
DWG NO.			A3
SCALE: 1:2.5			Boltable Twistlock 368 x 237
SHEET 1 OF 1			



Mass: 11 kg  
 Material (Twistlock): ZG270 - 500 (Cast)  
 Material (Plate): S355JR +N (Hot Rolled)  
 Twistlock: GLS BD-D1 45° Dovetail  
 Finish: Hot Dipped Galvanized  
 SWL Tension: 250 kN  
 SWL Shear: 210 kN  
 SWL Compression: 1000 kN  
 MBL Tension: 500 kN  
 MBL Shear: 420 kN  
 MBL Compression: 2000 kN



Address (JHB): 100 8th Avenue, Edenvale, 1610, Gauteng, South Africa  
 Address (CPT): 17 Simone Street, De Tjiger, Parow, 7500, Cape Town, South Africa  
 Website: [www.twistlockafrica.co.za](http://www.twistlockafrica.co.za)  
 Email: [info@twistlockafrica.co.za](mailto:info@twistlockafrica.co.za)  
 Tel: +27 11 609 7873

DO NOT SCALE DRAWING				REVISION	
NAME	SIGNATURE	DATE			
DRAWN R. Siebenhaar	R.A.S.	05/03/23			
CHECKED R. Siebenhaar	R.A.S.	05/03/23			
APPV'D R. Siebenhaar	R.A.S.	05/03/23			
MFG					
QA					
TITLE: Assembly Drawing: Boltable Twistlock (191 x 237)			A3		
DWG NO. Boltable Twistlock 191 x 237			A3		
SCALE: 1:2.5			SHEET OF 1		



Reg. No. 2003/0443807  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando, 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## 1.2 MATERIAL CERTIFICATES

- MECHANICAL AND CHEMICAL PROPERTIES

**DNV·GL**

Certificate No:  
**TAS00001KY**  
Revision No:  
**1**

## TYPE APPROVAL CERTIFICATE

### This is to certify:

**That the Cargo Securing Devices**

with type designation(s)  
**Slide Twistlock BD-D1**

Issued to

is found to comply with  
**DNV GL rules for classification – Ships**

### Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

**SWL, tension (kN) 250**  
**SWL, shear (kN) 210**  
**SWL, compr. (kN) 1000**

Issued at **Hamburg** on **2018-08-01**

This Certificate is valid until **2023-07-31**.

DNV GL local station: **Ningbo**

Approval Engineer: **Mark-Oliver Wobig**



for **DNV GL**

Digitally Signed By: Orth,  
Andree  
Signing Date: Dienstag, 14. August 2018

**Andree Orth**  
**Head of Section**

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.



Form code: TA 251

Revision: 2016-12

[www.dnvgl.com](http://www.dnvgl.com)

Page 1 of 2

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Job Id: 262.1-028785-1  
Certificate No: TAS00001KY  
Revision No: 1

## Product description

Twistlock.

## Application/Limitation

Load	Tension [kN]	Shear [kN]	Compression [kN]
Test Load	313	263	1250
Breaking Load	500	420	2000

Tests to be carried out:

- Production testing: At least 2% of the items delivered are to be selected and subjected to the test load.
- Material tests are to be included energy testing at -20°C, with the impact energy requirements acc. to DNVGL-CP-0068. The material shall be according to the approved drawings. Material certificates shall be 3.1 acc. to ISO 10474:2013.

## Type Approval documentation

Drawing No.	Rev.	Title
BD-D1		Slide Twistlock
BD/01		Shaft
BD-D1/01		Twistlocks
BD/05		Handlebar

Drawing Approval: Ref. No. 07-134241 dated 2007-11-20

## Tests carried out

The prototype test was carried out in Ningbo, P.R. China, dated 2018-07-13 in accordance with the DNVGL-CP-0068.

## Marking of product

Each item shall be marked by manufacturer for traceability.

## Periodical Assessment

For retention of the Type Approval, a DNVGL surveyor shall perform a survey after 2 and 3.5 years, to verify that the Type Approval is complied with.



SHUIXIN

水心

唐山市丰润区水心金属制品制造有限公司  
TANGSHAN FENGRUN SHUIXIN METAL PRODUCTS MANUFACTURING CO., LTD  
产品质量证明书

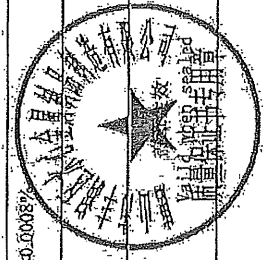
河北省唐山市丰润区沙流河乡沙流河村东  
EAST OF SHALIUHE VILLAGE SHALIUHE TOWN  
FENGRUN DISTRICT TANGSHAN CITY HEBEI  
PROVINCE

Post Code: 064006  
Tel: (0315) 2298799  
Fax: (0315) 2298799

Product Quality Certificate

SX/QR-ZJ-9086

供货单位 Customer	厦门建发金属有限公司		产品名称 Product	低合金结构钢板		技术条件 Technical Condition	EN10025-2											
合同编号 Contract No.	HBSX2212017		序列号 Serial Number	230426-527		交货状态 Delivery status	热轧 Hot rolled											
牌号 Grade	熔炼号 Heat No	批号 Batch No.	规格 Size (mm)			化学成分 Chemical Composition (%)			机械性能 Mechanical Property									
			厚度 Thick	高度 width	长度 Length	张数 Pieces	重量 Weight	C	Si	Mn	P	S	屈服 Y.S	伸长 E.L	冲击 Impact Test	弯曲试验 Bend Test		
S355JR	680	230426-527	16	2400	10000	3	9.042	0.18	0.21	1.09	0.014	0.010	395	25	108		10J	9F
合计 Total																		
注释 Notes																		
备注 Remarks																		
签发日期 Issue Date:	2023.05.29																	



Y.S=YIELD STRENGTH T.S=TENSILE STRENGTH E.L=ELONGATION AS PER EN10204 : 2004 TYPE 3.1 BORON=0.0008%

1. 本质保书涂改无效。MTC is invalid if altered.  
2. 复印件不具备同等法律效力。The copy of this certificate is not valid except stamped.

本产品已按上述要求进行制造和检验，其结果符合要求特此证明。  
THE MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

WE HEREBY CERTIFY THIS MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.

RALPH (1221)  
TLA/001  
30881



日照中板有限公司  
RIZHAO STEEL YNGKOU MEDIUM PLATE CO.,LTD.  
辽宁省营口市老边区冶金街115005  
Yelinstreet, Laobian district, Yngkou, Liaoning, P.R. China/115005  
TEL:0417-3256081 FAX:0417-3256057 NO.:D2101501/A

# 201470产品质量证明书

## INSPECTION CERTIFICATE



订货单位  
PURCHASER

KING METOREINTERNATIONALPTE.LTD.



低合金高强度结构钢

High strength low alloy structural steel

收货单位  
CONSIGNEE

KING METOREINTERNATIONALPTE.LTD.

热轧(AR)

BSI-221214YK-934 WP

技术标准/牌号  
SPEC/GRADE

EN 10025-2-2019 ; S355JR + AR

签发日期  
DATE OF ISSUE

20230212

车号  
TRAIN NO.

230212Z00246

炉号 HEAT NO.	批号 LOT NO.	钢板号 PLATE NO.	规格 (mm) DIMENSION	数量 QTY	重量 WEIGHT kg	分析区域 AA	化学成分 CHEMICAL ANALYSIS %																						
							C	Si	Mn	P	S	N	Cu	Mi	Cr	Mo	Ti	V	B	Alb	CEV	No							
23301340C	2321801	23B2796001	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	420	537	28.5	93	114	114	107
23301340C	2321846	23B2796002	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	61	76
23301340C	2321848	23B2796003	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	61	76
23301340C	2321848	23B2796004	16x2000x8000	1	2.010	L	166	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	61	76
23301340C	2321848	23B2796005	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	61	76
23301340C	2321846	23B2796006	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	61	76
							合计(TOTAL): 6 12.069																						

L: 熔炼成分SMELTING COMPOSITION  
拉伸标距(GAUGE LENGTH) Lo=5.65√S0 mm  
A0C冲击试验IMPACT TEST: 20℃, 纵向LONGITUDINAL,  
近表 CLOSE TO SURFACE, 尺寸SIZE 10±10±55  
BOA01=YIELD STRENGTH  
BOA02=TENSILE STRENGTH  
BOA03=PERCENTAGE ELONGATION AFTER FRACTURE

注释  
NOTES

According to EN 10204 3.1

本产品已按照标准要求进行制造和检验, 其结果符合要求, 特此证明。  
WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HAS MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION



冶金技术处处长  
DIRECTOR OF  
METALLURGICAL  
DEPARTMENT

张新刚

RALPH(1221)  
TLA/001-30881



SHUIXIN

水心

唐山市丰润区水心金属制品制造有限公司  
TANGSHAN FENGRUN SHUIXIN METAL PRODUCTS MANUFACTURING CO., LTD.  
产品质量证明书

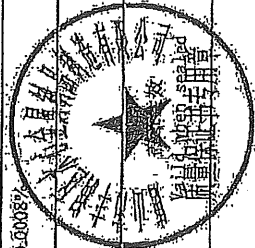
Product Quality Certificate

河北省唐山市丰润区沙流河镇沙流河村东  
EAST OF SHALIUHE VILLAGE SHALIUHE TOWN  
FENGRUN DISTRICT TANGSHAN CITY HEBEI  
PROVINCE

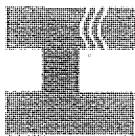
Post Code: 064006  
Tel: (0315) 5298799  
Fax: (0315) 5298799

SX/QR-ZJ-9D86

订货单位 Customer	厦门建发金属有限公司		产品名称 Product	低合金结构钢板		技术条件 Technical Condition	EN10025-2										
合同编号 Contract No.	HBSX2212017		序列号 Serial Number	230426-527		交货状态 Delivery status	热轧 Hot rolled										
牌号 Grade	规格 Spec	厚度 Thick	高度 Width	长度 Length	张数 Pieces	重量 Weight	化学成分 Chemical Composition (%)			冲击试验 Impact Test	弯曲试验 Bend Test						
							C	Si	Mn			P	S	温度 Temp	A	B	C
S355JR	16x2400	16	2400	10000	3	9.042	0.18	0.21	1.09	0.014	0.010	25	200C	108	104	97	合格 Qualified
合计 Total	注群 Notes	YS=YIELD STRENGTH		TS=TENSILE STRENGTH		EL=ELONGATION		AS PER EN10204 : 2004 TYPE 3.1		BOKON=0.008%							
备注 Remarks	1. 本原保中涂改无效。MTC is invalid if altered. 2. 复印件不具备同等法律效力。The copy of this certificate is not valid except stamped.																
签发日期 Issue Date:	2023.05.23 本产品已按上述要求进行制造和检验，其结果符合要求特此证明。 THE PRODUCT HAS BEEN MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION.																



RALPH(1221)  
TL4/002  
30882



日照中板有限公司  
RIZHAO STEEL YINGKOU MEDIUM PLATE CO., LTD.  
辽宁省营口市老边区冶金街/115005  
YeJinStreet.LaobianDistrict.Yingkou.Liaoning.P.R.China/115005  
TEL:0417-3256081 FAX:0417-3256057 NO.:DT2101501/A

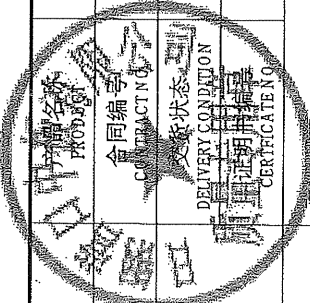
C1470产品 质量证明书  
INSPECTION CERTIFICATE



订货单位 PURCHASER	KING METORE INTERNATIONAL PTE.LTD.	
收货单位 CONSIGNEE	KING METORE INTERNATIONAL PTE.LTD.	
技术标准/牌号 SPEC./GRADE	EN 10025-2-2019 ; S355JR + AR	热轧(AR)
	签发日期 DATE OF ISSUE	20230212
车号 TRAIN NO.	230212Z00246	

低合金高强度结构钢  
High strength low alloy structural steel

BSI-221214YK-934 WP



炉号 HEAT NO.	批号 LOT NO.	钢板号 PLATE NO.	规格 (mm) DIMENSION	数量 QTY	重量 WEIGHT kg	分析 区域 AA	化学成分 CHEMICAL ANALYSIS %																						
							C	Si	Mn	P	S	N	Cu	Ni	Cr	Mo	Ti	V	B	Al <sub>5</sub>	CEV	Nb							
23301340C	2321841	23B2796001	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	420	537	28.5	93	114	114	107
23301340C	2321846	23B2796002	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	81	76
23301340C	2321848	23B2796003	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	81	76
23301340C	2321848	23B2796004	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	81	76
23301340C	2321848	23B2796005	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	81	76
23301340C	2321848	23B2796006	16x2000x8000	1	2.010	L	168	349	1515	180	63	46.8	8	20	12	30	160	1	5	24	42	130	406	531	28	84	82	81	76



注释 NOTES	L: 熔炼成分 SMELTING COMPOSITION 拉伸标距 (GAUGE LENGTH) Lo=5.65√SO mm AOC冲击试验 IMPACT TEST: 20℃, 纵向 LONGITUDINAL, 近表面 CLOSE TO SURFACE, 尺寸 SIZE 10*10*55 BOA01=YIELD STRENGTH BOA02=TENSILE STRENGTH BOA03=PERCENTAGE ELONGATION AFTER FRACTURE According to EN 10204 3.1	
	AOC01=IMPACT TEST A AOC012=IMPACT TEST B AOC013=IMPACT TEST C AOC02=IMPACT AVERAGE	
	本产品已按照标准要求进行制造和检验, 其结果符合要求, 特此证明。 WE HEREBY CERTIFY THAT MATERIAL DESCRIBED HAS MANUFACTURED AND TESTED WITH SATISFACTORY RESULTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MATERIAL SPECIFICATION	
	冶金技术处处长 DIRECTOR OF METALLURGICAL DEPARTMENT 	

<b>Certificate No:</b>	23-1630-4		
<b>Customer:</b>	North Reef Engineering		
<b>Attention:</b>	J. Anjinho	<b>Order No:</b>	0031413
<b>Address:</b>	P.O Box 369	<b>Date Received:</b>	12-Jul-2023
	Isando,1600	<b>Date Tested:</b>	20-Jul-2023
	Gauteng	<b>Date Reported:</b>	20-Jul-2023
		<b>Heat No:</b>	N/A
<b>Telephone:</b>	011 974 1961	<b>Ref No:</b>	N/A
<b>Email:</b>	accounts@northreef.co.za		
<b>Description:</b>	Casting section , As Received.		

**TEST REPORT ISSUED IN ACCORDANCE WITH EN10204 3.1**

ELEMENT (Results expressed in %)	TEST METHOD:	ASTM E415	MATERIAL SPECIFICATION:
	RESULT:		NO SPECIFICATION PROVIDED
Carbon	0.32		
Silicon	0.42		
Manganese	0.46		
Phosphorous	0.033		
Sulphur	0.008		
Chromium	0.05		
Molybdenum	<0.01		
Nickel	0.01		
Copper	0.01		
Aluminium	0.02		
Vanadium	0.001		
Titanium	<0.001		
Niobium	0.004		
Cobalt	0.002		
Tungsten	<0.002		
Lead	<0.001		
Boron	0.0004		
Arsenic	0.004		
Tin	0.001		
Antimony	<0.001		
Magnesium	---		
Zinc	---		
Nitrogen	---		
Iron	REMAINDER		

Additional information: Material: BS3100:1991 Grade A2 or similar.

Tested By: D. Tolmay	Witnessed By: N/A	Technical Signatory:	 <b>Juane Mohr</b> Technical signatory 

<b>RESULT:</b>	<b>NO SPECIFICATION PROVIDED</b>
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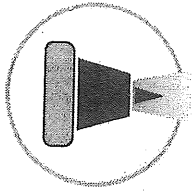


Reg. No. 2003/443027  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O.Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

### **1.3 BLASTING PROFILE REPORTS**

- **SHOT BLASTING (TONE BLAST)**



TLA/001

30881

# Tone-Blast

Abrasive Blasting and Painting  
Registration No: 2006/222404/23

PO Box 743  
Edenvale, Gauteng, 1610  
Telephone: (011) 452-6713  
E-mail: [office@toneblast.co.za](mailto:office@toneblast.co.za)

42 Plantation Road  
Eastleigh  
Edenvale, 1609  
VAT: 4190108847

## Certificate For Degree of Abrasive Grit Blasting

This is to certify that the following items have been Abrasive Grit Blasted to SA 2.5 Swedish Specification:

Profile Readings : 40 - 70 microns

Temperature : \_\_\_\_\_ Humidity : \_\_\_\_\_

Job No : 172739

Customer : NORTH REEF ENG

Customer Order Number : 0031444

Description :

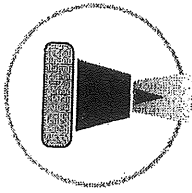
100 X 237 X 191 PLATES

100 X 237 X 368 PLATES

Date: 03/08/2003 Name: ELIA Signature: 

TLA/002

30882



# Tone-Blast

Abrasive Blasting and Painting  
Registration No: 2006/222404/23

PO Box 743  
Edenvale, Gauteng, 1610  
Telephone: (011) 452-6713  
E-mail: [office@toneblast.co.za](mailto:office@toneblast.co.za)

42 Plantation Road  
Eastleigh  
Edenvale, 1609  
VAT: 4190108847

## Certificate For Degree of Abrasive Grit Blasting

This is to certify that the following items have been Abrasive Grit Blasted to SA 2-5 Swedish Specification:

Profile Readings : 40 - 70 microns

Temperature : \_\_\_\_\_ Humidity : \_\_\_\_\_

Job No : 172739

Customer : NORTH REEF ENG

Customer Order Number : 0031444

Description :

100 X 237 X 191 PLATES

100 X 237 X 368 PLATES

Date: 03/08/2003 Name: ELIA Signature: 



Reg. No. 2003/444807  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando, 1600  
Tel: 011 974-1951  
Fax: 011 974-1833

## 1.4 WELDING DECUMENTATION

- WPS
- PQR
- WQS

North Reef Engineering (Pty) Ltd.

**WELD PROCEDURE SPECIFICATION**

Manufacturer	North Reef Eng. (Pty) Ltd	WPS	NRE 017
Base Metal	ZG 270-500	to	EN 10025-2 S355JR
Thickness	6 up to 50mm	CT =	up to max 50mm
Weld Process	GMAW	Appl Code	AWS D 1.1M-2020
Weld Position	Flat, Horizontal	Welder Qual.	1G, 2F Class/Group II

Consumable	AWS A5.18 ER70S6	F-No.6	Trade Name:A Arc Triton ER70 or equal
Gas Spec	80%Ar <sub>2</sub> -18%CO <sub>2</sub> -2%O <sub>2</sub>		Trade Name AIR Liquid Force or equal

Pass	Elec dia. mm	Current A DC+	Voltage V	T.Speed mm/s	WSO MM	Gas Flow l/min
FW	1.2	265-275	26-27	3-4	12-15	18-22
GW	1.2	265-275	26-27	3-4	15-18	18-22

Preheat Temperature CT. up to 50 mm =50° C.  
 Inter-pass Temperature = < 240° C.  
 Back Goug: Yes where applicable (PHT 50° C.)  
 Back Grind: Yes where applicable (PHT 50° C.)

<b>Applicable Joints</b>	<b>TWISTLOCK CASTING/S TO BASE PLTFABRICATION</b>
1	All Tack and Fillet welds.
2	All FPJ Groove welds except single sided.
3	All PJP welds.

- Notes**
- Heat by oxy-fuel flame, ensure soaking heat, no cutting torch heating permitted.
  - Check temperature with Tempilsticks or equivalent.
  - Maintain inter-pass temperature above preheat temperature.
  - Weld deposit to be stringer beads <10 mm wide.
  - Permit slow cooling after welding i.e. use thermal blanket, vermiculite etc.

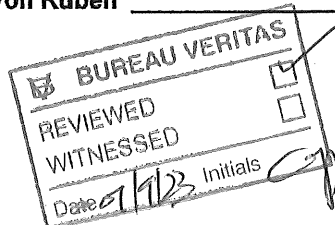
- Special Instructions**
- Use electrodes in accordance with manufacturer's specifications.
  - Preparation for welding to be done as per Workmanship Standard.
  - All Tack welds to be minimum 15 mm long.
  - Perform 100% Visual Inspection on all jobs at all times.
  - After weld completion and cooling to touch, fettle, clean and final inspect to specification/QCP.

Prepared by: Carl J. von Ruben  
 Supporting PQR: PQR NRE 010

Date: 2023/05/02  
 Revision No.: 00

Issued by Carl von Ruben

Engineering Approval



A handwritten signature in black ink, positioned to the right of the 'Engineering Approval' text.

North Reef Engineering (Pty) Ltd.

WELD PROCEDURE SPECIFICATION

Manufacturer	North Reef Eng. (Pty) Ltd	WPS	NRE 010
Base Metal	Class II- EN 10025-2 S355JR	to	Class IV-BS 970-080M40-N
Thickness	6 up to 50 mm	CT =	up to max 150mm
Weld Process	GMAW	Appl Code	AWS D 14.3/D 14.3M
Weld Position	Flat; Horizontal	Welder Qual	2G,2F Class II

Consumable	AWSA5.18 ER70S-6 F-No.6	Trade Name: A Arc Triton ER70 or equal
Gas Spec	85%Ar <sub>2</sub> -13%CO <sub>2</sub> -2%O <sub>2</sub>	Trade Name: Air Liquid ATAL or equal

Pass	Elec dia. mm	Current A DC+	Voltage V	T.Speed mm/min	WSO mm	Gas Flow l/min
All	1.2	195-240	19-26	manual	15-20	1822
All	1.6	200-300	22-31	manual	15-20	18-22

Preheat Temperature CT. up to 50mm =150°C.  
CT. 50 up to 150 mm =200°C.

Inter-pass maximum Temperature =<275°C.  
Back Gouge: Yes when required. (PHT 50°C.)  
Back grind: Yes when required. (PHT 50°C.)

Applicable Joints **FORGING TO PLATE FABRICATIONS**

- 1 All Tack and Fillet welds.
- 2 All FPJ Groove welds except single sided.
- 3 All PJP weld Joints.

Notes

- 1 Heat by Oxy-fuel torch ensures soaking heat, no cutting torch heating permitted.
- 2 Apply heat to the forging side predominantly.
- 3 Check Temperature with Tempel sticks or equivalent.
- 4 Maintain Inter-pass temperature above preheat temperature.
- 5 Weld deposit to be stringer beads <10 mm wide.
- 6 Permit slow cooling after welding using, thermal blankets, vermiculite etc.

Special Instructions

- 1 Use electrodes as per manufacturer's recommendations.
- 2 Preparation for welding to be done as per Workmanship Standard.
- 3 All Tack welds to be minimum 15mm long.
- 4 Perform 100% Visual Inspection on all jobs at all times.
- 5 After weld completion and cooling to touch, fettle, clean and final inspect to specification/QCP.

Prepared by  
Supporting PQR

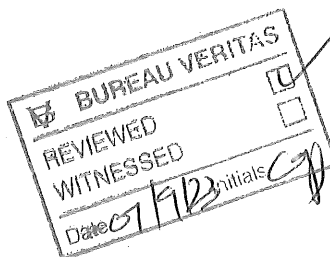
Carl J. von Ruben  
PQR NRE 010

Date: 2017/02/02  
Revision No.: 00

Issued by

Carl von Ruben

Engineering Approval



## WELD PROCEDURE QUALIFICATION RECORD

Material Specification	BS 970-080M40-N	to	EN 10025-2 S355JR
Weld Process/s	Group: UA	M-No.: UA	to Group: 1
Manual or Semi-Auto	1) GMAW	2) N/A	M-No.: 1
Thickness Range	1) Semi-auto	2) N/A	
Total Thickness Range	25mm		
Position	Un-limited		
	2G		Weldability Class: IV

Filler METAL	AWSA5.18 ER70S-6	F-No.6	Trade Name	Argon Arc Triton ER70
Shielding Gas	85%Ar <sub>2</sub> +13%CO <sub>2</sub> +2%O <sub>2</sub>		Trade Name	Air Liquid ATAL

Pass	Elect dia. Mm	Current A DC+	Voltage V	Speed mm/min	Gas Flow l/min	Wire Stick Out mm
1 to 4	1.2	195-240	20-24	manual	18-24	15-20
5 to Cap	1.6	240-275	24-30	manual	18-24	15-20

## PREHEATING AND INTERPASS TEMPERATURES

Preheat Temperature =150°C.  
Inter-pass temperature must not exceed Max. < 275°C.  
Back Gouge pre-heat – N/A

## JOINT DESCRIPTION

- 1 Single 'V' Plate FJP- Root back-ground (See page 2 of 2 for joint detail)
- 2 Beads to be Stringer beads with individual width size = <10 mm

## MECHANICAL AND NON-DESTRUCTIVE TESTS

Test Specification:- AWS D1.1/D1.1 M

NDE	RESULT	LAB TESTING	QTY	RESULT/REPORT No.
Visual exam:	Acceptable	Macro Etch:-	N/A	
MT exam:	N/A	Break test:-	N/A	
PT exam:	N/A	Guided Bend test: -	4 off- Accept.	IMP Labs 17-0164-C1
RT exam:	N/A	Tension test: -	2 off- Accept.	IMP Labs 17-0164-C1
UT exam:	N/A	Charpy VN test:-	N/A	

## WELDERS DETAILS

Welders Name: Allan Beato I/D No.:- 7004145300088 COY Clock/Stamp No.:026  
(Who by virtue of these tests meet Welder Performance Qualification requirements).  
Test conducted and witnessed by:- Carl J. von Ruben

Prepared and verified by: Carl J. von Ruben

Date: 2017/02/02

Issued by Carl von Ruben

Manufacturing Approval

**Manufacturer: North Reef Engineering (Pty) Ltd**

**WELDER PERFORMANCE QUALIFICATION TEST RECORD**

**CERT No.: NRE2017/02/001**

Name: ALLAN BEATO Identification: 7304145300088 Welder  Operator

Company Clock Number: 026 Qualified to WPS no: NRE 010

Process (es) GMAW Manual  Semi-Automatic  Automatic  Machine

Test base metal specification: EN 10025-2 S355 JR To: BS 970-080M40-N

Material number: 1 To: UA

Fuel gas (OFW) : N/A Weld Class Qualified: Class II 2G

AWS filler Metal Classification: AWSER70 S-6 F no.: 6

Backing: Yes  No  Double  or Single Side   
Current: AC  DC  Short-circuiting arc (GMAW) Yes  No   
Construction insert: Yes  No   
Root Shielding: Yes  No

TEST WELDMENT	POSITION TESTED					WELDMENT THICKNESS (T)		
<b>GROOVE:</b>								
Pipe	1G <input type="checkbox"/>	2G <input type="checkbox"/>	5G <input type="checkbox"/>	6G <input type="checkbox"/>	6GR <input type="checkbox"/>	Diameter(s)	(T)	+
Plate	1G <input type="checkbox"/>	2G <input checked="" type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>		(T) <u>25 mm</u>		
Rebar	1G <input type="checkbox"/>	2G <input type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>		Bar Size	Butt	

**FILLET:**

Pipe	<input type="checkbox"/>	IF <input type="checkbox"/>	2F <input type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>	5F <input type="checkbox"/>	Diameter(s)	(T)
Plate	<input type="checkbox"/>	IF <input type="checkbox"/>	2F <input type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>	5F <input type="checkbox"/>		(T)

Other (Describe) \_\_\_\_\_

**Test Result:** \_\_\_\_\_ **Remarks** \_\_\_\_\_

Visual test results	N/A. <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Bend test result	N/A. <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Macro test result	N/A. <input checked="" type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>
Tension test	N/A. <input checked="" type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>
Radiographic test results	N/A. <input checked="" type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>
Penetrant test	N/A. <input checked="" type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>
Break test	N/A. <input checked="" type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>



**QUALIFIED FOR: PROCESSES GROOVE:**


Pipe	1G <input type="checkbox"/>	2G <input type="checkbox"/>	5G <input type="checkbox"/>	6G <input type="checkbox"/>	6GR <input type="checkbox"/>	(T) Min	Max	Dia
Plate	1G <input checked="" type="checkbox"/>	2G <input checked="" type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>		(T) Min <u>6mm</u>	Max <u>Unlimited</u>	
Rebar	1G <input type="checkbox"/>	2G <input type="checkbox"/>	3G <input type="checkbox"/>	4G <input type="checkbox"/>		(T) Min	Max	Dia

**FILLET:**

Pipe	1F <input type="checkbox"/>	2F <input type="checkbox"/>	4F <input type="checkbox"/>	5F <input type="checkbox"/>	(T) Min	Max	Dia
Plate	1F <input checked="" type="checkbox"/>	2F <input checked="" type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>	(T) Min <u>6mm</u>	Max <u>Unlimited</u>	
Rebar	1F <input type="checkbox"/>	2F <input type="checkbox"/>	3F <input type="checkbox"/>	4F <input type="checkbox"/>	Bar size	Min	Max
Weld cladding	<input type="checkbox"/>	Position (s)			(T) Min	Max	Clad min

Consumable Insert  Backing type: Steel  
Vertical up  Down   
Single side  Double side  Backing   
Short-circuiting arc  Spray arc  No Backing   
Reinforcing bar-butt  or Spliced butt

The above named person is qualified for the welding process (es) used in this test within the limits of essential variables including materials and filler metal variables of AWS D14.3/D 14.3.M.

Date tested: 2017-02-07 Qualified by: Carl J. von Ruben 



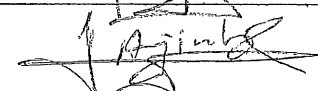

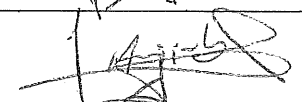

Welder/Operator's Name: Allan Beato

WPQR Certificate No: NRE 2017/02/002

NRE 010

- 1) This certification is valid indeterminately subject to the following conditions being maintained:-
  - a) The essential variables are maintained.
  - b) The welder/operator's workmanship standard does not fall below that specified by AWS D14.3-M 2010 i.e. this certification may be withdrawn or suspended and the welder subjected to re-training/qualification.
  - c) The welder's service in the welding technique is not interrupted by more than 6 months. (Unless proof of currency can be verified).
  - d) The welder/operator shall be evaluated every six to twelve months by a Production and Quality Dept. and his certification record endorsed below.

Certification maintenance/endorsement record

<u>REVIEW DATE</u>	<u>PRODUCTION MANAGER NAME &amp; SIGNATURE</u>	<u>Depot. QUALITY REPRESENTATIVE SIGNATURE</u>	<u>COMMENTS</u>
13/06/2022			
12/12/2022			
13/06/2023			

BUREAU VERITAS  
 REVIEWED   
 WITNESSED   
 Date 07/12/23 Initials CJ



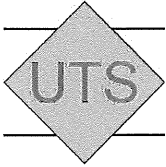
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## **1.5 DESTRUCTIVE & NON-DESTRUCTIVE TESTING**

- LIQUID PENETRANT REPORT
- PULL TEST REPORT

RALPH (1221)  
TLA/001  
30881



ULTRAMAG TECHNIHIRE SERVICES  
Company Registration No CK 91/01758/23

CC

PO BOX 296  
ALBERTON  
1450  
Tel/Fax:011-907 9551

### SURFACE INSPECTION REPORT

REPORT No : 11660

CLIENT :	NORTH REEF	DATE OF TEST :	01/08/2023
ADDRESS :	N/A	LOCATION OF TEST :	NORTH REEF
	N/A	A I A :	N/A
	N/A	JOB NUMBER :	30881
ORDER No :	30881	QCP NUMBER :	N/A

#### TEST OBJECT DETAILS

COMPONENT :	DOVETAIL TWISTLOCK 45-1 (DOUBLE)	ITEM NUMBER :	TLA/001
DRAWING No. :	TLA/001	REVISION :	0
		MATERIAL :	S355JR
SURFACE CONDITION :	CLEAN		

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ADROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ADROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ADROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE :	ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA :	ASME REF DOC :ASTM E709
TEST RESULT SUMMARY :	CONFORMS TO ASTM E709 SPECIFICATIONS

**1.0 COMPONENT EXAMINED:**

1 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS, IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

**2.0 EXAMINATION RESULTS:**

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender  
QUALIFICATION : PCN LEVEL 2

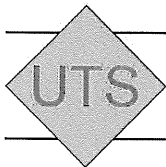
CLIENT : NORTH REEF  
DATE : 01/08/2023

A I A : \_\_\_\_\_  
DATE : \_\_\_\_\_

RUALPH (1221)

TLA/002

30882



ULTRAMAG TECHNIHIRE SERVICES

Company Registration No CK 91/01758/23

CC

PO BOX 296  
ALBERTON  
1450

Tel/Fax:011-907 9551

SURFACE INSPECTION REPORT

REPORT No : 11661

CLIENT :	NORTH REEF	DATE OF TEST :	01/08/2023
ADDRESS :	N/A	LOCATION OF TEST :	NORTH REEF
	N/A	A I A :	N/A
	N/A	JOB NUMBER :	30882
ORDER No :	30882	QCP NUMBER :	N/A

TEST OBJECT DETAILS

COMPONENT :	DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER :	TLA/002
DRAWING No. :	TLA/002	REVISION :	0
		MATERIAL :	S355JR
SURFACE CONDITION :	CLEAN		

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE :	ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA :	ASME REF DOC :ASTM E709
TEST RESULT SUMMARY :	CONFORMS TO ASTM E709 SPECIFICATIONS

1.0 COMPONENT EXAMINED:

1 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

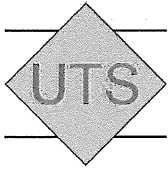
CLIENT : NORTH REEF

A I A :

QUALIFICATION : PCN LEVEL 2

DATE : 01/08/2023

DATE :



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Company Registration No CK 91/01758/23

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## SURFACE INSPECTION REPORT

REPORT No : 11716

CLIENT : NORTH REEF	DATE OF TEST : 14/08/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30881 (BATCH 2)
ORDER No : 30881	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-1 (DOUBLE)	ITEM NUMBER : TLA/001
DRAWING No. : TLA/001	REVISION : 0
	MATERIAL : S355JR
SURFACE CONDITION : CLEAN	

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

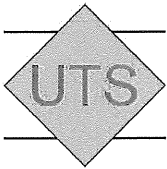
QUALIFICATION : PCN LEVEL 2

CLIENT : NORTH REEF

DATE : 14/08/2023

A I A : \_\_\_\_\_

DATE : \_\_\_\_\_



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## SURFACE INSPECTION REPORT

REPORT No : 11717

CLIENT : NORTH REEF	DATE OF TEST : 14/08/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30882 (BATCH 2)
ORDER No : 30882	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER : TLA/002
DRAWING No. : TLA/002	REVISION : 0
MATERIAL : S355JR	
SURFACE CONDITION : CLEAN	

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS, IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

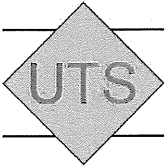
NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender  
QUALIFICATION : PCN LEVEL 2



CLIENT : NORTH REEF  
DATE : 14/08/2023

A I A : \_\_\_\_\_  
DATE : \_\_\_\_\_



# ULTRAMAG TECHNIHIRE SERVICES

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1450

Tel/Fax:011-907 9551

## SURFACE INSPECTION REPORT

REPORT No : 11718

CLIENT : NORTH REEF	DATE OF TEST : 17/08/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30881 (BATCH 3)
ORDER No : 30881	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-1 (DOUBLE)	ITEM NUMBER : TLA/001
DRAWING No. : TLA/001	REVISION : 0
	MATERIAL : S355JR
SURFACE CONDITION : CLEAN	

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ADROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ADROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ADROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

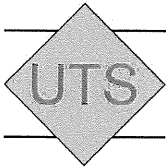
#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender  
QUALIFICATION : PCN LEVEL 2

CLIENT : NORTH REEF  
DATE : 17/08/2023

A I A : \_\_\_\_\_  
DATE : \_\_\_\_\_



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ALBERTON  
1450

Tel/Fax:011-907 9551

## SURFACE INSPECTION REPORT

REPORT No : 11719

CLIENT :	NORTH REEF	DATE OF TEST :	17/08/2023
ADDRESS :	N/A	LOCATION OF TEST :	NORTH REEF
	N/A	A I A :	N/A
	N/A	JOB NUMBER :	30882 (BATCH 3)
ORDER No :	30882	QCP NUMBER :	N/A

### TEST OBJECT DETAILS

COMPONENT :	DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER :	TLA/002
DRAWING No. :	TLA/002	REVISION :	0
		MATERIAL :	S355JR
SURFACE CONDITION :	CLEAN		

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE :	ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA :	ASME REF DOC :ASTM E709
TEST RESULT SUMMARY :	CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

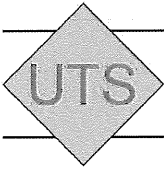
CLIENT : NORTH REEF

A I A : \_\_\_\_\_

QUALIFICATION : PCN LEVEL 2

DATE : 17/08/2023

DATE : \_\_\_\_\_



# ULTRAMAG TECHNIHIRE SERVICES

Company Registration No CK 91/01758/23

CC

PO BOX 296  
ALBERTON  
1450

Tel/Fax:011-907 9551

## SURFACE INSPECTION REPORT

REPORT No : 11745

CLIENT :	NORTH REEF	DATE OF TEST :	25/08/2023
ADDRESS :	N/A	LOCATION OF TEST :	NORTH REEF
	N/A	A I A :	N/A
	N/A	JOB NUMBER :	30881 (BATCH 4)
ORDER No :	30881	QCP NUMBER :	N/A

### TEST OBJECT DETAILS

COMPONENT :	DOVETAIL TWISTLOCK 45-1 (DOUBLE)	ITEM NUMBER :	TLA/001
DRAWING No. :	TLA/001	REVISION :	0
		MATERIAL :	S355JR
SURFACE CONDITION : CLEAN			

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE :	ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA :	ASME REF DOC :ASTM E709
TEST RESULT SUMMARY :	CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

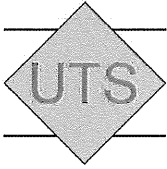
CLIENT : NORTH REEF

A I A : \_\_\_\_\_

QUALIFICATION : PCN LEVEL 2

DATE : 25/08/2023

DATE : \_\_\_\_\_



# ULTRAMAG TECHNIHIRE SERVICES

Company Registration No CK 91/01758/23

CC

PO BOX 296  
ALBERTON  
1450

Tel/Fax:011-907 9551

## SURFACE INSPECTION REPORT

REPORT No : 11746

CLIENT : NORTH REEF	DATE OF TEST : 25/08/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30882 (BATCH 4)
ORDER No : 30882	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER : TLA/002	
DRAWING No. : TLA/002	REVISION : 0	MATERIAL : S355JR
SURFACE CONDITION : CLEAN		

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ADROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ADROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ADROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS, IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

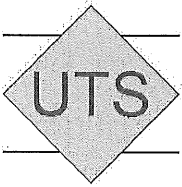
QUALIFICATION : PCN LEVEL 2

CLIENT : NORTH REEF

DATE : 25/08/2023

A I A : \_\_\_\_\_

DATE : \_\_\_\_\_



# ULTRAMAG TECHNIHIRE SERVICES

CC

PO BOX 296

ALBERTON

1450

Tel/Fax:011-907 9551

Company Registration No CK 91/01758/23

## SURFACE INSPECTION REPORT

REPORT No : 11774

CLIENT : NORTH REEF	DATE OF TEST : 05/09/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30882 <i>Batch 5</i>
ORDER No : 30882	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER : TLA/002
DRAWING No. : TLA/002	REVISION : 0
MATERIAL : S355JR	
SURFACE CONDITION : CLEAN	

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

- 2 OFF DOVETAIL TWISTLOCK (BATCH E)
- 2 OFF DOVETAIL TWISTLOCK (BATCH F)

THE ABOVE MENTIONED WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

CLIENT : NORTH REEF

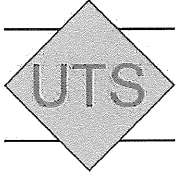
A I A : \_\_\_\_\_

QUALIFICATION : PCN LEVEL 2



DATE : 05/09/2023

DATE : \_\_\_\_\_



# ULTRAMAG TECHNIHIRE SERVICES

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PO BOX 296  
ALBERTON  
1450

Company Registration No CK 91/01758/23

Tel/Fax:011-907 9551

## SURFACE INSPECTION REPORT

REPORT No : 11774

CLIENT : NORTH REEF	DATE OF TEST : 05/09/2023
ADDRESS : N/A	LOCATION OF TEST : NORTH REEF
N/A	A I A : N/A
N/A	JOB NUMBER : 30882 <i>Batch 6</i>
ORDER No : 30882	QCP NUMBER : N/A

### TEST OBJECT DETAILS

COMPONENT : DOVETAIL TWISTLOCK 45-2 (SINGLE)	ITEM NUMBER : TLA/002
DRAWING No. : TLA/002	REVISION : 0
MATERIAL : S355JR	
SURFACE CONDITION : CLEAN	

MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION
TEST EQUIPMENT : N/A	ADROX 996PA PEN BATCH No : 98738
CURRENT SOURCE : N/A	ARDROX 9PR5 CLEANER BATCH No : 83765
TEST METHOD : N/A	ADROX 9D1B DEVELOPER BATCH No : 27610
CURRENT : N/A	TEST METHOD : VISIVEL COLOUR CONTRAST
ARDROX 8903W WHITE B G - BATCH No : N/A	SURFACE TEMPERATURE : 19 DEG
ARDROX 800/3 BLACK MAG INK - BATCH No : N/A	DWELL TIME : 20 MIN
FIELD INDICATOR : N/A	OTHER : N/A

PROCEDURE : ASME REF DOC :ASTM E709
ACCEPTANCE CRITERIA : ASME REF DOC :ASTM E709
TEST RESULT SUMMARY : CONFORMS TO ASTM E709 SPECIFICATIONS

#### 1.0 COMPONENT EXAMINED:

2 OFF DOVETAIL TWISTLOCK (BATCH E)  
2 OFF DOVETAIL TWISTLOCK (BATCH F)

THE ABOVE MENTIONED WAS EXAMINED BY THE LIQUID PENETRANT INSPECTION METHOD FOR SURFACE BREAKING FLAWS,IN ACCORDANCE WITH THE REQUIREMENTS OF SPECIFICATION.

#### 2.0 EXAMINATION RESULTS:

NO RECORDABLE INDICATIONS WERE NOTED AT THE TIME OF EXAMINATION . THE COMPONENT'S MEET WITH THE REQUIREMENTS OF ASTM E70 SPECIFICATION.

TECHNICIAN : T Govender

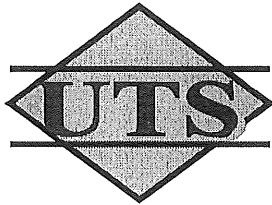
QUALIFICATION : PCN LEVEL 2

CLIENT : NORTH REEF

DATE : 05/09/2023

A I A : \_\_\_\_\_

DATE : \_\_\_\_\_



**ULTRAMAG TECHNIHIRE SERVICES cc**

P. O. Box 297 – Alberton - 1450  
E-mail: [ultramag@mweb.co.za](mailto:ultramag@mweb.co.za)

Tel / Fax: (011) 907 9551

## Company Authorization

This is to confirm

**THERON GOVENDER**

IDENTITY NO:8111255061084

Meets the requirements laid in Ultramag Written Practice No:UTS 001  
Rev 3 and SNT-TC1A(2006)  
For  
Non-Destructive Testing

<b>Method</b> Dye Penetrant Inspection	<b>Level</b> II	<b>Sector</b> Multi Sector
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<b>Date of Issue</b> 02/08/2020	<b>Limitations</b> Corrected Vision	<b>Expiry Date</b> 01/08/2025
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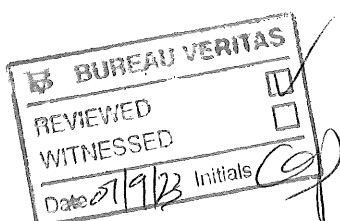
Certificate No: OF45367

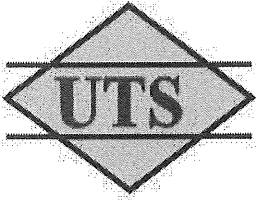
**Appointed Level III**

Ultramag Level III

*This Certificate authorizes this person to carry out Services for and on behalf of  
Ultramag Technichire Services cc*

*This certificate remains the property of Ultramag Technihire Services cc*



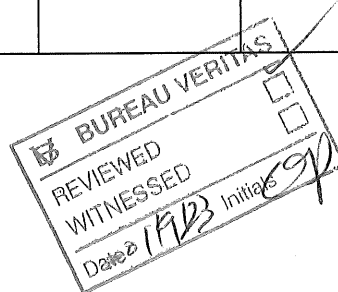


## Penetrant Testing in Accordance with ASME

<b>PREPARED BY:</b>	<b>APPROVED BY</b>	<b>APPROVED BY (MANAGEMENT):</b>
R Bhotha	A. Mahomed	T Govender
NDT Level III	NDT Level III	Operations Manager
11/06/2019	11/06/2019	11/06/2019

CLIENT APPROVAL STATUS				
NO.	NAME	TITLE	SIGNATURE	DATE
1				
2				
3				

CHANGE CONTROL TABLE				
REVISION	STATUS	DATE	AUTHOR	DESCRIPTION OF CHANGE
00	New	11/06/2019	R Bhotha	New document



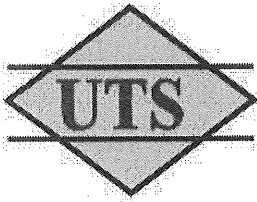
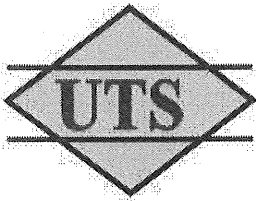


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**1 PURPOSE**

The purpose of this procedure is to detail the method and underlying principals by which Liquid Penetrant Examinations are conducted by UTS personnel and their sub-contractors.

**2 SCOPE**

The scope of this document is to detail the procedural requirements that need to be followed when Liquid Penetrant Examination is used to detect discontinuities, e.g. cracks, laps, folds, porosity and lack of fusion, which are open to the surface of the material being examined. It is mainly metallic material that will be tested, but can be performed on other materials, provided that the material is inert to the examination media and are not excessively porous. Examples of materials/items that may be examined are; castings, forgings, welds, plastics and fully densified ceramics.

Either Colour Contrast or Fluorescent Penetrants, which can be either Solvent Removable or Water Washable, is to be used with Non-Aqueous Wet developer.

Emulsifiers are not to be used for the removal of penetrants.

**3 APPLICATION**

This document is to be applied when the client/contract stipulates that examinations are to be conducted in accordance with the ASME V code.

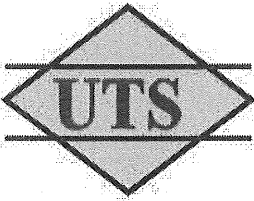
Liquid Penetrant Examination is only to be applied where Magnetic Particle Examination is not feasible and/or is approved by the manufacturer, i.e. on austenitic materials and where access is deemed to be limited etc.

Procedure qualification and/or demonstration is only applicable when the referencing code section stipulates that it is needed.

**4 DEFINITIONS/ABBREVIATIONS/ACRONYMS**

NDT	- Non-destructive Testing – a process that involves the Inspection, Testing and /or the Evaluation of component without impairing the serviceability of the components.
ASME	- American Society of Mechanical Engineers
API	- American Petroleum Institute
PT	- Penetrant Testing
Company	- Ultramag Technihire Services, known as UTS.
MSDS	- Material Safety Data Sheet
UV/Black Light	- electromagnetic radiation in the near ultraviolet range of wavelength (320 nm to 400 nm) with peak intensity at 365 nm.
LOX	- Liquid Oxygen





**5 PERSONNEL**

Personnel performing PT in accordance with this document shall be authorised to do so in accordance with UTS company written practice, which complies with the requirements of SNT-TC-1A and be competent in the technique of the Penetrant examination, including performing the examination and interpreting and evaluating the results.

As a minimum, personnel performing the penetrant examination shall be a Level 1, and personnel who evaluate the results shall be either a level 2 or 3, in accordance with the afore mentioned.

**6 TECHNIQUE RESTRICTIONS**

Fluorescent penetrant examination shall not follow a colour contrast penetrant examination. Intermixing of penetrant materials from different families or different manufacturers is not permitted. A retest with water washable penetrants may cause loss of marginal indications due to contamination.

**7 EQUIPMENT/CONSUMABLES**

**7.1 EQUIPMENT**

- When performing Colour Contrast Examinations, a white light (Lux) meter should be available and the light intensity measured at each work station. One reading on the examination surface is sufficient for each work station.
- When performing Fluorescent Examinations, a UV/Black Light will be used with a UV Light meter.
- When performing Water Washable Examinations, a means of applying the rinse water must be provided, which could be by hose or spray bottle.

**7.2 CONSUMABLES**

Penetrants, solvent removers and developers must be from the same product family and when received must be accompanied by a batch certificate and MSDS.


The compatibility of all penetrant material with the test item must be ascertained prior to the start of any examination, i.e. inert in a LOX environment, low Halogen and Sulphur content when examining Stainless Steel and/or nickel alloys, etc.

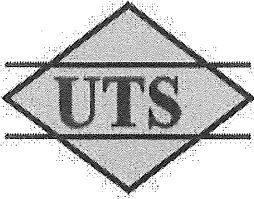
**7.3 CALIBRATION**

Light meters, both visible and fluorescent (black) light meters, shall be calibrated at least once a year or whenever the meter has been repaired. If meters have not been in use for one year or more, calibration shall be done before being used.

**8 SAFETY AND ENVIRONMENTAL CONDITIONS**

As Liquid Penetrant Examination often requires the use of harmful, inflammable and/or volatile materials, certain precautions need to be taken to reduce risks.

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WITNESSED	<input type="checkbox"/>
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Prolonged or repeated contact of these materials with the skin or mucous membrane should be avoided.

Work stations shall be adequately ventilated and sited away from sources of heat, sparks and naked flames. There should always be sufficient space for cleaning and access to equipment and materials.

Penetrant materials and equipment shall be used with care and in accordance with the MSDS or to the instructions supplied by the equipment manufacturer.

When using a UV/Black Light care shall be taken to ensure that unfiltered UV radiation (UVB and C) does not directly reach the eye or the skin of the operator, or other persons. The UV/Black light shall only be used with sufficient filtration in place, whether the filter is an integral part of the lamp or is a separate component. The filter shall at all times be maintained in a good condition.

All electrical equipment shall be thoroughly inspected to ensure there is no danger of malfunction, electrocution or fire hazard. These safety inspections shall be done before the equipment is used.

General precautions with regards to the use of aerosol cans need to be practiced.

## 9 SURFACE CONDITIONS AND PRE-CLEAN

The best examination results are usually obtained if items are tested in the as-welded, as-ground, as-machined or as-polished condition. The as-welded or as-cast conditions could be limiting factors, if the surface is rough, and must be assessed on a case by case basis, as the detection sensitivity may be affected. In addition, surface features such as undercut is considered a limitation and should be recorded as such, as this may mask relevant indications.

Surface contaminants, such as scale, rust, oil, grease, paint, slag and weld spatter shall be removed by mechanical and/or chemical methods. The pre-clean shall ensure that the test surface is free from residues and that penetrant can enter discontinuities open to the surface. The cleaned area shall be large enough to ensure complete coverage of the examination area.

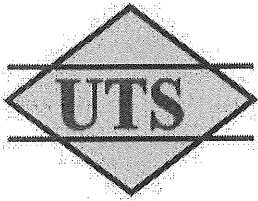
Mechanical pre-cleaning may be done, with caution on steels, to remove contaminants from the surface, but are generally incapable of removing contaminants from within surface discontinuities. If necessary, subsequent etching may be done to ensure discontinuities that may have been closed or clogged by the mechanical pre-cleaning are open to the surface. Following etching the surface shall be rinsed and dried.

Mechanical pre-cleaning shall not be done on aluminium and other malleable materials.

Chemical pre-cleaning, when used, shall be carried out with suitable cleaning agents. All residues shall be removed from the surface; this can be done by use of a water rinse.

All parts shall be dried after pre-cleaning, so that no residue water or solvent will remain in discontinuities or on the surface before the application of penetrants. The minimum time

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allowed from drying of the pre-clean to the application of penetrant shall be not less than 2 minutes. The maximum time allowed shall not be more than 15 minutes. If the period between drying and penetrant application is exceeded, then the surface is to be solvent wiped again and allowed to dry.

The temperature measured on the surface to be examined shall be between 10°C and 52°C. If examinations need to be conducted outside this temperature range, the technique shall first be qualified and approved by the level 3.

## 10 EXAMINATION PROCESS

### 10.1 APPLICATION OF PENETRANT

- Penetrant can be applied by any suitable means, i.e. spraying, pouring, brushing, flooding, dipping, immersion or dabbing. When dabbing care is to be taken to ensure enough penetrant is placed on the examination surface.
- The penetrant shall be applied to the entire examination surface area and where possible 25mm of the adjacent parent material.

### 10.2 PENETRANT DWELL TIME

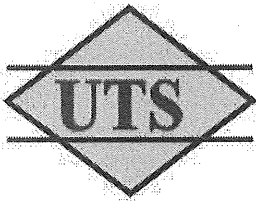
- The penetrant dwell time shall not be less than 20 minutes. Longer dwell times are permitted but shall not exceed 60 minutes.
- Longer dwell times may be considered, but not without prior consultation with the level 3.
- The penetrant shall not be allowed to dry on the examination surface during the penetrant dwell time. Frequent re-application of penetrant is advisable.
- When large numbers of items or vast areas are to be examined, only manageable quantities are to be examined at a time and when complete to systematically examine the next manageable quantity, thus achieving total coverage.
- If the penetrant is inadvertently allowed to dry on the examination surface, the entire examination shall be repeated, from pre-clean.
- Only when the penetrant dwell time has lapsed shall the penetrant be removed from the surface.

### 10.3 EXCESS PENETRANT REMOVAL

#### 10.3.1 REMOVAL OF SOLVENT REMOVABLE PENETRANT

- The surface is to be wiped with a clean, lint free cloth or paper towel, so as to remove excess penetrant from the surface. Then with a solvent dampened, clean lint free cloth or paper towel, wipe the surface to remove any penetrant residue from the surface. Care should be taken to avoid the use of excess solvent to minimize the removal of penetrant inside broad/shallow discontinuities.
- Solvent shall not be used to flush the surface during excess penetrant removal.

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### 10.3.2 REMOVAL OF WATER WASHABLE PENETRANT

- A coarse water spray shall be used held at between 30° to 70° to the surface, with a minimum distance of 300mm from the surface and a water pressure less than 50psi (350kPa). The water temperature shall be between 5°C and 40°C.
- The surface shall only be washed for as long as penetrant is visible on the surface. Over washing must be avoided.
- An alternative method is to use a water dampened cloth with which to wipe the surface, but it is not recommended.

### 10.3.3 CLEANLINESS PRE-CHECK AND DRYING

- During excess penetrant removal, either solvent wipe or water wash, the surface shall be visually checked for penetrant residues. Colour contrast penetrants under white light and fluorescent penetrants under a UV/Black light.
- When the surface appears to be clean of background penetrant the part must be dried. The drying for solvent wipe can be achieved by evaporation for 2 minutes. The drying for water wash can be achieved by placing the examination item in a heated environment but must ensure the surface temperature does not exceed 50°C, or alternatively by natural evaporation and dabbing with a dry cloth or paper towel.
- When it is noted that excessive background penetrant remains on the surface after the removal process, the decision on further action shall be taken by the supervisor, who should consult with the level 3.

## 10.4 APPLICATION OF DEVELOPER

Only non-aqueous wet developer is to be used.

- The developer is to be sprayed onto the examination surface in a thin uniform coating as soon as possible when the surface is dry.
- The developer time shall be a minimum of 10 minutes, A generally not less than half the penetrant dwell time. The maximum dwell time shall be 60 minutes, longer dwell times are possible, but shall not exceed 60 minutes without prior consultation with the level 3.
- Final interpretation shall be done, and indications recorded, at the end of the stipulated developer dwell time.

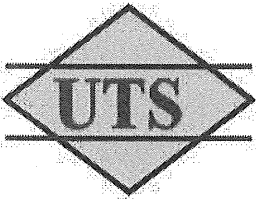
## 11 INTERPRETATION AND VIEWING CONDITIONS

### 11.1 VIEWING CONDITIONS

#### 11.1.1 COLOUR CONTRAST PENETRANTS

- Colour contrast penetrant indications shall be interpreted in good day light or under artificial white light.
- When measured with a Lux meter, the luminance should not be less than 1000 Lux.
- The viewing conditions should be such that there is no glare from the surface.

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### 11.1.2 FLUORESCENT PENETRANTS

- Fluorescent penetrant indications shall only be interpreted when the work station is sufficiently darkened, the white light measured should not be above 20 Lux.
- Sufficient time, 5 minutes, should be allowed for dark area eye adaptation before interpretation and the use of photo chromatic spectacles shall not be worn.
- The irradiance on the examination surface shall be a minimum of  $1000\mu\text{W}/\text{cm}^2$ , as measured with a UV light meter.
- The UV/Black light should be held so as not to cause glare from the surface.

### 11.2 INTERPRETATION


- All indications shall be interpreted as false, non-relevant or relevant. Only those indications that are relevant should be recorded, although non-relevant indications that may mask relevant indications should be noted on the report. A relevant is one that is at least 1.5mm in size.
- Interpretation should start as soon as the developer has dried on the surface.
- Final interpretation shall be at the end of the stipulated developer dwell time. At this time indication size is to be measured for reporting, further bleed-out after this point is inconsequential.
- Generally, the penetrant indication is larger than the discontinuity that causes it. It is the size of the penetrant indication that is to be recorded for evaluation.
- Indications are to be recorded as either linear or rounded:
  - a) A linear indication is one having a length greater than three times the width.
  - b) A rounded indication is one of circular or elliptical shape with the length equal to or less than three times the width.
  - c) Any questionable or doubtful indications shall be re-examined to determine if they are relevant.

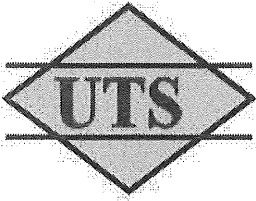
### 12 RECORDING AND EVALUATION

All examinations are to be recorded on an examination report and all relevant indications presented on an accompanying sketch or other visual means, i.e. photograph. Reference to a datum point, the size and orientation shall be indicated.

The evaluation shall be done by a level 2 or 3 in accordance with these acceptance standards unless other more restrictive standards are specified for specific materials or applications within this procedure.

The type of discontinuities is difficult to evaluate if the penetrant diffuses excessively into the developer. If this condition occurs, close observation of the formation of indication(s) during application of the developer may assist in characterization.

 BUREAU VERITAS	
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WITNESSED	<input type="checkbox"/>
Date 07/12/23	Initials CJV



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E-mail: ultramag@mweb.co.za

Tel / Fax: (011) 907 9551

## 13 ACCEPTANCE CRITERIA

- Acceptance criteria shall be as stated in the relevant design code.
- The acceptance criteria in Attachment 1 shall apply unless other more restrictive criteria are specified.
- Other acceptance criteria may be used, when mentioned in client specifications or when agreed to between contracting parties.

## 14 POST CLEANING

Where necessary or required by the client/customer post cleaning shall be done only after final interpretation and recording of all relevant indications.

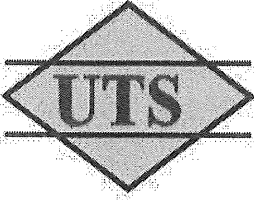
## 15 NON-CONFORMANCE

Any deviation from this document shall be seen as reason for the test to be declared null and void. Any change shall first be brought to the attention of the signatories on the front page.

## 16 REFERENCE DOCUMENTS

Recommended Practice no SNT-TC-1A  
ASME V Article 6 (2017)  
ASME VIII Division 1 Appendix 8 (2017)  
API 650 (2013)  
ASTM A709  
UTS Written Practice – UTS 001 WP, latest

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WITNESSED <input type="checkbox"/>
Date 07/12/13 Initials <i>ep</i>



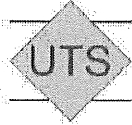
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E-mail: ultramag@mweb.co.za

Tel / Fax: (011) 907 9551

Attachment 2

Example Report Format



## ULTRAMAG TECHNIHIRE SERVICES

CC

PO BOX 296  
ALBERTON  
1450  
Tel/Fax: 011-907 9551

Company Registration No CK 91/01758/23

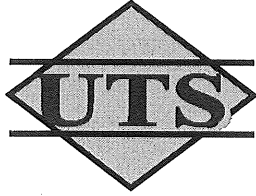
SURFACE INSPECTION REPORT		
REPORT No :		
CLIENT :	DATE OF TEST :	
ADDRESS :	LOCATION OF TEST :	
	A I A :	
	JOB NUMBER :	
ORDER No :	QCP NUMBER :	
TEST OBJECT DETAILS		
COMPONENT :	ITEM NUMBER :	
DRAWING No. :	REVISION :	MATERIAL :
SURFACE CONDITION :		
MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION	
TEST EQUIPMENT :	ADROX 996PA PEN BATCH No :	
CURRENT SOURCE :	ADROX 9PR5 CLEANER BATCH No :	
TEST METHOD :	ADROX 9D1B DEVELOPER BATCH No :	
CURRENT :	TEST METHOD :	
ADROX 8903W WHITE B G - BATCH No :	SURFACE TEMPERATURE :	
ADROX 800/3 BLACK MAG INK - BATCH No :	DWELL TIME :	
FIELD INDICATOR :	OTHER :	
PROCEDURE :		
ACCEPTANCE CRITERIA :		
TEST RESULT SUMMARY :		
1.0 COMPONENT EXAMINED:		
2.0 EXAMINATION RESULTS:		

TECHNICIAN : \_\_\_\_\_ CLIENT : \_\_\_\_\_ A I A : \_\_\_\_\_  
 QUALIFICATION : \_\_\_\_\_ DATE : \_\_\_\_\_ DATE : \_\_\_\_\_

UTS-PT-ASME-001 Rev 00

<b>BUREAU VERITAS</b>	
REVIEWED	<input checked="" type="checkbox"/>
WITNESSED	<input type="checkbox"/>
Date <u>07/12/23</u> Initials <u>CG</u>	

R.E. Bhotha  
ASNT Level 3  
Page 1 of 1  
219687



## ULTRAMAG TECHNIHIRE SERVICES cc

P. O. Box 297 – Alberton - 1450  
E-mail: ultramag@mweb.co.za

Tel / Fax: (011) 907 9551

# Company Authorization

This is to confirm

**THERON GOVENDER**

IDENTITY NO:8111255061084

Meets the requirements laid in Ultramag Written Practice No:  
UTS 001 WP  
Non-Destructive Testing

**Method**  
Magnetic Particle Testing

**Level**  
II

**Sector**  
Welds

**Date of Issue**  
02/08/2020

**Limitations**  
Corrected Vision

**Expiry Date**  
01/08/2025

**Certificate No:**

**OA020S62120555**

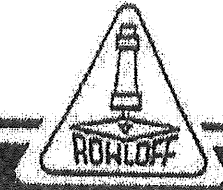
Appointed Level III

Ultramag Level III

*This Certificate authorizes this person to carry out Services for and on behalf of  
Ultramag Technichire Services cc*

*This certificate remains the property of Ultramag Technihire Services cc*

H:ROHLOFF (PTY) LIMITED



MATERIALS TESTING AND MEASURING EQUIPMENT

## CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER: HR 51526

THIS IS TO CERTIFY THAT THE ACCURACY OF THE UNIT BELOW HAS BEEN VERIFIED IN ACCORDANCE WITH

ASME V:2021 – Article 7 & 25

CUSTOMER:	ULTRAMAG
MANUFACTURER:	ELECTROMAGNETIC YOKE
MODEL:	MY-2
SERIAL NO:	2202128
DATE CALIBRATED:	08-03-2023
DUE DATE RECOMMENDED:	08-03-2024

Calibrated by:

  
Frikkie van Wyk



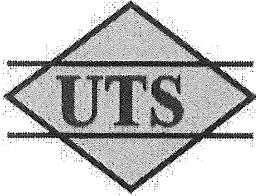
CALIBRATION TEST CERTIFICATE NO:8379	
CALIBRATED FOR :	ULTRAMAG
DATE:	15-Aug-22
DUE DATE:	15-Aug-23
EQUIPMENT TYPE:	LIFTING BLOCK
SERIAL NUMBER:	45
MAKE OF SCALE:	TSCALE
MODEL:	ATW
CAPACITY:	6/15 KG
DIVISION SIZE:	2/5 KG
SA NUMBER:	1218

INSTRUMENT READING

SERIAL NO	MIN.WEIGHT	ACTUAL WEIGHT
	4,500	4,610

MEASURED ON TSCALE ATW SCALE NO : 47170621016 - VERIFICATION NO.  
2022IM075/A/B

CALIBRATED BY



## Magnetic Particle Testing in Accordance with ASME

<b>PREPARED and APPROVED BY:</b>	<b>APPROVED BY (MANAGEMENT):</b>
<b>R E Bhotha</b>	<b>T Govender</b>
<b>NDT Level III</b>	<b>Management</b>
<b>11/06/2019</b>	<b>11/06/2019</b>

CLIENT APPROVAL STATUS				
NO.	NAME	TITLE	SIGNATURE	DATE
1				
2				
3				

CHANGE CONTROL TABLE				
REVISION	STATUS	DATE	AUTHOR	DESCRIPTION OF CHANGE
00	New	11/06/2019	R.E. BHOTHA	New Document

Reviewed 26/01/2022

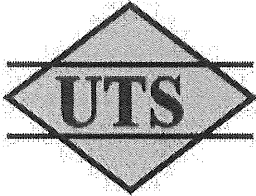
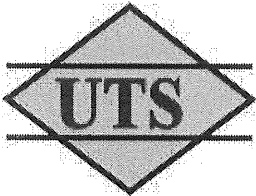


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## ULTRAMAG TECHNIHIRE SERVICES cc

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Tel / Fax: (011) 907 9551

### 1. PURPOSE

The purpose of this procedure is to detail the method and underlying principals by which Magnetic Particle Examinations are conducted by UTS personnel and sub-contractors.

### 2. SCOPE

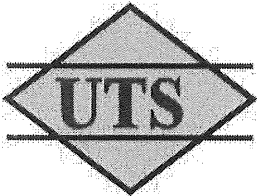
- 2.1. The scope of this document is to detail the procedural requirements that need to be followed when Magnetic Particle Examination is used to detect discontinuities, e.g. cracks, laps, folds, porosity and lack of fusion, which are open to or close to the surface of the material being examined with the continuous magnetising method with an electromagnetic yoke or permanent magnet. The sensitivity is greatest for surface discontinuities and diminishes rapidly with increasing depth of discontinuities below the surface.
- 2.2. This document is limited to the examination of Ferro-magnetic materials in the following product forms; castings, forgings and welds.
- 2.3. Either Visible (Colour Contrast) or Fluorescent examination mediums, which can be either wet or dry particles, may be used.

### 3. APPLICATION

- 3.1. This document is to be applied when the client/contract stipulates that examinations are to be conducted in accordance with the ASME code.
- 3.2. Magnetic Particle Examination should take precedence for Surface Crack examination wherever feasible.
- 3.3. Procedure qualification and/or demonstration is only applicable when the referencing code section stipulates that it is needed, i.e. ASME III.

### 4. DEFINITIONS/ABBREVIATIONS/ACRONYMS

- |                 |   |
|-----------------|---|
| NDT             | - Non-destructive Testing – a process that involves the Inspection, Testing and /or the Evaluation of component without impairing the serviceability of the components. |
| Company         | - Ultramag Technihire Services, hereafter known as UTS.   |
| ASME            | - American Society of Mechanical Engineers  |
| MSDS            | - Material Safety Data Sheet  |
| UV/Black Light  | - Ultra-Violate Light   |
| Magnetic Medium | - Highly permeable magnetic particles either in dry powder form or as a suspension-based liquid   |
| Personnel       | - Personnel shall mean authorised as described in Clause 6  |



## 5. RESPONSIBILITIES AND AUTHORITIES

- The Operations Manager (or his/her delegate) shall be responsible for the implementation of this procedure.
- Personnel applying this process shall ensure that the requirements of this procedure are adhered to.

## 6. PERSONNEL

Personnel performing Magnetic Particle Examinations in accordance with this document shall be authorised to Level 1, 2 or 3 in accordance with the company Written Practice.

The Technician performing the test shall be responsible for reporting the results of his/her test in accordance with the project contract code.

Level 1 personnel may only perform the examination under direct supervision of a level 2 or 3 technician. A level 2 or 3 must interpret the indications.

Level 2 may perform the examinations, record indications and evaluate to an acceptance criterion.

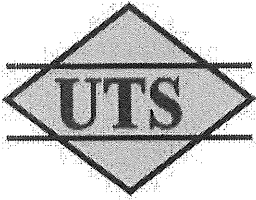
## 7. EQUIPMENT/CONSUMABLES

### 7.1. EQUIPMENT

- Electromagnetic yokes and permanent magnets may be used.
- AC yokes shall lift a dead weight of 4.5kg and DC, HWDC and permanent magnets shall lift 18.1kg, this shall be done at the maximum pole spacing to be used in subsequent examinations.
- A yoke test log shall be opened and completed at least daily for electromagnetic yokes and for permanent magnet yokes, when in use.
- When performing Visual (Colour Contrast) Examinations a white light (Lux) meter should be available and the light intensity measured at each work station. One reading on the examination surface is sufficient for each work station.
- When performing Fluorescent Examinations, a UV/Black Light will be used with a UV Light meter.
- Light meters should be calibrated annually.

### 7.2. CONSUMABLES

- Dry powders and inks must be accompanied by a batch certificate and MSDS when received. The batch certificate shall indicate conformance to ASTM E 1444.
- When using wet inks, only pre-packaged aerosol cans are to be used.



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- For black inks the batch certificate should indicate that the settling is from 1.2 and 2.4ml per 100ml.
- For fluorescent inks the batch certificate should indicate the settling is from 0.1 to 0.4 mL per 100ml.
- Inks and powders should only be applied in accordance with the manufactures recommendations, but the following serves as a general guide as to temperatures for various mediums:

5 to 50°C	-	Wet black inks
5 to 40°	-	Wet fluorescent inks
< 420°C	-	Dry powder

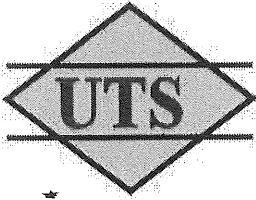
- When used to enhance contrast the white background (contrast aid) shall be a thin, even adherent coating which is compatible with the ink/dry powder used.
- The following magnetic particles may be used:

Product Name	Product Description	Particle Size
Ardrox 800/3*	Wet Magnetic Black ink	1 to 6 µm
Ardrox 8530*	Wet Magnetic Fluorescent ink	2 to 5 µm 98% pass through 45 µm Mesh
Ardrox 825Y*	Dry Magnetic Powder	Average 75 µm

Note: \* other manufacturers products may be used, provided the requirements of paragraph 7.2 are met.

### 8. SAFETY AND ENVIROMENTAL CONDITIONS

- 8.1. As Magnetic Particle Examination often requires the use of harmful, flammable and/or volatile materials, certain precautions need to be taken to reduce risks.
- 8.2. Prolonged or repeated contact of these materials with the skin or mucous membrane should be avoided.
- 8.3. Work stations shall be adequately ventilated and sited away from sources of heat, sparks and naked flames. There should always be sufficient space for cleaning and access to equipment and materials.
- 8.4. Magnetic Particle materials and equipment shall be used with care and in accordance with the MSDS or to the instructions supplied by the equipment manufacturer.
- 8.5. When using a UV/Black Light care shall be taken to ensure that unfiltered UV radiation (UVB and C) does not directly reach the eye or the skin of the operator, or other persons. The UV/Black light shall only be used with sufficient filtration in place, whether the filter is an integral part of the lamp or is a separate component. The filter shall always be maintained and in a good condition.



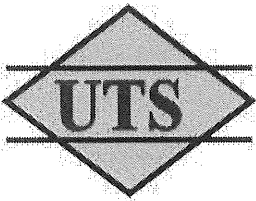
- 8.6. All electrical equipment shall be thoroughly inspected to ensure there is no danger of malfunction, electrocution or fire hazard. These safety inspections shall be done before the equipment is used.
- 8.7. When testing in a confined space it is advisable that equipment with a main supply 110V and above should be fitted with an earth leakage. Further, consideration should be given to more stringent electrical safeguards by reducing the leakage current to trip at 12mA.
- 8.8. General precautions with regards to the use and discarding of aerosol cans need to be practiced.

## 9. SURFACE CONDITIONS

- 9.1. The best examination results are usually obtained if items are tested in the as-welded, as-ground, as-machined or as-polished condition. The as-welded or as-cast conditions could be limiting factors, if the surface is rough, and must be assessed on a case by case basis, as the detection sensitivity may be affected. In addition, surface features such as undercut is considered a limitation and should be recorded as such, as this may mask relevant indications.
- 9.2. Surface contaminants, such as scale, rust, oil, grease, paint, slag and weld spatter shall be removed by mechanical and/or chemical methods. The pre-clean shall ensure that the test surface is free from residues that may affect the subsequent examination. The cleaned area shall be large enough to ensure complete coverage of the examination area.
- 9.3. In the case of weld testing, the cleaned area shall cover the weld and 25mm either side of the weld.
- 9.4. Mechanical pre-cleaning may be done with caution to remove contaminants from the surface.
- 9.5. Chemical pre-cleaning, when used, shall be carried out with suitable cleaning agents. All residues shall be removed from the surface; this can be done by use of a water rinse.
- 9.6. All parts shall be dry after pre-cleaning, so that no residue water or solvent will interfere with the application of contrast aid or magnetic ink/powder.
- 9.7. When there is sufficient contrast between the surface and magnetic medium or when fluorescent testing a contrast aid does not need to be used.
- 9.8. The temperature measured on the surface to be examined shall be between 5°C and 52°C.

## 10. EXAMINATION PROCESS

- The continuous method of examination shall be used
  - (a) *Dry Particles*. The magnetizing current shall remain on while the examination medium is being applied and while any excess of the examination medium is removed.
  - (b) *Wet Particles*. The magnetizing current shall be turned on after the particles have been applied. Flow of particles shall stop with the application of current. Wet particles applied from aerosol spray cans may be applied before and/or after magnetizing current is applied. Wet particles may be applied during the application



of magnetizing current if they are not applied directly to the examination area and are allowed to flow over the examination area or are applied directly to the examination area with low velocities insufficient to remove accumulated particles.

- Ensure that adequate dispersion of wet ink particles will take place by agitation of the suspension (can) before application and when, needed demagnetisation of the particles should be done.
- A minimum of two examinations (shots) shall be performed on each area with the lines of flux approximately perpendicular between the shots. This can be accomplished by either a criss-cross action of a yoke or with two different techniques.
- The duration of the magnetizing current is typically on the order of 2s for each magnetizing pulse (shot), with two or more shots given to the part during the application of examination medium being used.
- To accomplish full coverage of the area each subsequent shot must have sufficient overlap with the previous one.
- The direction of expected indications in relation to the placement of the yoke poles should be verified with a field indicator.
- Where required by the client, the particles are to be blown off the surface for dry particles, whereas wet inks are to be wiped off with a rag.

#### 10.1. TECHNIQUES

There are various techniques that can be used to perform Magnetic Particle Examination and the following techniques are covered by this document:

- Yoke technique

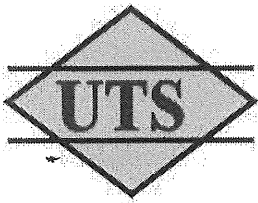
Alternating current, direct current of permanent yoke may be used, but preference should be given to alternating current due to the increased sensitivity caused by the skin effect.

#### 11. INTERPRETATION AND VIEWING CONDITIONS

##### 11.1. VIEWING CONDITIONS

##### 11.1.1. FLUORESCENT EXAMINATIONS

- Fluorescent Magnetic Particle indications shall only be interpreted when the work station is sufficiently darkened, the white light should not be measured above 20 Lux.
- Sufficient time, 5 minutes, should be allowed for dark area eye adaptation before interpretation and the use of photo chromatic spectacles shall not be worn.
- The irradiance on the examination surface shall be a minimum of  $1000\mu\text{W}/\text{cm}^2$ , as measured with a UV light meter.
- The UV/Black light should be held so as not to cause glare from the surface.



### 11.1.2. COLOUR CONTRAST EXAMINATIONS

- Colour contrast Magnetic Particle indications shall be interpreted in good day light or under artificial white light.
- When measured with a Lux meter, the luminance should not be less than 1000 Lux.
- The viewing conditions should be such that there is no glare from the surface.

### 11.2. INTERPRETATION

- All indications shall be interpreted as false, non-relevant or relevant. Only those indications that are relevant should be recorded, although non-relevant indications that may mask relevant indications should be noted on the report. A relevant is one that is at least 1.5mm in size.
- Interpretation should be done while the magnetising force is being applied and after the application of the magnetic medium.
- The indication size is to be measured for reporting.

### 12. RECORDING AND EVALUATION

All examinations are to be recorded on an examination report and all relevant indications presented on an accompanying sketch or other visual means, i.e. photograph. Reference to a datum point, the size and orientation shall be indicated.

The evaluation shall be done by a Level 2 or 3 in accordance with the applicable code or standard as in table 1 below:

### 13. ACCEPTANCE CRITERIA

13.1. Acceptance criteria shall be as stated in the relevant design code.

13.2. The acceptance criteria in Attachment 1 shall apply unless other more restrictive criteria are specified.

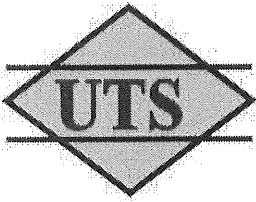
13.3. Other acceptance criteria may be used, when mentioned in client specifications or when agreed to between contracting parties.

### 14. POST CLEANING AND DE-MAGNETISATION

Where necessary or required by the client/customer post cleaning and/or de-magnetisation shall be done only after final interpretation.

### 15. NON-CONFORMANCE

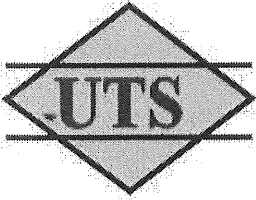
Any deviation from this document shall be seen as reason for the test to be declared null and void. Any change shall first be brought to the attention of the signatories on the front page.



16. TYPICAL MAGNETISING TECHNIQUES

Figure 1 Yokes

	<p><math>d \geq 75\text{mm}</math>  <math>b \leq d/2</math>  <math>\beta \approx 90^\circ</math></p>
	<p><math>d_1 \geq 75\text{mm}</math>  <math>b_1 \leq d_1/2</math>  <math>b_2 \leq d_2 - 50\text{mm}</math>  <math>d_2 \geq 75\text{mm}</math></p>
	<p><math>d_1 \geq 75\text{mm}</math>  <math>b_1 \leq d_1/2</math>  <math>b_2 \leq d_2 - 50\text{mm}</math>  <math>d_2 &gt; 75\text{mm}</math></p>
	<p><math>d_1 \geq 75\text{mm}</math>  <math>b_1 \leq d_1/2</math>  <math>b_2 \leq d_2 - 50\text{mm}</math>  <math>d_2 &gt; 75\text{mm}</math></p>



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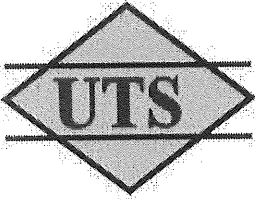
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E-mail: [ultramag@mweb.co.za](mailto:ultramag@mweb.co.za)

Tel / Fax: (011) 907 9551

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### 17. REFERENCE DOCUMENTS

- Recommended Practice No. SNT-TC-1A
- ASME V Article 7 and 25 SE-709 (2017)
- ASME VIII Division 1 Appendix 6 (2017)
- ASTM A709
- CSIR ME 1909
- UTS Written Practice – UTS 001 WP, latest



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### 18. ATTACHMENTS

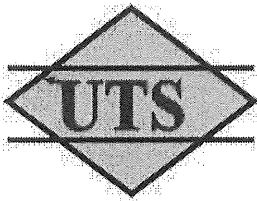
#### *Attachment 1*

#### *ASME VIII Division 1 Appendix 6*

The following acceptance criteria shall apply unless other more restrictive standards are specified:

In accordance with **ASME VIII Division 1 Appendix 6**, all surfaces to be examined shall be free of:

- i. Relevant linear indication  $>1.5$  mm
- ii. Relevant rounded indications  $>5.0$  mm
- iii. Four or more rounded indications in a line separated by 1.5 mm or less (edge to edge).



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Attachment 2

EXAMPLE MT REPORT



## ULTRAMAG TECHNIHIRE SERVICES

Company Registration No CK 91/01758/23

CC  
PO BOX 296  
ALBERTON  
1450  
Tel/Fax:011-907 9551

SURFACE INSPECTION REPORT		
REPORT No :		
CLIENT :	DATE OF TEST :	
ADDRESS :	LOCATION OF TEST :	
	A I A :	
	JOB NUMBER :	
ORDER No :	QCP NUMBER :	
<b>TEST OBJECT DETAILS</b>		
COMPONENT :	ITEM NUMBER :	
DRAWING No. :	REVISION :	MATERIAL :
SURFACE CONDITION :		
MAGNETIC PARTICLE INSPECTION	LIQUID PENETRANT INSPECTION	
TEST EQUIPMENT :	ADROX 898PA PEN BATCH No :	
CURRENT SOURCE :	ADROX 8PR5 CLEANER BATCH No :	
TEST METHOD :	ADROX 9D1B DEVELOPER BATCH No :	
CURRENT :	TEST METHOD :	
ARDROX 8903W WHITE B G - BATCH No :	SURFACE TEMPERATURE :	
ARDROX 8003 BLACK MAG INK - BATCH No :	DWELL TIME :	
FIELD INDICATOR :	OTHER :	
PROCEDURE :		
ACCEPTANCE CRITERIA :		
TEST RESULT SUMMARY :		
<u>1.0 COMPONENT EXAMINED:</u>		
<u>2.0 EXAMINATION RESULTS:</u>		

TECHNICIAN : \_\_\_\_\_ CLIENT : \_\_\_\_\_ A I A : \_\_\_\_\_  
 QUALIFICATION : \_\_\_\_\_ DATE : \_\_\_\_\_





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 www.implabs.co.za | E-mail: admin@implabs.co.za  
 25 Moore Avenue, Benoni Ext 7



<b>Certificate No:</b>	<b>23-1630-1</b>		
<b>Customer:</b>	North Reef Engineering		
<b>Attention:</b>	J. Anjinho	<b>Order No:</b>	0031413
<b>Address:</b>	P.O Box 369	<b>Date Received:</b>	12-Jul-2023
	Isando,1600	<b>Date Tested:</b>	18-Jul-2023
	Gauteng	<b>Date Reported:</b>	19-Jul-2023
		<b>Heat No:</b>	N/A
<b>Telephone:</b>	011 974 1961	<b>Ref No:</b>	N/A
<b>Email:</b>	accounts@northreef.co.za		
<b>Description:</b>	1 off DOVETAIL TWISTLOCK 45-1 (DOUBLE) , As Received.		


**HARDNESS TEST**

Tester: Innovatest Vickers hardness tester.  
 Test method: ISO 6507-1.  
 Specification: No specification provided.

**RESULT- BUTT WELD (HV10):**

PM1:	HAZ1:	WELD:	HAZ2:	PM2:
256/270/287	194/205/223	218/221/220	222/213/204	224/228/231

NO SPECIFICATION PROVIDED.

		 <b>Juane Mohr</b> Technical signatory
<b>Tested By:</b> D. Tolmay	<b>Witnessed By:</b> N/A	
<b>RESULT:</b>		<b>NO SPECIFICATION PROVIDED</b>

# IMPQ LABS

CK 1996/060517/23

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23-1630-1  
NORTH REEF  
BUTT WELD





Tel: 011 421 9026  
 www.implabs.co.za | E-mail: admin@implabs.co.za  
 25 Moore Avenue, Benoni Ext 7



<b>Certificate No:</b>	<b>23-1630-2</b>		
<b>Customer:</b>	North Reef Engineering		
<b>Attention:</b>	J. Anjinho	<b>Order No:</b>	0031413
<b>Address:</b>	P.O Box 369	<b>Date Received:</b>	12-Jul-2023
	Isando,1600	<b>Date Tested:</b>	18-Jul-2023
	Gauteng	<b>Date Reported:</b>	19-Jul-2023
		<b>Heat No:</b>	N/A
<b>Telephone:</b>	011 974 1961	<b>Ref No:</b>	N/A
<b>Email:</b>	accounts@northreef.co.za		
<b>Description:</b>	1 off DOVETAIL TWISTLOCK 45-1 (DOUBLE) , As Received.		

**HARDNESS TEST**

Tester: Innovatest Vickers hardness tester.

Test method: ISO 6507-1.




Specification: No specification provided.

**RESULT- FILLET WELD NO.1 (HV10):**

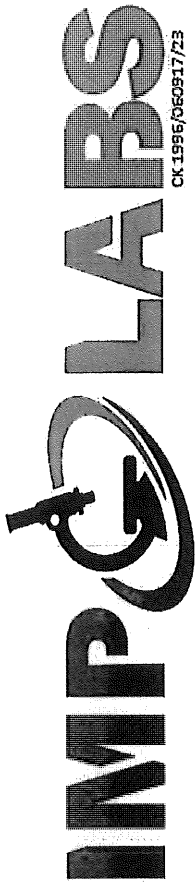
PM1:	HAZ1:	WELD:	HAZ2:	PM2:
166/164/163	190/195/192	215/218/219	231/218/218	228/224/219

NO SPECIFICATION PROVIDED.

Sample:	Fillet weld size (mm):	Leg lengths (mm):	Convexity (mm):
1	11.38 x 10.11 x 13.81	13.42 x 10.19	0.22

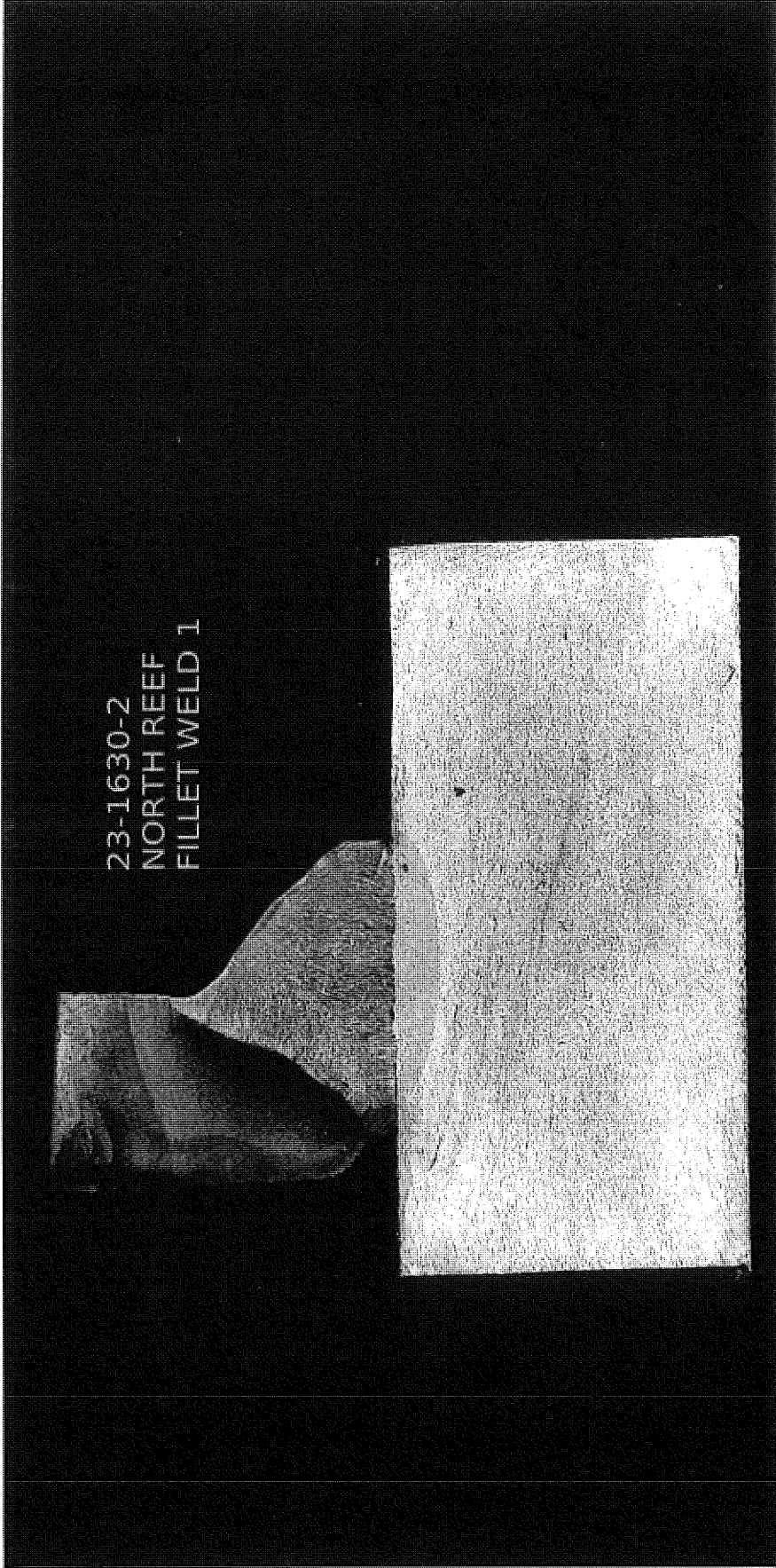
		 <b>Juane Mohr</b> Technical signatory
<b>Tested By: D. Tolmay</b>	<b>Witnessed By: N/A</b>	
		 

**RESULT:** NO SPECIFICATION PROVIDED



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25 Moore Avenue, Benoni Ext 7

23-1630-2  
NORTH REEF  
FILLET WELD 1





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 www.implabs.co.za | E-mail: admin@implabs.co.za  
 25 Moore Avenue, Benoni Ext 7



<b>Certificate No:</b>	<b>23-1630-3</b>		
<b>Customer:</b>	North Reef Engineering		
<b>Attention:</b>	J. Anjinho	<b>Order No:</b>	0031413
<b>Address:</b>	P.O Box 369	<b>Date Received:</b>	12-Jul-2023
	Isando,1600	<b>Date Tested:</b>	18-Jul-2023
	Gauteng	<b>Date Reported:</b>	19-Jul-2023
		<b>Heat No:</b>	N/A
<b>Telephone:</b>	011 974 1961	<b>Ref No:</b>	N/A
<b>Email:</b>	accounts@northreef.co.za		
<b>Description:</b>	1 off DOVETAIL TWISTLOCK 45-1 (DOUBLE) , As Received.		

**HARDNESS TEST**




Tester: Innovatest Vickers hardness tester.  
 Test method: ISO 6507-1.  
 Specification: No specification provided.

**RESULT- FILLET WELD NO.2 (HV10):**

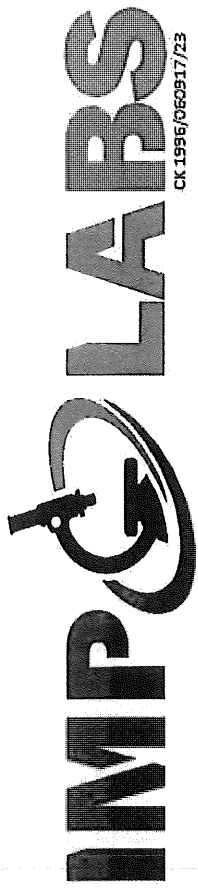
PM1:	HAZ1:	WELD:	HAZ2:	PM2:
159/169/170	196/196/198	214/218/212	224/224/228	194/191/193

NO SPECIFICATION PROVIDED.

Sample:	Fillet weld size (mm):	Leg lengths (mm):	Convexity (mm):
1	11.33 x 10.14 x 13.79	11.39 x 10.21	0.21

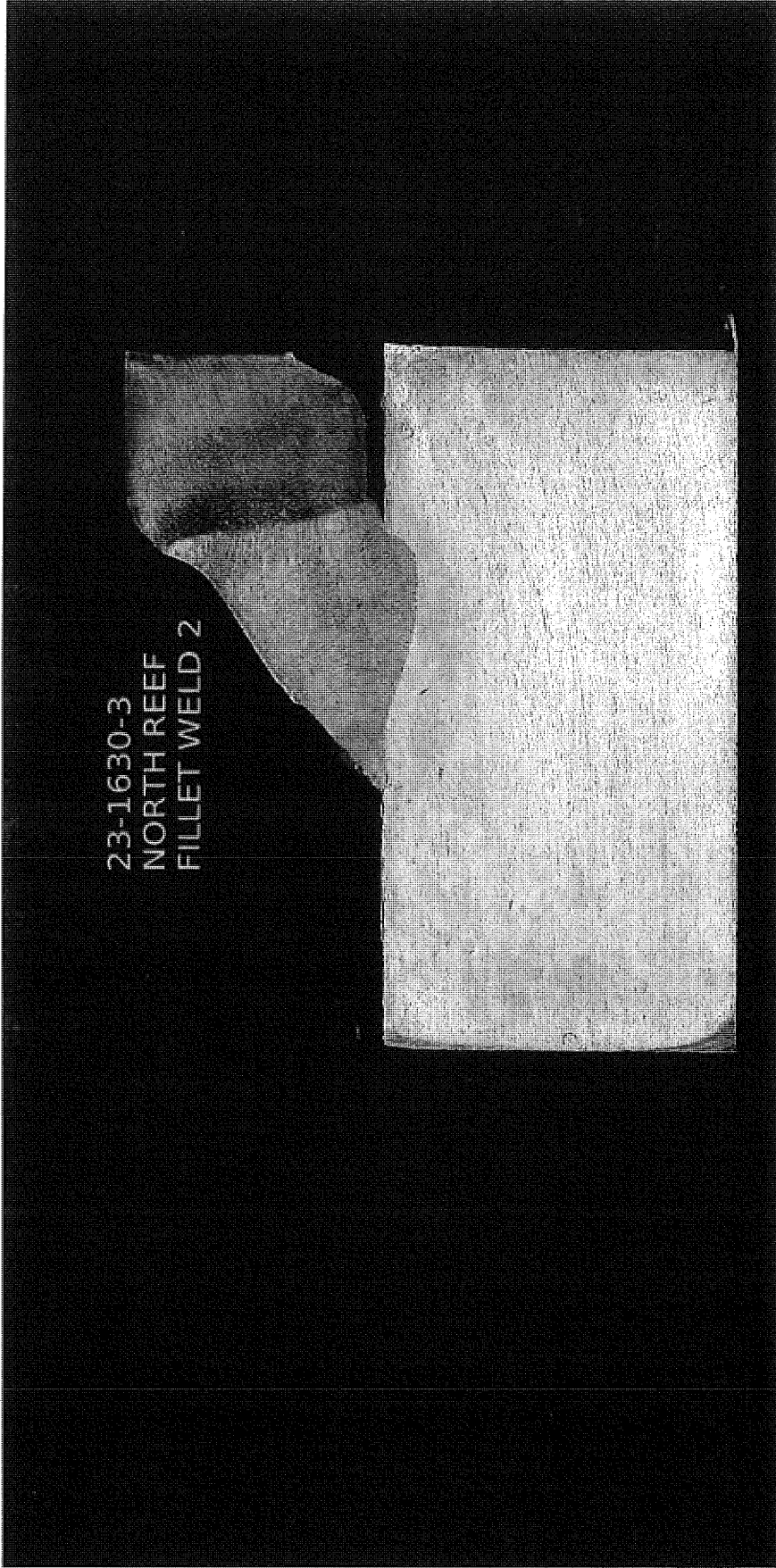
		 <b>Juane Mohr</b> Technical signatory
<b>Tested By: D. Tolmay</b>	<b>Witnessed By: N/A</b>	
		 

**RESULT:** NO SPECIFICATION PROVIDED



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25 Moore Avenue, Benoni Ext 7

23-1630-3  
NORTH REEF  
FILLET WELD 2



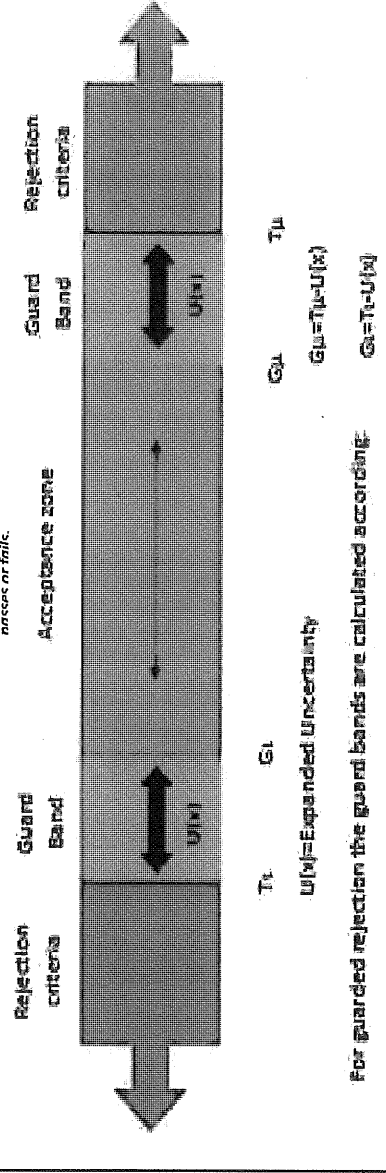
**CERTIFICATE No: 23-1630**  
Testing was carried out according to IMPLABS procedures.  
**SCOPE OF TEST METHODS**

MATERIALS TESTED	TEST TYPE	METHOD ID	ACCREDITATION STATUS	UNCERTAINTY OF MEASUREMENT (IF APPLICABLE)
METALLIC MATERIALS	Tensile Testing: At room temperature. Tensile testing up to 600 kN. Determination of tensile strength, yield strength (upper and lower), yield point elongation, 0.2% proof stress, elongation and area reduction	ASTM E8/E8M, ISO6892-1	ACCREDITED	12.76 Mpa
	Impact Testing: Determination of absorbed energy up to 300J	ASTM E23, ISO 148-1	ACCREDITED	5.75J
	Hardness Testing: Determination of Brinell Hardness	ASTM E10, ISO6506-1	ACCREDITED	3.18 HBW
Ferrous & Non-Ferrous Metals	Bend Testing: Determination of fusion strength between weld metal and base metal	ASME IX, AWS D1.1/D1.1M	ACCREDITED	Not Applicable
	Hardness Testing: Vickers HV0.3; HV5; HV10	ASTM E92/E384, ISO6507-1	ACCREDITED	5.37 HV
	Hardness Testing: Rockwell C- Scale and B-Scale	ASTM E18	ACCREDITED	0.69 HRC
	Laboratory spectrometric chemical analysis for determination of C, Mn, P, S, Cu, Ni, Cr, Mo, Nb, V, Ti, Al, As, B, Bi, Ca, Ce, Co, Si, Sn, Zr, Sb, Pb, Fe, Ta, La, and W by OES	ASTM E415	ACCREDITED	Please Request for uncertainty of measurement if required

**PLEASE NOTE: SAMPLES WILL BE DISCARDED AFTER 30 DAYS. Testing temperature 23°C±5°C.**

**DECISION RULE**

A result that is a definite pass/fail, will be documented as pass/fail by IMPLABS on the Test Report. Should a result fall within the Guard Band, IMPLABS will state "Result within Guard Band". By taking the Uncertainty of Measurement into consideration, it is up to the Customer to make the decision on whether a result passes or fails.



- The Test Results relate ONLY to items tested
- Whilst making every effort to ensure the accuracy of our results, they are without guarantee or warranty.
- Results marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory.
- Results marked "Subcontracted Test" in this report are not included in the SANAS Schedule of Accreditation for this laboratory
- "Opinions and Interpretations" expressed herein are outside the scope of SANAS accreditation.
- While every endeavour has been made to ensure that the results quoted above are accurate neither IMPLABS nor staff members shall be liable for any error or omission or for any damage or loss that may arise from the issue of this certificate.
- This Certificate may not be reproduced except in full, without the written consent of the of IMPLABS.

## CERTIFICATE OF TEST

**Test four single twistlocks**

Application Received: 25 July 2023

Certificate No.: T30954

Order No.: 1292

Date of test: 01 September 2023

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, four single twistlocks were submitted for tensile testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in Tension: 25.5 t (250 kN)  
Ultimate load expected in tension: 51 t (500 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Tensile test (Z – Axis)

**Table 1. Project identification**

Project name:	Proposal CADG 23 September 2023 REV 0
---------------	---------------------------------------

### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in tension  
Test specification: Customer's request

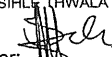
The single twistlocks were installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
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Page: 1 of 4

Testing Officer:

  
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

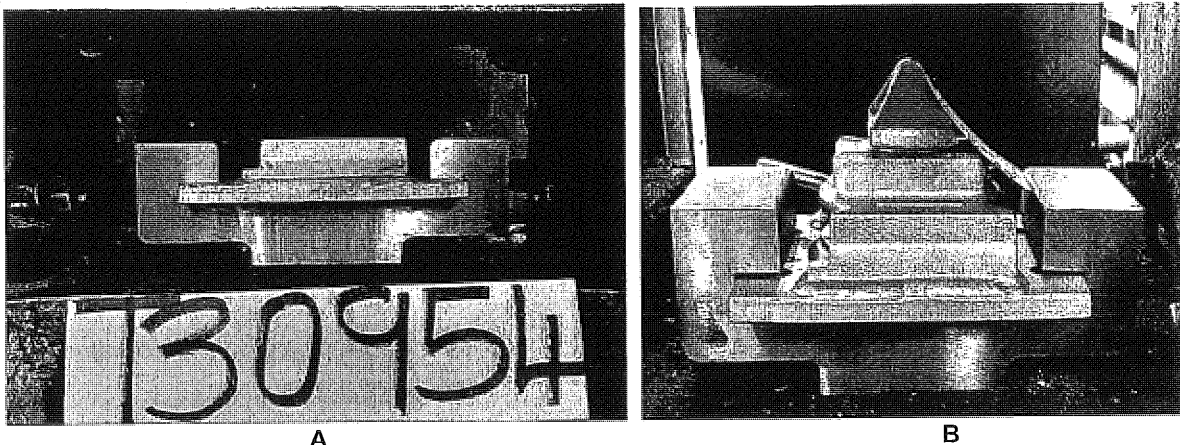
The test procedure was as follows:

**Tensile testing (Z – direction):**

For the tensile testing, the tensile testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the upper and lower tensile jigs are correctly installed and far enough apart to install the twistlock.
2. The sample twistlock base plate is inserted into the bottom jig.
3. With the twistlock in the open position, the top jig is lowered onto the twistlock until the claw is close to touching the landing pads on the twistlock.
4. The twistlock can be closed by turning the handle to the opposite side of the twistlock.
5. The tensile test is ready to commence.



**A** **B**  
**Figure 1- Twistlock installed in the testing machine**

**5. TEST RESULTS**

The results of the destruction tests carried out on the single twistlocks are summarised in Table 1.

**Table 2. Test results for single twistlocks.**

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-SA-0032	563.2	The twistlocks fractured as shown in Figure 2.
2	CADG-SB-0032	564.5	
3	CADG-SC-0032	471.2	
4	CADG-SF-0032	513.8	
<b>Mean</b>		<b>528.2</b>	
<b>Standard Deviation</b>		<b>38.7</b>	
Refer to page 4 of this report to see the plotted graph.			

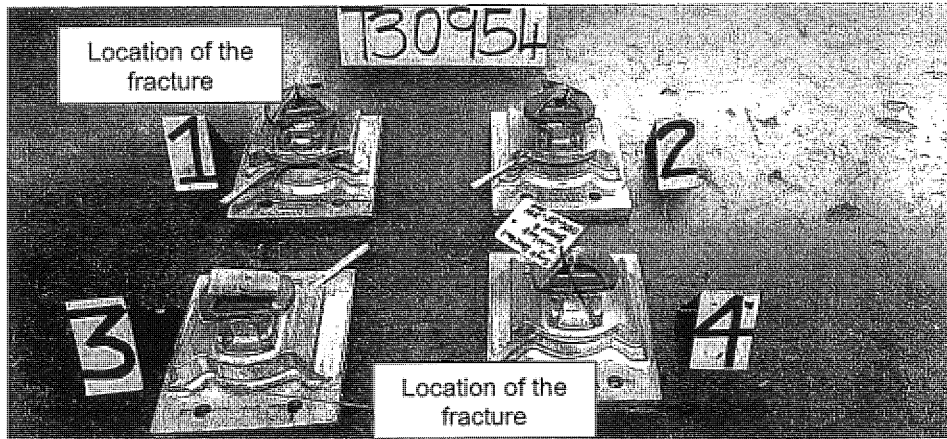


Figure 2 - Single twistlocks after the test

#### 6. TEST COMMENTS

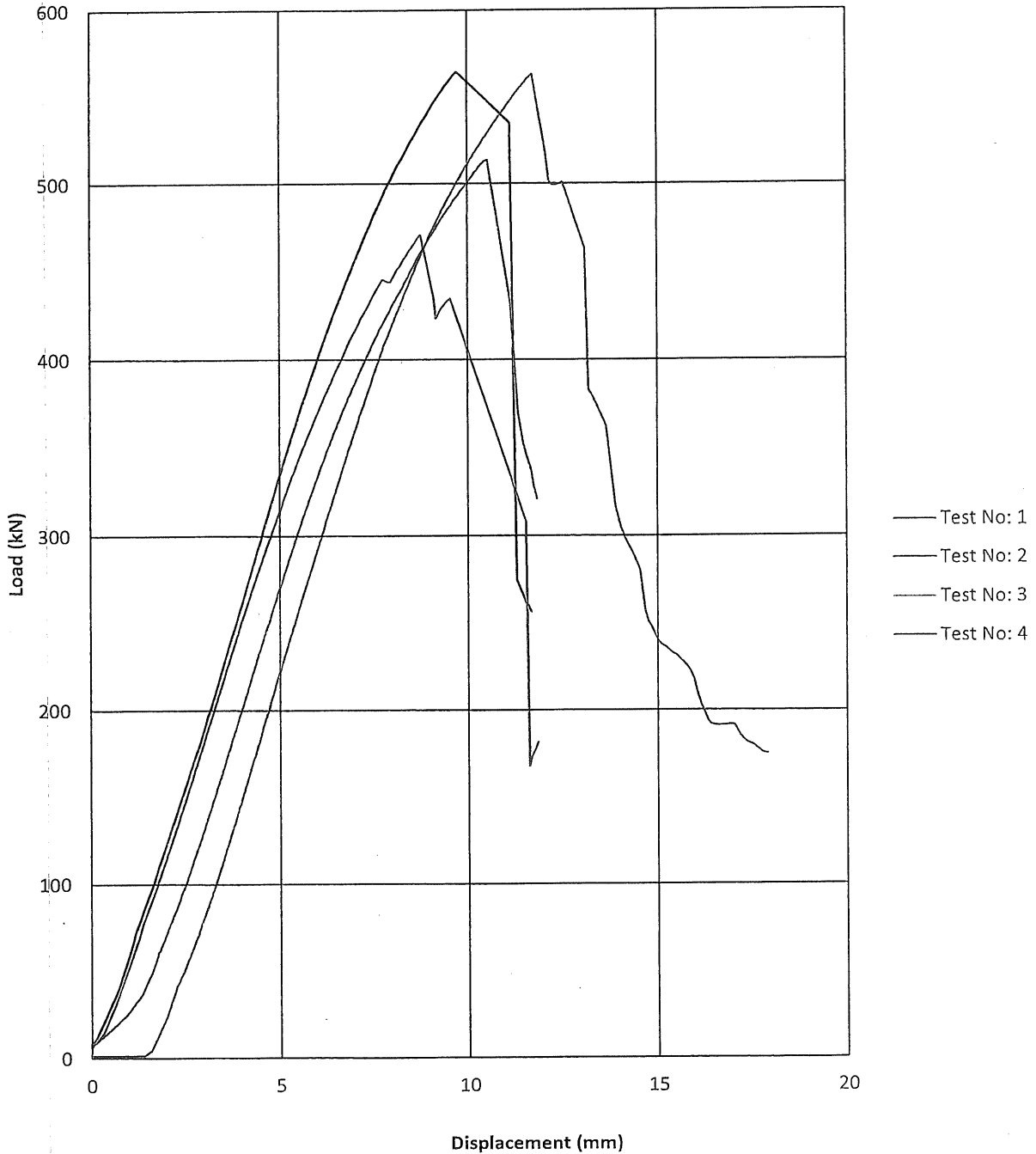
1. The minimum requirement of the customer's specifications is that the (250 t SWL) twistlocks reach their maximum breaking load of 51 t (500 kN).
2. Failure of the three single twistlock assemblies, batch numbers CADG-SB-0032, CADG-SC-0032, and CADG-SF-0032, occurred above the maximum breaking load based on the customer's specification. Therefore, the three single twistlocks comply with the requirements set out by the customer's specifications.
3. Batch number CADG-SC-0032 failed before reaching the maximum load as per the customer's requirements; therefore, it does not comply with the customer's requirements.
4. Batch testing is recommended to ensure conformity with the above requirements.

#### 7. DISCLAIMER

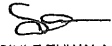
1. The CSIR cannot be held responsible for product indifferences and cannot be held responsible for any accidents or incidents as a result thereof.
2. Due to the limited amount of sample(s) tested and the type of testing done, CSIR can only account for the results from those specific samples tested.
3. All CSIR Routine Testing General Contract Conditions and conditions of testing apply.
4. This Certificate of Test may not be published without prior written consent of the CSIR.
5. This Certificate of Test must be reproduced in its entirety if published or reproduced by the client.
6. This report does not constitute any type of certification.

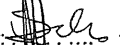
Certificate No.: T30954  
Date of test: 01 September 2023  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Single twistlocks

Test No.:	1	2	3	4
Batch Number	CADG-SA-0032	CADG-SB-0051	CADG-SC-0146	CADG-SF-0372
Maximum Force:	563.2 kN	564.5 kN	471.2	513.8



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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLWANA

## CERTIFICATE OF TEST

**Test two double twistlocks**

Application Received: 25 July 2023

Certificate No.: T30955

Order No.: 1292

Date of test: 01 September 2023

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, two double twistlocks were submitted for tensile testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in Tension: 25.5 t (250 kN)  
Ultimate load expected in tension: 51 t (500 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Tensile test (Z – Axis)

**Table 1. Project identification**


Project name:	Proposal CADG 23 January 2023 REV 0
---------------	-------------------------------------


### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in tension  
Test specification: Customer's request

The double twistlocks were installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

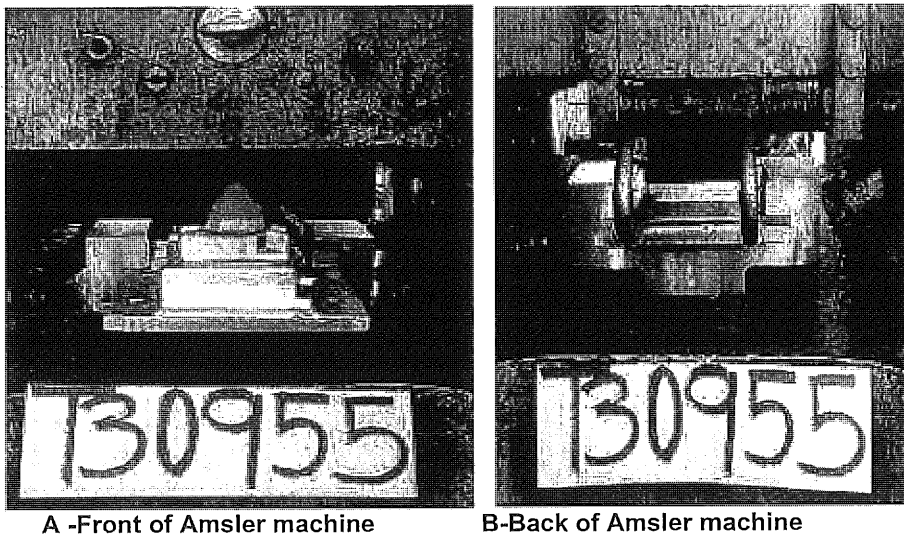
The test procedure was as follows:

**Tensile testing (Z – direction):**

For the tensile testing, the tensile testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the upper and lower tensile jigs are correctly installed and far enough apart to install the twistlock.
2. The sample twistlock base plate is inserted into the bottom jig.
3. With the twistlock in the open position, the top jig is lowered onto the twistlock until the claw is close to touching the landing pads on the twistlock.
4. The twistlock can be closed by turning the handle to the opposite side of the twistlock.
5. The tensile test is ready to commence.



A -Front of Amsler machine

B-Back of Amsler machine

Figure 1- Double twistlock installed in the testing machine

**5. TEST RESULTS**

The results of the destruction tests carried out on the double twistlocks are summarised in Table 1.

Table 1. Test results for single twistlocks.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-SA-0001	568.1	The twistlocks fractured as shown in Figure 2.
2	CADG-SB-0054	525.1	
<b>Mean</b>		<b>546.6</b>	
<b>Standard Deviation</b>		<b>21.5</b>	
Refer to page 4 of this report to see the plotted graph.			

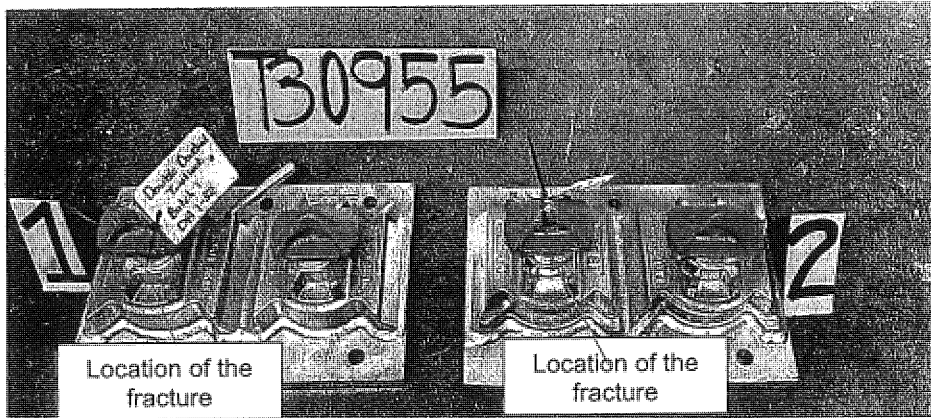


Figure 2 - Double twistlocks after the test

#### 6. TEST COMMENTS

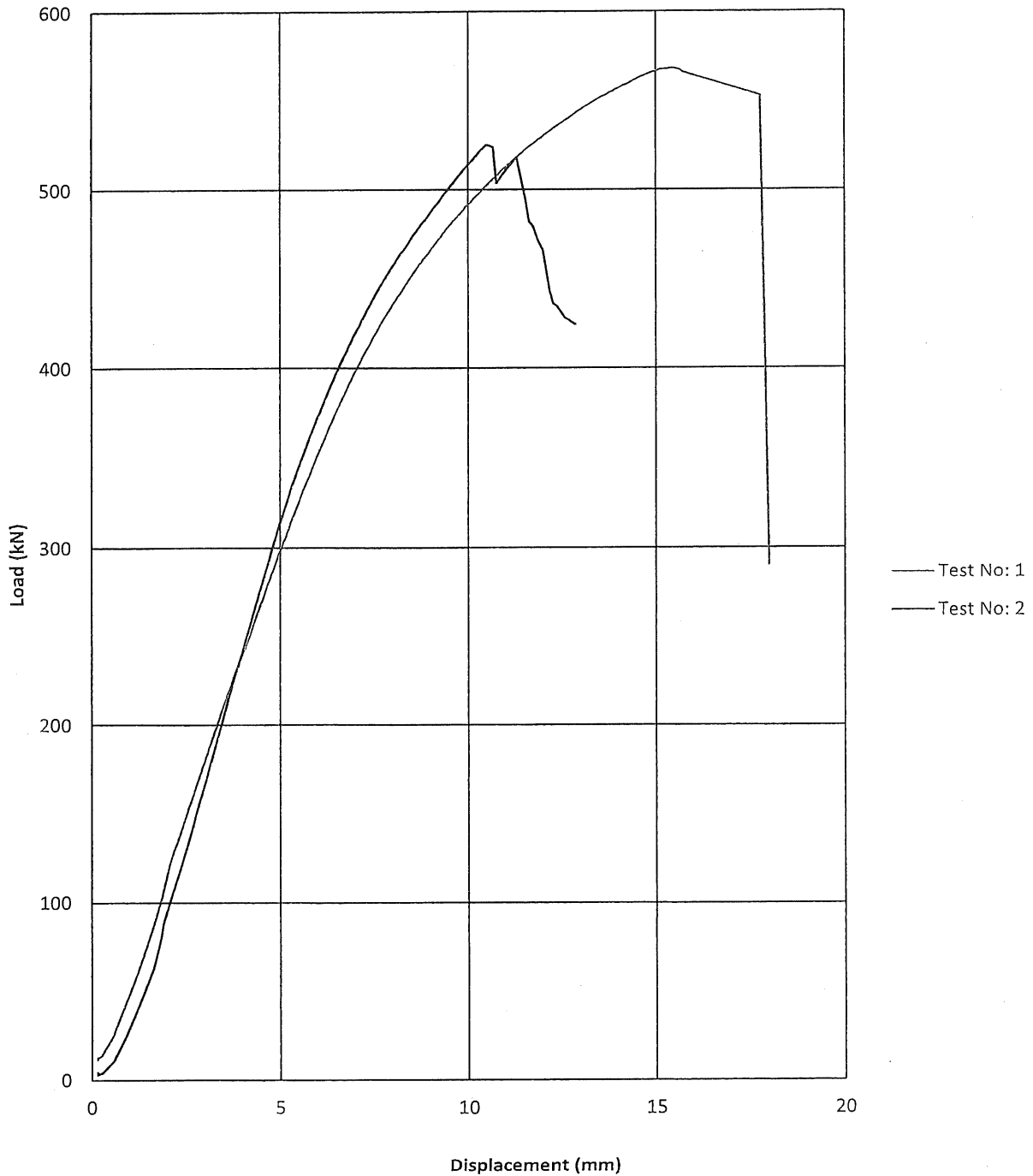
1. The minimum requirement of the customer's specifications is that the (250 t SWL) double twistlocks reach their maximum breaking load of 51 t (500 kN).
2. Failure of the single twistlock assemblies occurred above the maximum breaking load based on the customer's specification. Therefore, double twistlocks comply with the requirements set out by the customer's specifications.
3. Batch testing is recommended to ensure conformity with the above requirements.

#### 7. DISCLAIMER

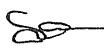
1. The CSIR cannot be held responsible for product indifferences and cannot be held responsible for any accidents or incidents as a result thereof.
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5. This Certificate of Test must be reproduced in its entirety if published or reproduced by the client.
6. This report does not constitute any type of certification.

Certificate No.: T30955  
Date of test: 01 September 2023  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Double twistlocks

Test No.:	1	2
Batch Number:	CADG-DA-0001	CADD-DB-0054
Maximum Force:	568.1 kN	525.1 kN



**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

## CERTIFICATE OF TEST

**Test two single twistlocks**

Application Received: 25 July 2023

Certificate No.: T30956

Order No.: 1292

Date of test: 01 September 2023

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, two single twistlocks were submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Shear test (Y – Axis)

**Table 1. Project identification**


Project name:	Proposal CADG 23 September 2023 REV 0
---------------	---------------------------------------


### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The single twistlocks were installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

The test procedure was as follows:

### Shear testing (Y direction)

For the shear testing, the Y-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.

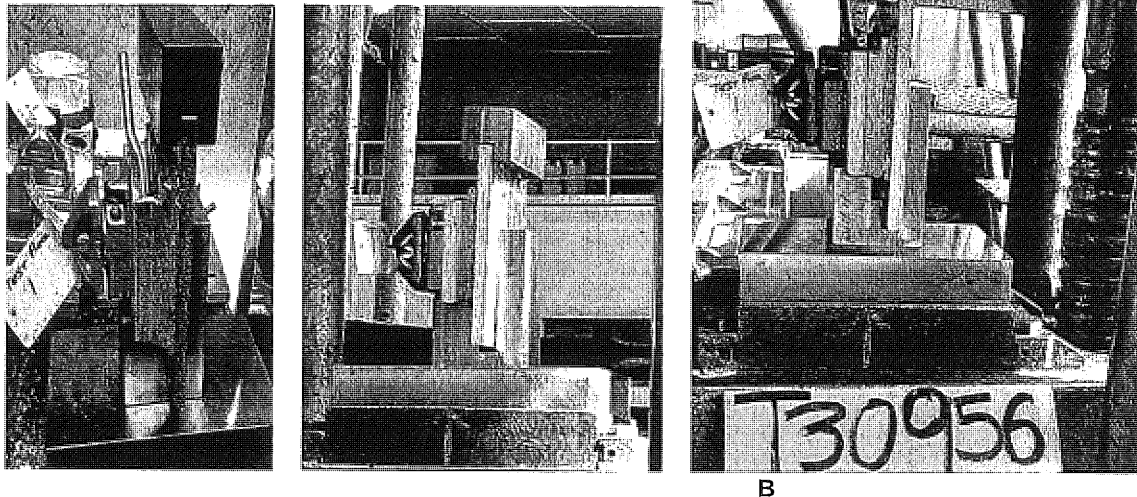


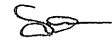
Figure 1- Single twistlock installed in the testing machine

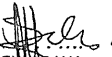
## 5. TEST RESULTS

The results of the destruction tests carried out on the single twistlocks are summarised in Table 1.

Table 1. Test results for single twistlocks.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-SA-0001	703.0	The twistlocks deformed as shown in Figure 2.
2	CADG-SB-0054	680.0	
Mean		691.8	
Standard Deviation		11.2	
Refer to page 4 of this report to see the plotted graph.			

Testing Officer:   
 SIHLE THWALA

Engineer:   
 MICHAEL SEHLABANA

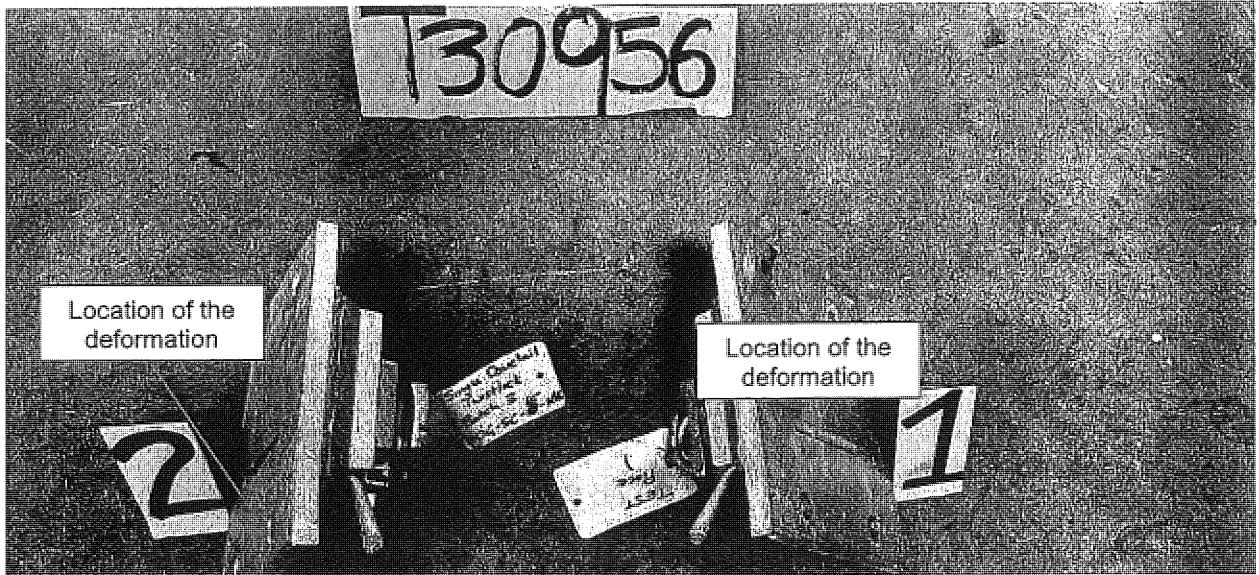


Figure 2 - Single twistlocks after the test

#### 6. TEST COMMENTS

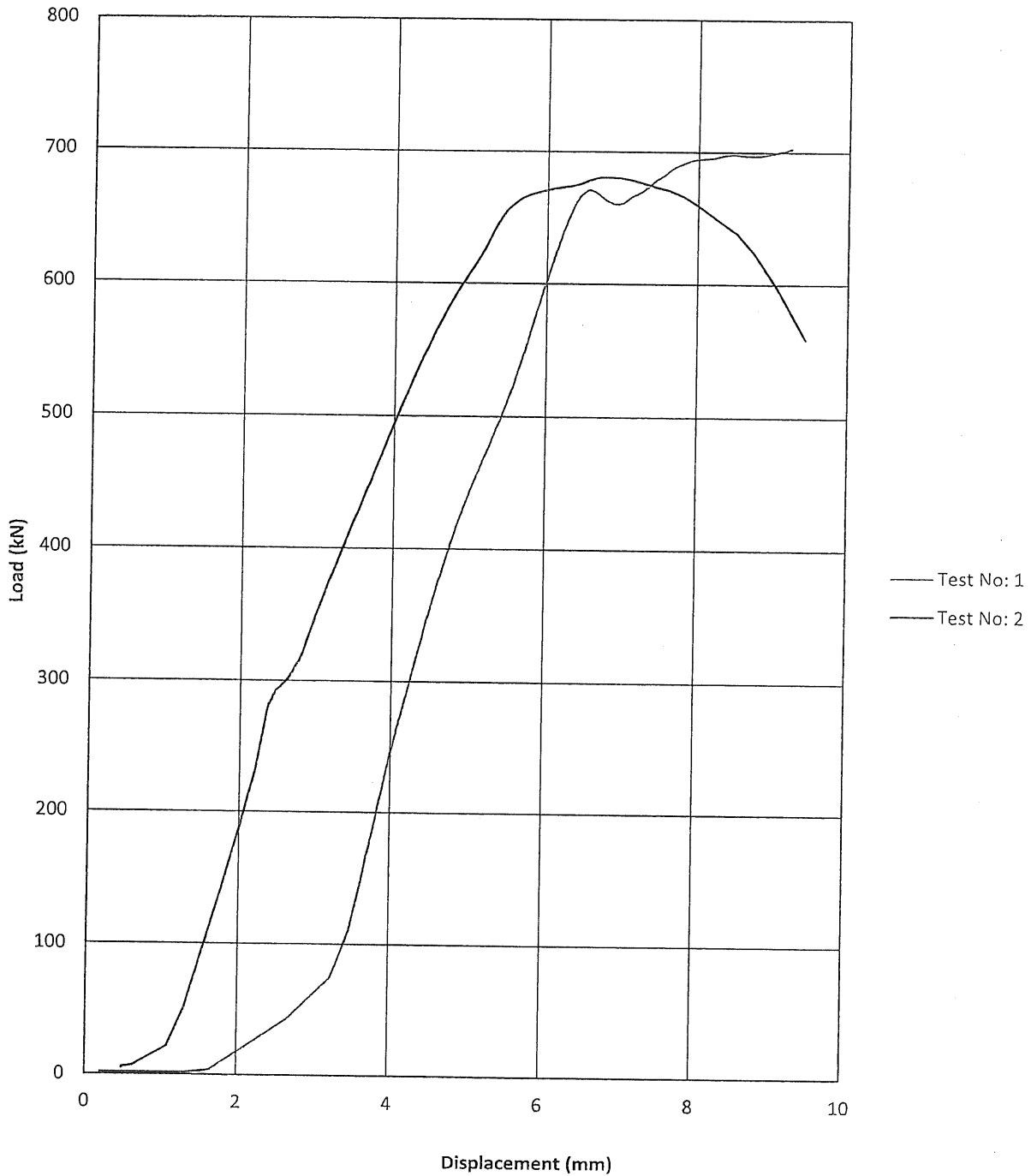
1. The minimum requirement of the customer's specifications is that the (210 t SWL) single twistlocks reach their maximum breaking load of 42.8 t (420 kN)
2. Failure of the single twistlock assemblies occurred above the maximum breaking load based on the customer's specification. Therefore, single twistlocks comply with the requirements set out by the customer's specifications.
3. Batch testing is recommended to ensure conformity with the above requirements.

#### 7. DISCLAIMER

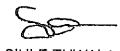
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2. Due to the limited amount of sample(s) tested and the type of testing done, CSIR can only account for the results from those specific samples tested.
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Certificate No.: T30956  
Date of test: 01 September 2023  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Single twistlocks

Test No.:	1	2
Batch Number:	CADG-SC-0130	CADD-SH-0005
Maximum Force:	703.0 kN	680.6 kN



**Notice:**  
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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

## CERTIFICATE OF TEST

**Test one double twistlocks**

Application Received: 25 July 2023

Certificate No.: T30957

Order No.: 1292

Date of test: 01 September 2023

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, one double twistlocks were submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Shear test (X – Axis)

**Table 1. Project identification**

Project name:	Proposal CADG 23 January 2023 REV 0
---------------	-------------------------------------


### 4. TEST PROCEDURE


Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The double twistlocks were installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLWANA

The test procedure was as follows:

### Shear testing (X direction)

For the shear testing, the X-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.

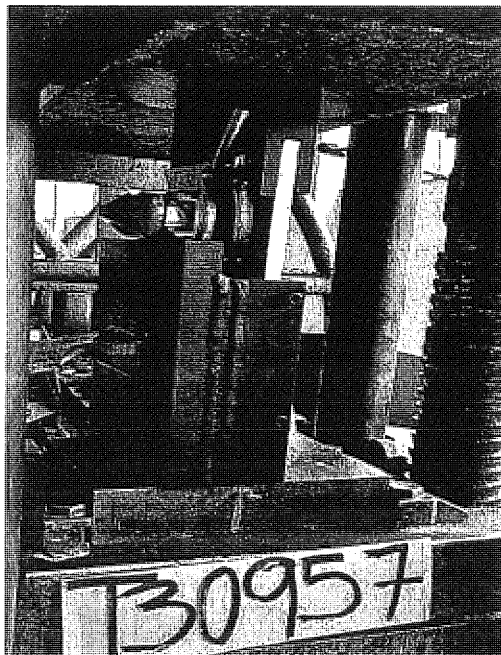


Figure 1- Double twistlock installed in the testing machine

## 5. TEST RESULTS

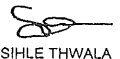
The results of the destruction tests carried out on the double twistlock are summarised in Table 1.


Table 1. Test results for double twistlock.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-SA-0001	737.7	No physical defects were visible as shown in Figure 2.
Refer to page 4 of this report to see the plotted graph.			

**Notice:**

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Testing Officer:   
 SIHLE THWALA

Engineer:   
 MICHAEL SEHLABANA

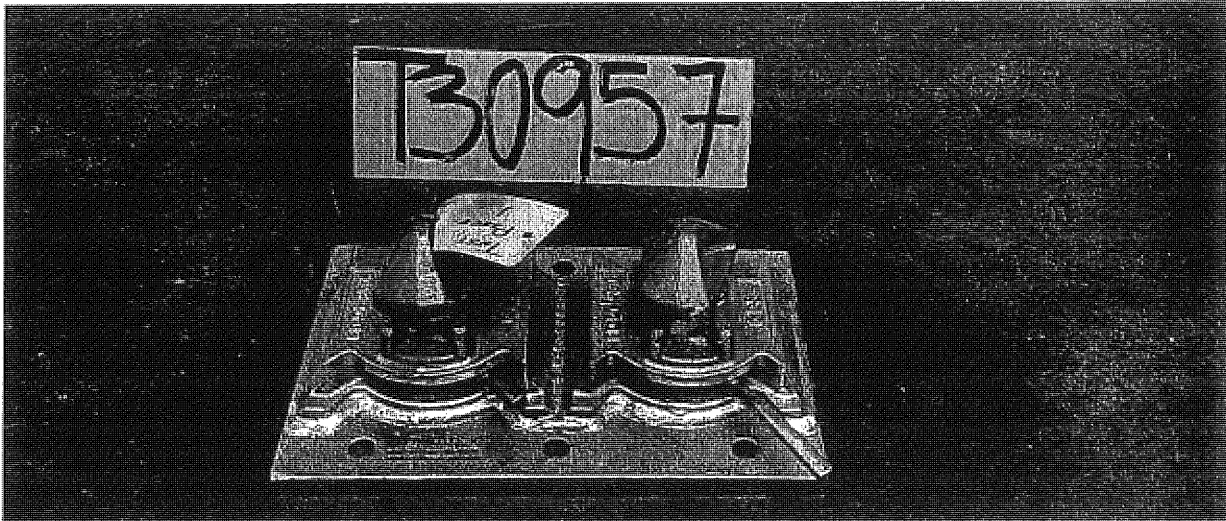


Figure 2 - Double twistlocks after the test

6. TEST COMMENTS


1. The result was inconclusive because the fittings were yielding from 213 kN to 450 kN; therefore, batch testing is recommended to ensure conformity with the above requirements.


7. DISCLAIMER

1. The CSIR cannot be held responsible for product indifferences and cannot be held responsible for any accidents or incidents as a result thereof.
2. Due to the limited amount of sample(s) tested and the type of testing done, CSIR can only account for the results from those specific samples tested.
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5. This Certificate of Test must be reproduced in its entirety if published or reproduced by the client.
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**Notice:**

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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

Certificate #: T30957

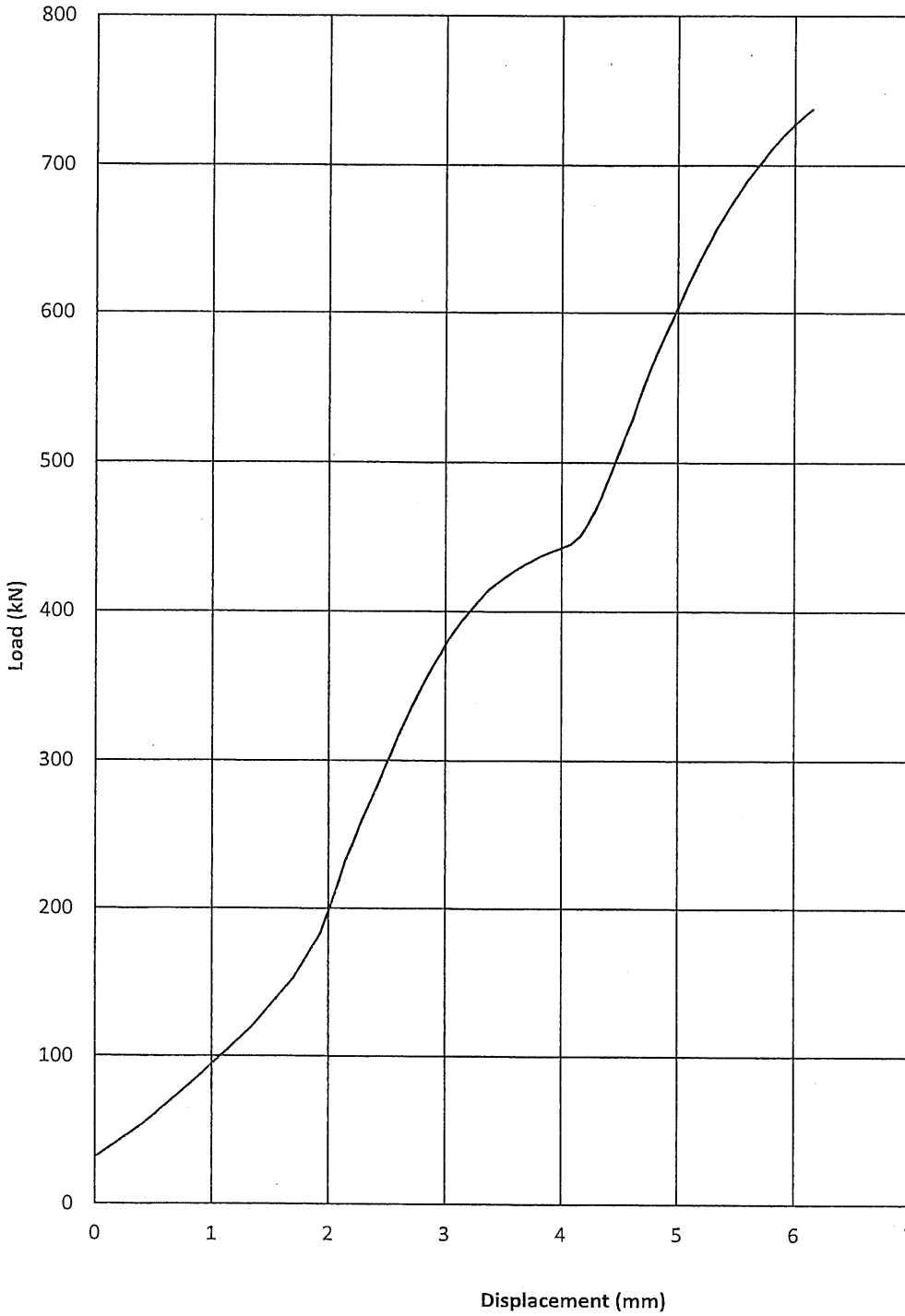
Date Issued: 15 November 2023



Vibe Doc ID: 7352036 V1

Certificate No.: T30957  
Date of test: 01 September 2023  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Double twistlocks

Batch Number:	CADG-SC-0130
Maximum Force:	737.7 kN



**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA  
Engineer:   
MICHAEL SEHLABANA

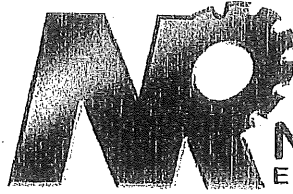


Reg. No. 200144802  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## **1.6 MANUFACTURING PROGRESS REPORT**

- VISUAL INSPECTION REPORTS
- DIMENSIONAL REPORTS



Reg. No: 70014430/07  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P O Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

01/07/2022

**Frequency of re-calibration of measuring equipment.**

This letter serves to confirm that it is North Reef Engineering's policy to re-calibrate measuring equipment every three years for equipment up to 300mm and every five years for equipment over 300mm due to less frequency of use or as and when it is found to be necessary to re-calibrate due to a faulty instrument.

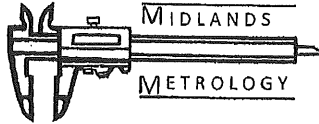
We do in-house check every time an instrument is used.

John Anjinho,

Technical Director.

Shop No 2  
Beechcraft Shopping Centre  
Beechcraft Road  
Impala Park

PO Box 5045  
Boksburg, 1461  
Tel: 011 894 5890  
Fax: 011 894-6091  
Cell No 073 2232603



Email: [midlandsmetrology@gmail.com](mailto:midlandsmetrology@gmail.com)



Lab No. 036

Cert no. MS36693

Certificate of calibration

Cal. Date: 06 February 2023  
Issue Date: 06 February 2023  
Customer: North Reef Engineering (Pty) Ltd  
6 Power Street  
Isando

Description: 0 – 300mm Digital Vernier Caliper

Serial: 5K 0033901

Manufacturer: Standard Gauge

Uncertainty Of Measurement: As specified below

Reference Publication: BS 887 : 2008

Calibration Procedure No: MM/WP/010

Environment: Temperature 20°C ± 1°C Humidity 40 To 60%

Traceable Standard Used: Steel Reference Set Gauge Blocks

Serial No. 10832

Cert. No. DB 7101

Equipment Used:

Long series gauge blocks

Cert. No. DB 7103 & 7104

External Micrometer

Cert. No. DB 0069

25mm Plain setting Ring

Ser. No. 001

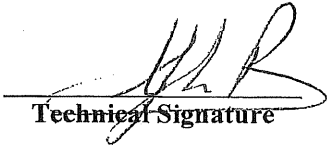
Results

Position (mm)	Specified (mm)	Deviation (mm)
0	± 0.020	0.000
10		0.000
41.2		+0.010
81.5		+0.020
121.5		0.000
191.8		+0.020
201.5		+0.010
291.8		+0.010
300		+0.010
Parallelism Internal Jaws		0.010
Parallelism External Jaws	0.008	0.010
Internal Reading on 25mm Ring Gauge	± 0.020	+0.040
Depth Rod Reading	± 0.020	+0.010

Uncertainty of Measurement: ± 0.020mm

End of Certificate

C. F. Le Roux  
Calibrated By:

  
Technical Signature

# NORTH REEF ENGINEERING

## ACCEPTANCE REPORT

Date 29/08/2023

Order No.	RALPH 1221	Inspected by	Musa	Quantities		Accepted for Delivery
Report No.		Lot No.		Inspected	/ACC	
Cert No.		Batch No.		98	246	

Drawing No.	TLA/002		Rev		Classific	Sample size	Qty Insp.Total	Characteristics Defective
Job No.	TLA/002	Shop Order Number	30881		Critical			
Description DOVETAIL TWISTLOCK 45-1 (DOUBLE)			Item	Major A				
				Major B				
				Minor				
				Incidental				

### INSPECTION RESULTS

ref	Specification	Actual	Inspection Means	Class	Checked Qty	Defective Qty
1	368.00	368.06	Digital Vernier		98	0
2	237.00	237.24	Digital Vernier		98	0
3	186.00	186.00	Height Gauge		98	0
4	129.00	129.00	Height Gauge		98	0
5	120.00	119.94	Digital Vernier		98	0
6	55.00	55.00	Digital Vernier		98	0
7	94.00	97.4/97.67	Digital Vernier		98	0
8	58.00	58.34	Digital Vernier		98	0
9	48.00	48.1	Height Gauge		98	0
10	60.00	59.68	Digital Vernier		98	0
11	30.00	29.78	Digital Vernier		98	0
12	16.00	16.08/16.25	Digital Vernier		98	0
13	Ø18x6holes	OK	Digital Vernier		98	0
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

**BUREAU VERITAS**

REVIEWED

WITNESSED

Date 29/8/23 Initials *MS*

Comments:

Signature

# NORTH REEF ENGINEERING

## ACCEPTANCE REPORT

Date 22/08/2023

Order No.	RALPH 1221	Inspected by	Musa	Quantities		Accepted for Delivery
Report No.		Lot No.		Inspected	/ACC	
Cert No.		Batch No.		170	490	

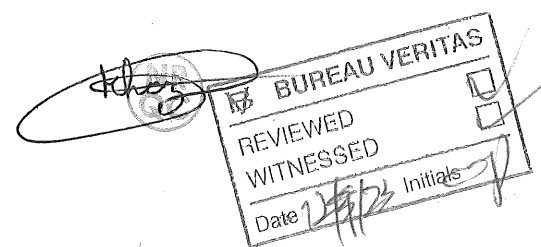
Drawing No.	TLA/002	Rev		Classific	Sample size	Qty Insp.Total	Characteristics Defective
Job No.	TLA/002	Shop Order Number	30882	Critical			
Description DOVETAIL TWISTLOCK 45-2 (SINGLE)			Item	Major A			
				Major B			
				Minor			
				Incidental			

### INSPECTION RESULTS

ref	Specification	Actual	Inspection Means	Class	Checked Qty	Defective Qty
1	237.00	236.93	Digital Vernier		170	0
2	191.00	191.16	Digital Vernier		170	0
3	186.00	186.00	Height Gauge		170	0
4	237.00	237.09	Height Gauge		170	0
5	120.00	119.90	Digital Vernier		170	0
6	95.00	95.00	Digital Vernier		170	0
7	94.00	97.4/97.68	Digital Vernier		170	0
8	58.00	58.32	Digital Vernier		170	0
9	48.00	48.14	Height Gauge		170	0
10	60.00	59.68	Digital Vernier		170	0
11	30.00	29.78	Digital Vernier		170	0
12	16.00	16.11/16.25	Digital Vernier		170	0
13	Ø18x4holes	OK	Digital Vernier		170	0
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						

Comments:

Signature





Reg. No. 2008/1443027  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## **1.7 CORROSION AND PROTECTION**

- GALVANIZING CERTIFICATE (N/A)
- GALVANIZING REPORTS (N/A)
- PAINTING (IN HOUSE)

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## Progress Report

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**Twistlock Africa - Ralph Siebenhaar** <ralph@twistlockafrica.co.za>  
To: Gregg Shepherd <gregg@northreef.co.za>, John Northreef <john@northreef.co.za>

Sat, Aug 12, 2023 at 12:08 AM

Thanks for the feedback.

Attached is the confirmation from Sihle (CSIR) that the testing has been booked for the 1<sup>st</sup> of September.

This date cannot be missed.

Galvanising is to be matt, which will assist with the marking, as well as be the same as the GLS twistlocks.

Regarding the holes in the base plates, I'll need to check with the client, I don't foresee it as being an issue.

Kind regards

Ralph A. Siebenhaar | Solutions Engineer



100 8<sup>th</sup> Avenue, Edenvale, 1609, South Africa

Direct: +27 11 609 7873 | Mobile: +27 82 825 1852

Email: ralph@twistlockafrica.co.za | Web:  
<https://www.twistlockafrica.co.za>

---

**From:** Gregg Shepherd <gregg@northreef.co.za>

**Sent:** Friday, 11 August 2023 13:46

**To:** Twistlock Africa - Ralph Siebenhaar <ralph@twistlockafrica.co.za>; John Northreef <john@northreef.co.za>

**Subject:** Progress Report

Dear Ralph

[Quoted text hidden]

----- Forwarded message -----

From: Sihle Thwala <SThwala@csir.co.za>

To: Twistlock Africa - Ralph Siebenhaar <ralph@twistlockafrica.co.za>

Cc: "Gregg Shepherd" <gregg@northreef.co.za>, "Tyron MOODLEY" <tyron.moodley@bureauveritas.com>

Bcc:

Date: Fri, 11 Aug 2023 17:52:25 +0200

Subject: RE: FW: RE: Proposal CADG 23 January 2023 REV 0

Hi Ralph,

# SABS

## Permit to Apply Certification Mark

Subject to the provisions of the Standards Act, 2008  
(Act 8 of 2008), the relevant regulations made thereunder and the permit  
conditions contained in the under mentioned schedules, this permit authorizes

**PRO-TECH GALVANIZERS (PTY) LTD**  
Co Reg. 1998/020104/07  
**NIGEL**

to apply the certification mark



in respect of the mark specification

**SANS 121:2011**  
**TO: HOT DIP GALVANIZED COATINGS ON FABRICATED**  
**IRON AND STEEL ARTICLES - SPECIFICATIONS AND TEST**  
**METHODS**

This permit, including the schedules 1 to 3 which form an integral part thereof:

- is issued without alteration;
- is identified by the applicable permit number;
- is subject to any condition or limitation contained therein;
- is valid subject to ongoing compliance with permit conditions;
- bears the embossed SABS Commercial seal. In the absence of the seal, the permit and the schedules shall be invalid; and
- the permit may be authenticated by referring to the register of "Certified Clients" on the SABS Commercial website ([www.sabs.co.za](http://www.sabs.co.za))
- Scheme Type 5 permit applies to products that have been tested.

Permit Number 6521/9626

Effective Date 14 June 2022

Expiry Date 16 June 2025

Date of Original Registration 20 August 1999

Chief Executive Officer 



SABS COMMERCIAL 500 LTD

A4A1006321

00971A





# PRO-TECH GALVANIZERS (PTY) LTD

REG No.: 1998/020104/07

12 FABRIEK CRESCENT • VORSTERSKROON • NIGEL • 1490

P.O. Box 759  
Nigel, 1490

TEL: +27 (011) 814 4292  
FAX: +27 (011) 814 2037

A41809

## DELIVERY NOTE / RELEASE CERTIFICATE

CUSTOMER	ORDER NO	BIN NO
North Reef Engineering	0031497	

JOB NO	BATCH NO	END USER	DATE
			18/08/23

### ITEMS INSPECTED

DESCRIPTION OF MATERIAL	Kg
Double Dovetail Twist Lock	711
Single Dovetail Twist Lock	381

ZINC COATING THICKNESS AVERAGE: MICRONS	120
---	-----

DELIVERY NOTE No.	IN 072087
-------------------	-----------

TOTAL MASS Kg	109219
---------------	--------



CERTIFIED THAT THE ABOVE INSPECTED ITEMS COMPLY WITH SABS:  
 SANS 121:2011  SANS 10684:2011

INSPECTED BY:

SAMPLES: AVERAGE COATING THICKNESS IN MICRONS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

SIGNATURE:

# PRO-TECH GALVANIZERS (PTY) LTD

REG No.: 1998/020104/07

12 FABRIEK CRESCENT • VORSTERSKROON • NIGEL • 1490

P.O. Box 759  
Nigel, 1490

TEL: +27 (011) 814 4292  
FAX: +27 (011) 814 2037

A41870

## DELIVERY NOTE / RELEASE CERTIFICATE

CUSTOMER	ORDER NO	BIN NO
North Reef Engineering	0031507	

JOB NO	BATCH NO	END USER	DATE
			25/08/23

### ITEMS INSPECTED

DESCRIPTION OF MATERIAL	Kg
Single Dovetail Twist Lock	580
Double Dovetail Twist Lock	1129

ZINC COATING THICKNESS AVERAGE: MICRONS	151
---	-----

DELIVERY NOTE No.	11072150
-------------------	----------

TOTAL MASS Kg	1709kg
---------------	--------



CERTIFIED THAT THE ABOVE INSPECTED ITEMS COMPLY WITH SABS:  
 SANS 121:2011  SANS 10684:2011

INSPECTED BY:

SAMPLES: AVERAGE COATING THICKNESS IN MICRONS																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

SIGNATURE:









Reg No. 2003/144607  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando, 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## 1.8 TWISTLOCK AFRICA & CUSTOMER INSPECTION REPORT



**Industry & Facilities Division**  
**Procurement Services**

<b>INSPECTION REPORT Nr BV-ZA 23313-IND</b>
<input type="checkbox"/> Initial <input checked="" type="checkbox"/> Interim <input type="checkbox"/> Final <input type="checkbox"/> Resident
Inspection requested by: Twistlock Africa
BV Job Nr: ZA 23313-IND

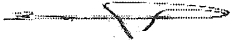


<b>Project:</b> Boltable Twist lock Project	<b>IPO Ref (If applicable):</b> Not Applicable.
<b>BV Client:</b> Twistlock Africa	<b>P/o nr:</b> N/A
<b>Manufacturer/Vendor:</b> North Reef Engineering	<b>P/o nr:</b> Not Given
<b>Sub-Vendor:</b> N/a	
<b>Inspection Location:</b> No 6 power Avenue Isando	<b>Previous Inspection (If applicable):</b> Initial
<b>Inspection performed on:</b> 12.09.2023	<b>Next Inspection:</b> TBC

<b>MATERIAL / SUBJECT OF INSPECTION</b> <input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate material list is provided in attachment)</i>	<b>ITEM / TAG Nr</b>	<b>QTY</b> As per P/O	<b>QTY</b> Offered for inspection
Visual/Dimensional Inspections and quantity counting	No tag numbers on items	No P/O provided at the time of inspections	Singles 490 off Doubles 246 off

<b>A – INSPECTION RESULT</b>		
<input checked="" type="checkbox"/> <b>Satisfactory</b> (Without comments)	<input type="checkbox"/> <b>Satisfactory with comments</b> (Any of trailing Punch or Non Conformity items is still open)	<input type="checkbox"/> <b>Not Satisfactory</b> (NCR raised during the inspection)

**Inspection Summary:**

- Visual and dimensional inspections and quantity checks done on twistlocks. Items have been fabricated as per drawings.
- Visual and dimensional inspections done on twist locks before dispatch to site.
- Visual and final release of twistlocks Singles 490 in total (160 per crate), Doubles 246 in total (72 per crate). No damage noticed at the time of inspections
- Data book reviewed and the QCP especially signed off
- The WQT is Allan Beato from 26/06/2023 and due for retest 6 months later
- The WPS is NRE 010 of 01/02/2022
- The QCP single is A-002 of 06/06/2023 all signed off
- The QCP double is B-001 of 06/06/2023 all signed off
- All paper work reviewed and signed off as per the QCP.
- All reviewed paper work are in the data file

<b>Open Non Conformities:</b>	<input type="checkbox"/> Yes, details in section G	<input checked="" type="checkbox"/> No
<b>Open Punch List Items:</b>	<input type="checkbox"/> Yes, details in section H	<input checked="" type="checkbox"/> No
<b>Release Note Issued:</b>	<input type="checkbox"/> Yes, number(s):	<input checked="" type="checkbox"/> No
<b>BV Inspector:</b> Patrick Kome Ntungwe 	<b>BV Coordinator: Louis PHAHLANE</b>  	
<b>BV Office: South Africa (Sandton)</b> 01/08/2023 	<b>Inspection Report Date: 12.09.2023</b>	
<b>Distribution:</b> <input checked="" type="checkbox"/> CLIENT <input checked="" type="checkbox"/> BV <input type="checkbox"/> OTHER: .....	<b>Attachments Report:</b> <input type="checkbox"/> Yes, details in section J <input checked="" type="checkbox"/> No	

**B - REFERENCE DOCUMENTATION:**

Refer to attachment section J instead  
(Indicate if separate document list is provided in attachment)

Title	Reference n°	Rev.	Approval status	Approved by	Date
QCP Single	A-002	00	Approved	Client	06/06/2023
QCP Double	B-001	00	Approved	Client	06/06/2023
WQT	Allan Beato	00	Approved	Manufacturer	26/06/2023
WPS	NRE 010	00	Approved	Manufacturer	01/02/2022
Technician Qualification	Theron Govender	00	Approved	Manufacturer	02/08/2020 to 01/08/2025
Dye Pen Procedure	UTS/ASME -001	00	Approved	Manufacture	25/01/2022

C – ATTENDEES		
Name	Position	Representing
Mr. Gregg Shepherd	Project Manager	North Reef Engineering
Mr. Patrick Kome Ntungwe	QC Inspector	Bureau Veritas

D - MEASURING & TESTING EQUIPMENT USED			
<input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate equipment list is provided in attachment)</i>			
Equipment Type	Equipment Identity n°	Last Calibration Date	Expiry Date
Measuring Viner	0033901	06/02/2023	06/02/2024
Adrox 996PA PEN	Batch No: 98738	n/a	2024
Adrox 9PR5 Cleaner	Batch No: 83765	n/a	2024
Adrox 9D1B Developer	Batch No: 27610	n/a	2024

E - INSPECTION DETAILS	
<b>E1 – Details of Witness (W) &amp; Hold (H) Inspection Points</b>	
<p>The QCP, Drawings, qcp</p>	
<b>E2 – Details of Monitoring and Surveillance Patrols</b>	
<input type="checkbox"/> Tick if conducted during the visit	
<p>The QCP, Drawings, qcp</p>	
<b>E3 – Details of Certificates Review</b>	
<input type="checkbox"/> Tick if conducted during the visit	

The QCP, Drawings, qcp

**F – HEALTH, SAFETY & ENVIRONMENT COMMENTS**

*(Comment on Observations and Actions Taken During the Inspection)*

All covid 19 protocols are respected all the time while in the workshop or offices for the inspections

**G- NON CONFORMITIES: None**

Refer to attachment section J instead  
*(Indicate if separate punch list is provided in attachment)*

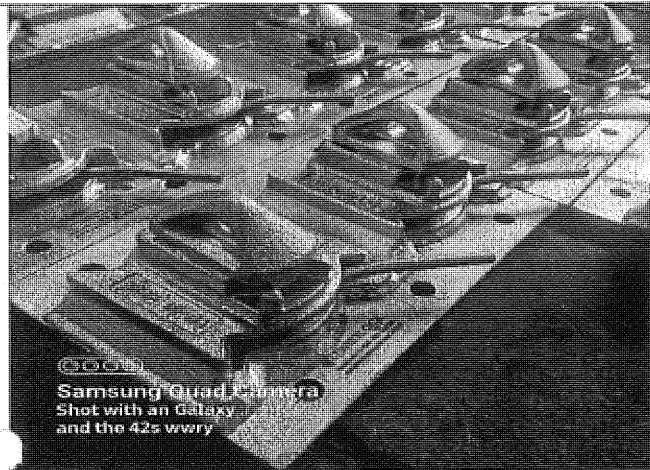
Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments

**H – PUNCH LIST**

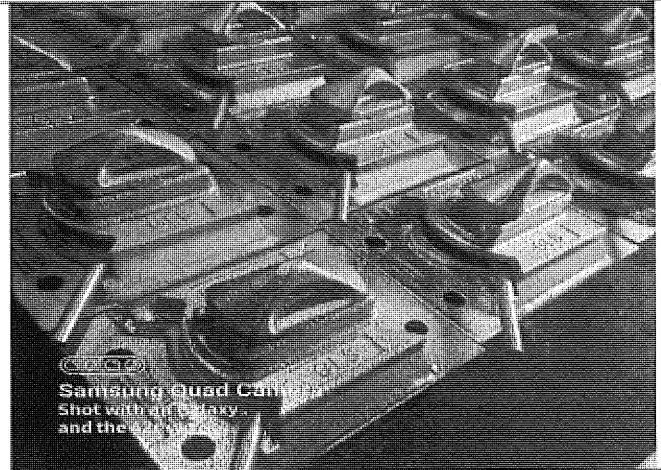
Refer to attachment section J instead  
*(Indicate if separate punch list is provided in attachment)*

Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments

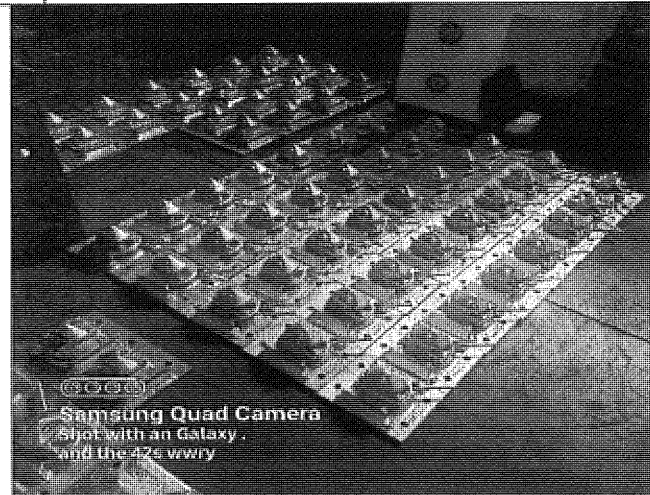
I - DIGITAL PICTURES



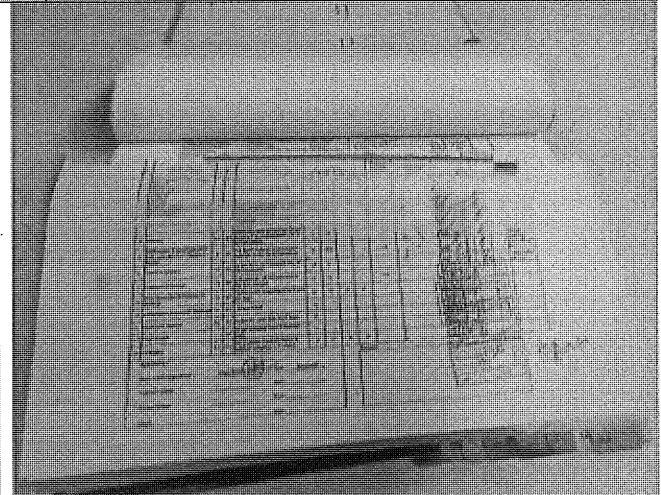
No damages on the twistlocks at the time of the inspections



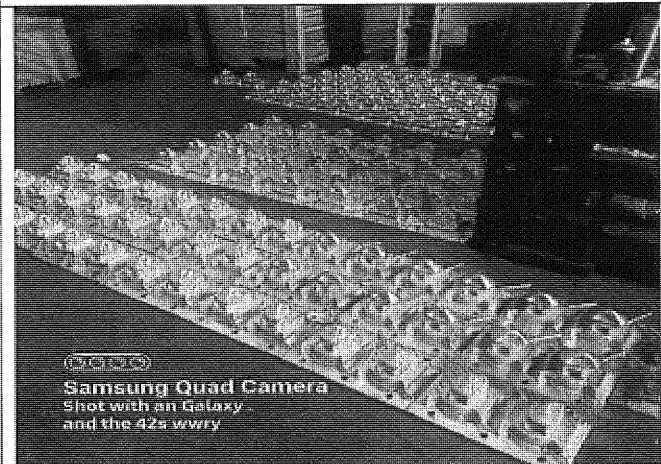
No damages on the twistlocks at the time of the inspections

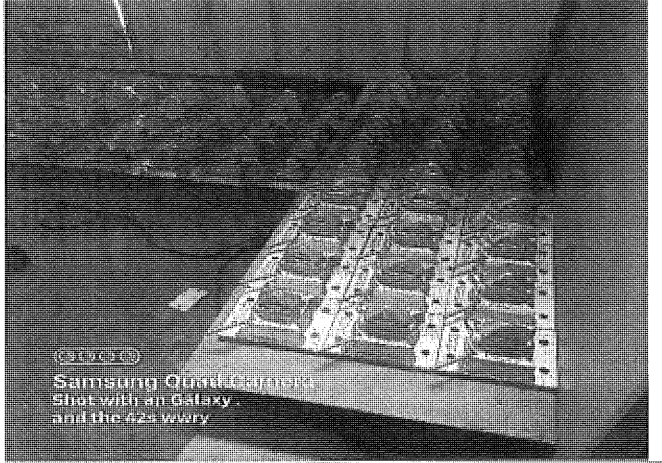
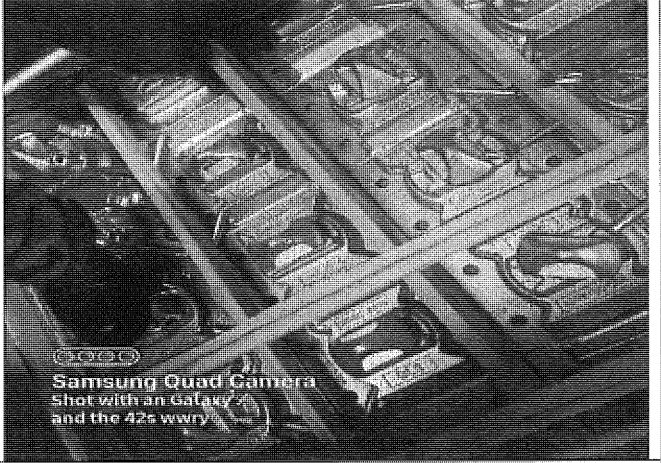
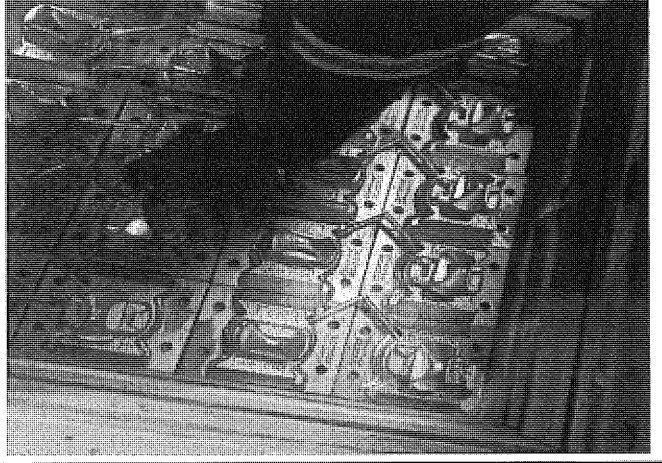
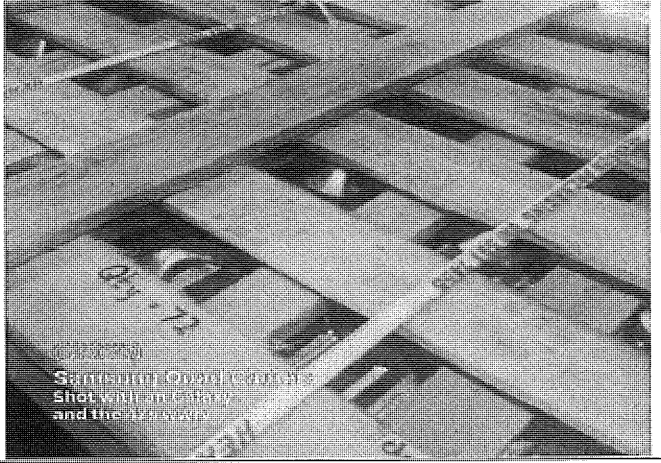

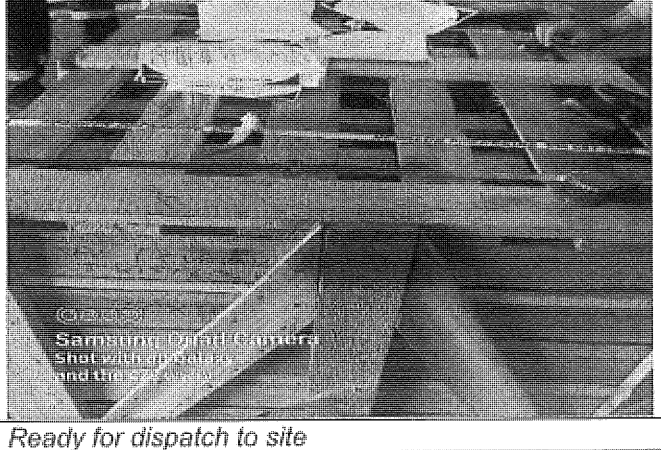


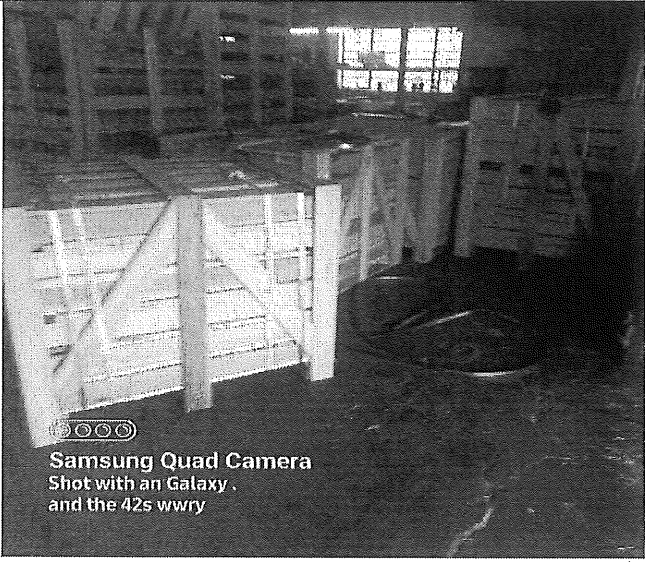



No damages on the twistlocks at the time of the inspections



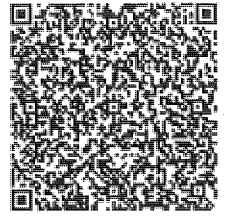
Reviewed and signed QCP



<p>No damages on the twistlocks at the time of the inspections</p>	<p>No damages on the twistlocks at the time of the inspections</p>
 <p>Samsung Quad Camera Shot with an Galaxy and the #2s wvry</p>	 <p>Samsung Quad Camera Shot with an Galaxy and the #2s wvry</p>
<p>No damages on the twistlocks at the time of the inspections</p>	<p>No damages on the twistlocks at the time of the inspections</p>
	 <p>Samsung Quad Camera Shot with an Galaxy and the #2s wvry</p>
<p>No damages on the twistlocks at the time of the inspections</p>	<p>Ready for dispatch to site</p>
 <p>Samsung Quad Camera Shot with an Galaxy and the #2s wvry</p>	 <p>Samsung Quad Camera Shot with an Galaxy and the #2s wvry</p>

 <p>   <b>Samsung Quad Camera</b>                  Shot with an Galaxy .                  and the 42s wwry             </p>	 <p>   <b>Samsung Quad Camera</b>                  Shot with an Galaxy .                  and the 42s wwry             </p>
<p><i>Ready for dispatch to site</i></p>	<p><i>No damages on the twistlocks at the time of the inspections</i></p>

J – ATTACHMENTS			
Item	Attachment Name	Total Pages	Description
<b>END OF REPORT</b>			



**Industry & Facilities Division  
Third Party Inspection Report**

Type of Inspection : Initial    Interim <input checked="" type="checkbox"/> Final    Resident    Remote
Inspection Requested by: Twistlock Africa
Inspection performed as Recognised Authority: Yes, <span style="float: right;">No</span>
BV Job Nr : ZA 23313-IND

<b>Inspection Report Nr:</b> BV-ZA 23313-IND-2023-003	<b>Revision Nr:</b> 0
<b>Project</b> Boltable Twist lock Project	<b>BV Job Nr (local ref.)</b> ZA 23313-IND
<b>BV Client:</b> TWIST LOCK AFRICA	<b>IPO Ref (BV internal P/o):</b> NOT APPLICABLE.
<b>Manufacturer / Vendor:</b> NORTH REEF ENGINEERING	<b>P/O Nr (Client to BV):</b> NOT PROVIDED
<b>Sub-Vendor</b> N/A	<b>P/O Nr (Client to Manufacturer):</b> NOT PROVIDED
<b>Inspection Location</b> NO: 6 POWER ROAD ISANDO.	<b>Previous Inspection:</b> 17/08/2023
<b>Previous inspection from:</b> 17/08/2023	<b>Previous inspection until:</b> 17/09/2023
<b>Inspection Performed on:</b> 05/09/2023	<b>Inspection performed until:</b> 05/09/2023
<b>Total number of days inspection performed</b> 1	

**MATERIAL / SUBJECT OF INSPECTION**

Equipment Category	Description	Item / Tag Nr	Quantity as per P/PO	Quantity Offered for Inspection
Mechanical	SINGLE TWIST LOCKS BATCH E	NOT ITEM TAG NUMBERS	99	2
Mechanical	SINGLE TWIST LOCKS BATCH F	NOT ITEM TAG NUMBERS	144	2

**A - INSPECTION RESULT**

<input checked="" type="checkbox"/>	Satisfactory (Without comments)	Satisfactory with comments (Any new or trailing Punch or Non Conformity items open)	Not Satisfactory (NCR raised during the inspection)
-------------------------------------	---------------------------------	---	---

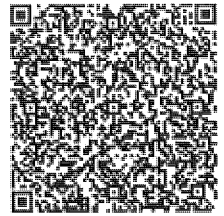
**Inspection Summary:**

A total of 99 Single Lock Twistlocks from Batch E and 144 of the single Twist locks from batch F were provided for Inspections. Two sample of Each batch was provided for testing and no defect indications were detected.

Open Non Conformities:	Yes, details in section G	<input checked="" type="checkbox"/> No	
Open Punch List Items:	Yes, details in section H	<input checked="" type="checkbox"/> No	
Release Note Issued:	Yes	<input checked="" type="checkbox"/> No	Release Note number(s):
BV Traceability Stamping		<input checked="" type="checkbox"/> No	

**BV Inspector: Louis PHAHLANE**

**BV Coordinator: Louis PHAHLANE**



Industry & Facilities Division  
Third Party Inspection Report

<b>BV Office:</b> BVSA (JOHANNESBURG)	<b>Inspection Report Date :</b> 05/09/2023
<b>Distribution:</b> to BV: <input checked="" type="checkbox"/> to Client: <input checked="" type="checkbox"/> to Manufacturer: to Other:	<b>Attachments Report:</b> Yes, details in section J <input checked="" type="checkbox"/> No attachment

**B - REFERENCE DOCUMENTATION**

Code	Reference Nr	Revision	Approval Status	Approved by	Date
QCP	A-001 BATCH E	0	Approved as final	Supplier	26/06/2023
QCP	A-001 BATCH F	0	Approved as final	Supplier	26/06/2023

**C - ATTENDEES**

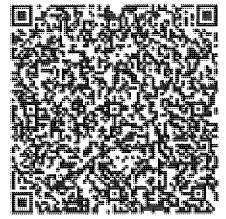
Name	Position	Representing	Email	Phone
Louis Phahlane	Inspector	Bureau Veritas	louis.phahlane@bureauveritas.com	083 706 4901
Denford Muhoni	Quality Controller	North Reef Engineering	denford@northreef.co.za	
Trevoh Moodley	NDT Tech	North Reef Engineering		

Equipment Used	Equipment Identity Nr	Last Calibration Date	Expiry Date
A WELD CLEANER	BN 409662		14/09/2028
R DYE PENETRANT	BN 409987		30/09/2028
DEVELOPER	BN 409940		30/04/2028

**E - INSPECTION DETAILS**

**General**

A TOTAL OF FOUR SAMPLE WERE PROVIDED FOR DYE- PEN TESTING, TWO FROM EACH BATCH AS MENTIONED ABOVE ON THIS REPORT AND NO DEFECT INDICATIONS WERE FOUND.



**E1 – Details of Witness (W) & Hold (H) Inspection Points**

ONLY ONE ACTIVITY TOOK PLACE THAT IS THE DYE PENETRANT TESTING AND WAS DONE 100% ON EACH SAMPLE PROVIDED FOR TESTING AND NO DEFECT INDICATINOS WERE FOUND.

**E2 – Details of Monitoring and Surveillance Patrols**

N/A

**3 – Details of Certificates Review**

QCPs for both batch E and F were provided for review and signature and were signed accordingly.

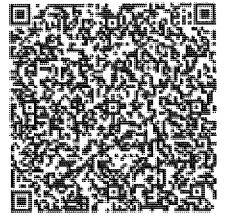
**F - HEALTH, SAFETY & ENVIRONMENT COMMENTS**

A MINI SAFETY WALK WAS PROVIDED.

2 minutes for my safety

**Hazards**

	Yes/No/NA
Is the equipment / energy isolated?	NA
If a permit is required, eg. confined space entry, do I have it?	NA
Are tools and equipment in good condition and tagged?	Yes
In my work environment, is all necessary equipment (vehicle, conveyors, etc.) isolated?	NA
Is the walking surface free of slip, trip and fall hazards?	Yes
Is the appropriate barricading for the task in place?	Yes
If someone works above me, am I protected from a falling object?	Yes
Have I communicated with the other groups about their activities?	Yes



**Personal Health**

	Yes/No/NA
Am I fit for this task?	Yes
If the task involves heavy lifting, am I equipped to manage this factor?	Yes

**Conditions**

	Yes/No/NA
If extreme weather conditions are a factor on this job, are there measures in place to manage it?	Yes
Am I familiar with the equipment I inspect?	Yes

**G - NON-CONFORMITIES**

Defect Type	Description	Status	Raised on	Report No. (Raised)	Closed on	Report No. (Closed)	Comments

**H - PUNCH LIST**

Defect Type	Description	Status	Raised On	Report No. (Raised)	Closed On	Report No. (Closed)	Comments

**I - DIGITAL PICTURES**

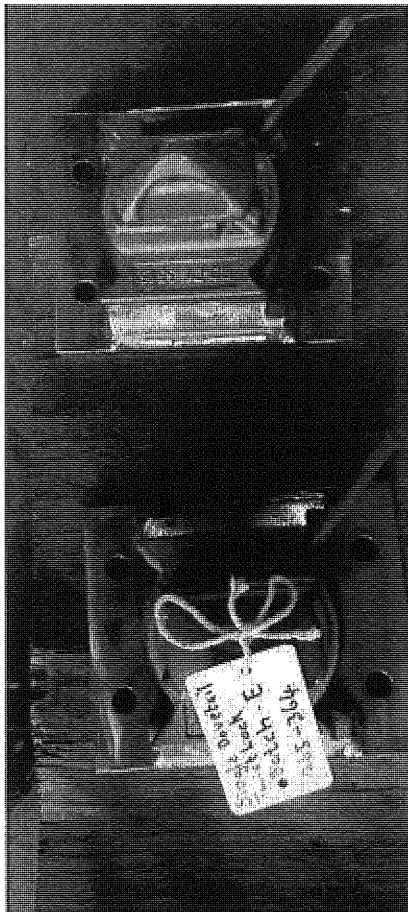
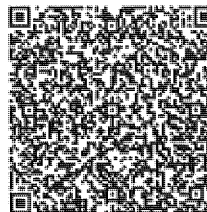


Photo 001 - SAMPLES PRIOR TESTING  
POST CLEANING



Photo 002 - SAMPLES PRIOR TESTING  
POST CLEANING

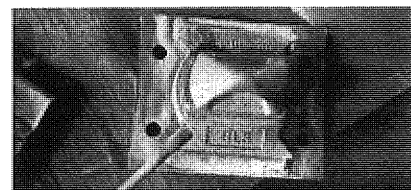


Photo 003 - NO DEFECT INDICATIONS

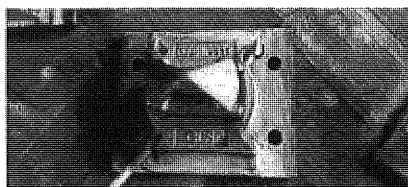


Photo 004 - NO DEFECT INDICATIONS

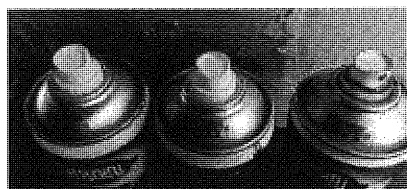
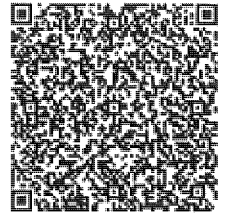


Photo 005 - CONSUMABLES USED FOR  
TESTING



Photo 006 - CONSUMABLES USED FOR  
TESTING



**J - ATTACHMENTS**

Item	Description / Attachment name	Attachment	Total Pages

**END OF REPORT**



<b>INSPECTION REPORT Nr BV-ZA 23313-IND-2023-001</b>
<input type="checkbox"/> Initial <input checked="" type="checkbox"/> Interim <input type="checkbox"/> Final <input type="checkbox"/> Resident
Inspection requested by: Twistlock Africa
BV Job Nr: ZA 23313-IND




<b>Project:</b> Boltable Twist lock Project	<b>IPO Ref (If applicable):</b> <i>Not Applicable.</i>
<b>BV Client:</b> Twistlock Africa	<b>P/o nr:</b> N/A
<b>Manufacturer/Vendor:</b> North Reef Engineering	<b>P/o nr:</b> Not Given
<b>Sub-Vendor:</b> N/a	
<b>Inspection Location:</b> No 6 power Avenue Isando	<b>Previous Inspection (If applicable):</b> <i>Initial</i>
<b>Inspection performed on:</b> 01.08.2023.	<b>Next Inspection:</b> TBC

MATERIAL / SUBJECT OF INSPECTION <input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate material list is provided in attachment)</i>	ITEM / TAG Nr	QTY As per P/O	QTY Offered for inspection
Visual/Dimensional Inspections and witness of Dye Pen	No tag numbers on items	No P/O provided at the time of inspections	Batch A Single and Batch A Double 6 off items Dye pen tested

A – INSPECTION RESULT		
<input checked="" type="checkbox"/> <b>Satisfactory</b> (Without comments)	<input type="checkbox"/> <b>Satisfactory with comments</b> (Any of trailing Punch or Non Conformity items is still open)	<input type="checkbox"/> <b>Not Satisfactory</b> (NCR raised during the inspection)

**Inspection Summary:**

- Visual and dimensional inspections done batch A single and batch A double twistlock before Dye pen. Items have been fabricated as per drawings.
- During the Dye pen test, no visible indications noted at the time of the test.
- All Dye pen consumables used like the red ink, white background and solvent cleaner are still within the shelf life.
- The level 2 NDT technician is Mr Theron Govender. Certificate is valid from 02/08/2020 to 01/08/2025
- The Dye Pen procedure is UTS/ASME -001 Rev 00 of 25/01/2022
- The vainer caliper used for dimensional is within calibration. Serial number is 0033901. Calibrated on the 06/02/2023 and due for calibration on the 06/02/2024
- The WQT is Allan Beato from 26/06/2023 and due for retest 6 months later
- The WPS is NRE 010 of 01/02/2022
- The QCP single is A-002 of 06/06/2023
- The QCP double is B-001 of 06/06/2023
- All paper work reviewed and signed off as per the QCP.
- All reviewed paper work are in the data file

<b>Open Non Conformities:</b> <input type="checkbox"/> Yes, details in section G	<input checked="" type="checkbox"/> No
<b>Open Punch List Items:</b> <input type="checkbox"/> Yes, details in section H	<input checked="" type="checkbox"/> No
<b>Release Note Issued:</b> <input type="checkbox"/> Yes, number(s):	<input checked="" type="checkbox"/> No
<b>BV Inspector:</b> Patrick Kome Ntungwe 	<b>BV Coordinator: Louis PHAHLANE</b> 
<b>BV Office: South Africa (Sandton)</b> 01/08/2023 	<b>Inspection Report Date: 01.08.2023</b>
<b>Distribution:</b> <input checked="" type="checkbox"/> CLIENT <input checked="" type="checkbox"/> BV <input type="checkbox"/> OTHER: .....	<b>Attachments Report:</b> <input type="checkbox"/> Yes, details in section J <input checked="" type="checkbox"/> No

<b>B - REFERENCE DOCUMENTATION:</b>					
<input type="checkbox"/> Refer to attachment section J instead (Indicate if separate document list is provided in attachment)					
Title	Reference n°	Rev.	Approval status	Approved by	Date
QCP Single	A-002	00	Approved	Client	06/06/2023
QCP Double	B-001	00	Approved	Client	06/06/2023
WQT	Allan Beato	00	Approved	Manufacturer	26/06/2023
WPS	NRE 010	00	Approved	Manufacturer	01/02/2022

Technician Qualification	Theron Govender	00	Approved	Manufacturer	02/08/2020 to 01/08/2025
Dye Pen Procedure	UTS/ASME -001	00	Approved	Manufacture	25/01/2022

C – ATTENDEES		
Name	Position	Representing
Mr. Gregg Shepherd	Project Manager	North Reef Engineering
Mr. Patrick Kome Ntungwe	QC Inspector	Bureau Veritas

D - MEASURING & TESTING EQUIPMENT USED			
<input type="checkbox"/> Refer to attachment section J instead <i>(Indicate if separate equipment list is provided in attachment)</i>			
Equipment Type	Equipment Identity n°	Last Calibration Date	Expiry Date
Measuring Viner	0033901	06/02/2023	06/02/2024
Adrox 996PA PEN	Batch No: 98738	n/a	2024
Adrox 9PR5 Cleaner	Batch No: 83765	n/a	2024
Adrox 9D1B Developer	Batch No: 27610	n/a	2024

E - INSPECTION DETAILS	
<b>E1 – Details of Witness (W) &amp; Hold (H) Inspection Points</b>	
The QCP, Drawings, Procedures	
<b>E2 – Details of Monitoring and Surveillance Patrols</b>	
<input type="checkbox"/> Tick if conducted during the visit	
The QCP, Drawings, Procedures	
<b>E3 – Details of Certificates Review</b>	
<input type="checkbox"/> Tick if conducted during the visit	

The QCP, Drawings, Procedures

**F – HEALTH, SAFETY & ENVIRONMENT COMMENTS**

*(Comment on Observations and Actions Taken During the Inspection)*

All covid 19 protocols are respected all the time while in the workshop or offices for the inspections

**G- NON CONFORMITIES: None**

Refer to attachment section J instead  
*(Indicate if separate punch list is provided in attachment)*

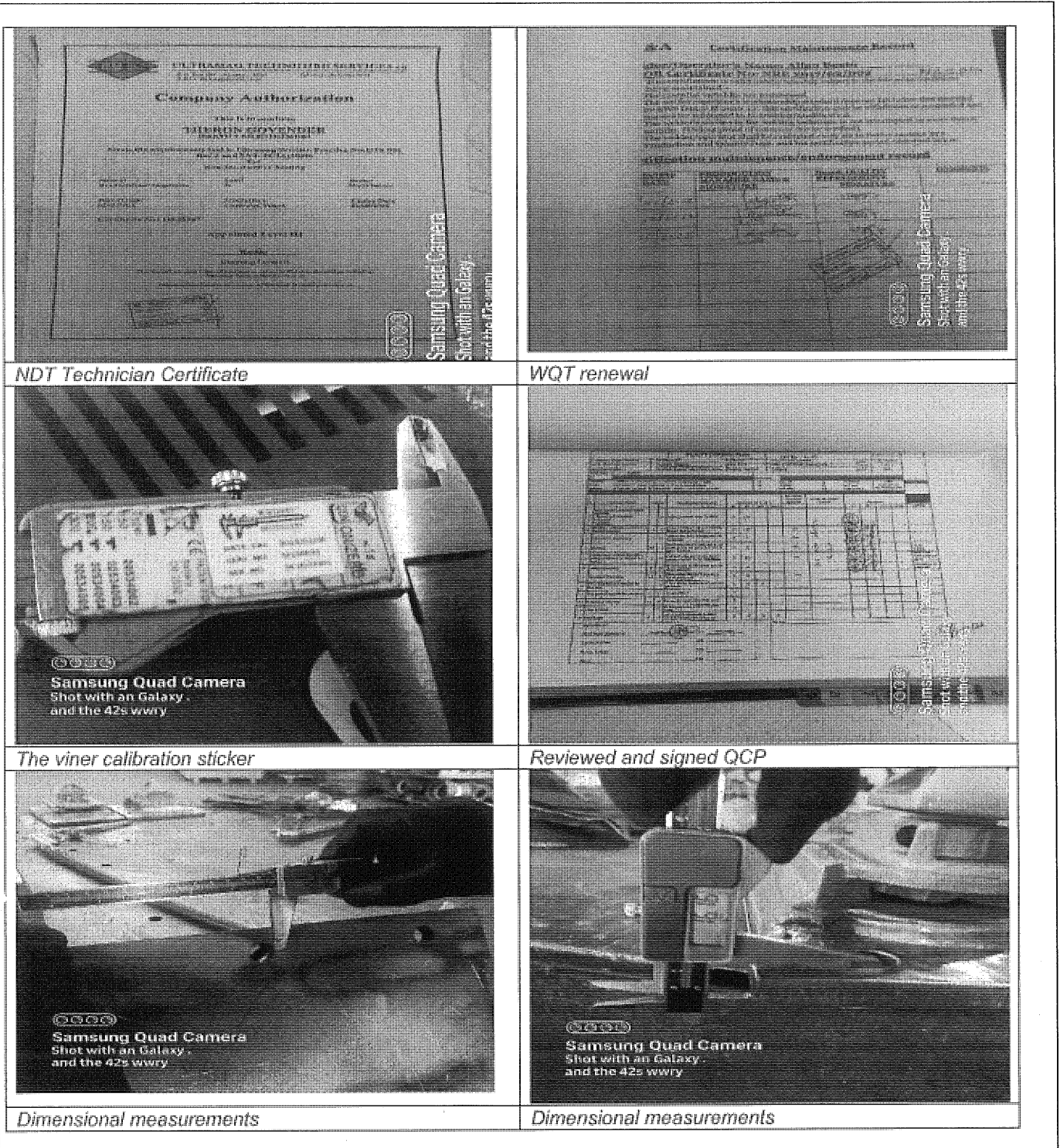
Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments

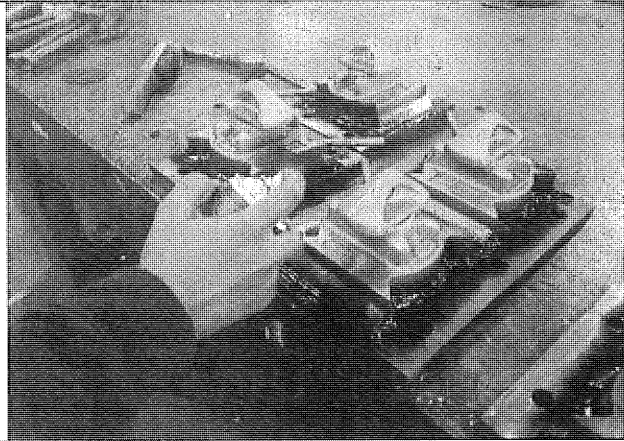
**H – PUNCH LIST**

Refer to attachment section J instead  
*(Indicate if separate punch list is provided in attachment)*

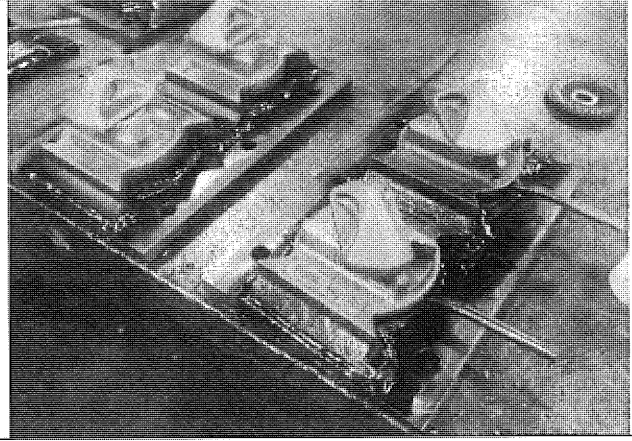
Item	Description	Status	Raised on	Report #	Closed on	Report #	Comments

**I - DIGITAL PICTURES**

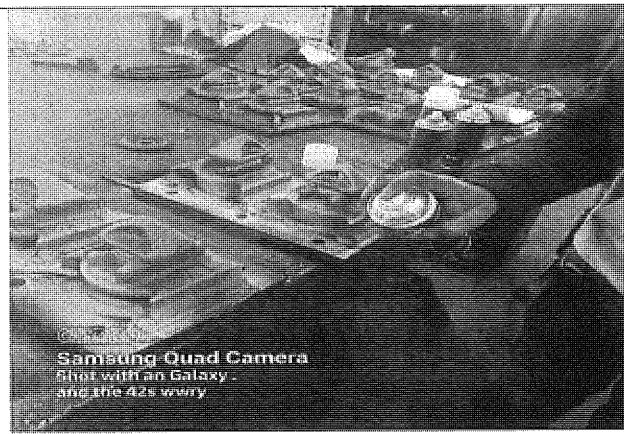




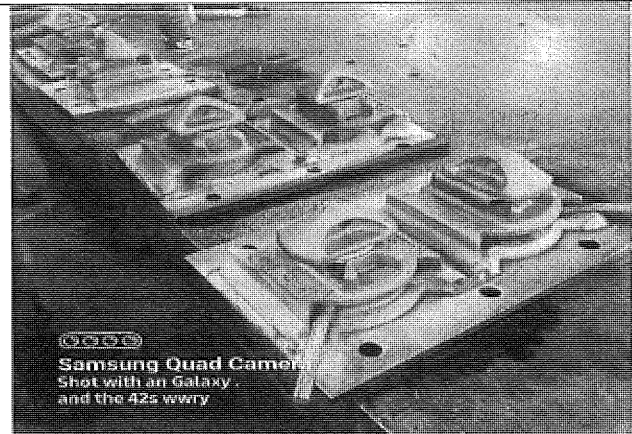
*Dye pen in progress. Spraying of red ink*



*Dye pen in progress. Spraying of red ink*



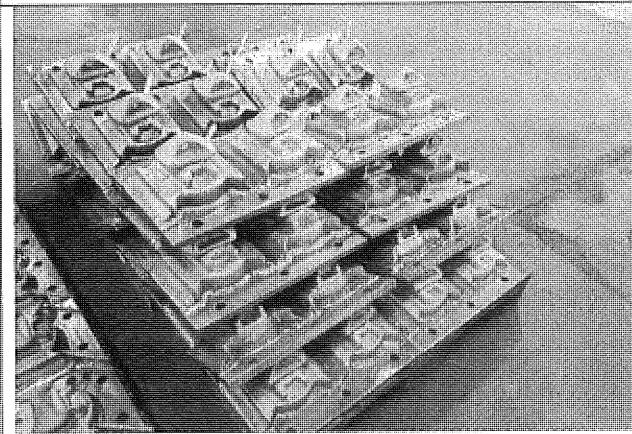
*Dye pen in progress. Spraying of solvent cleaner*



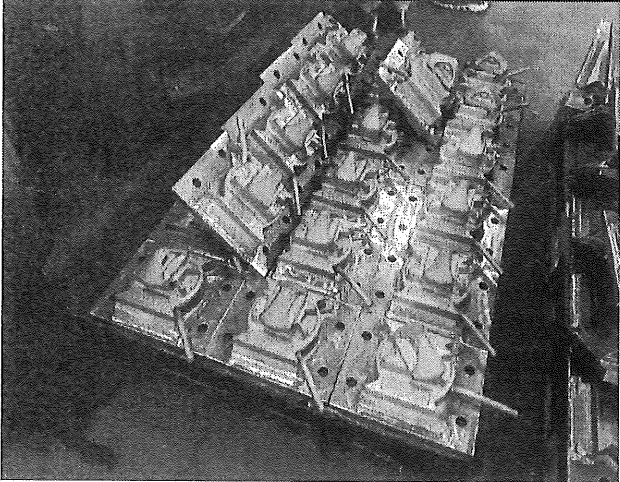
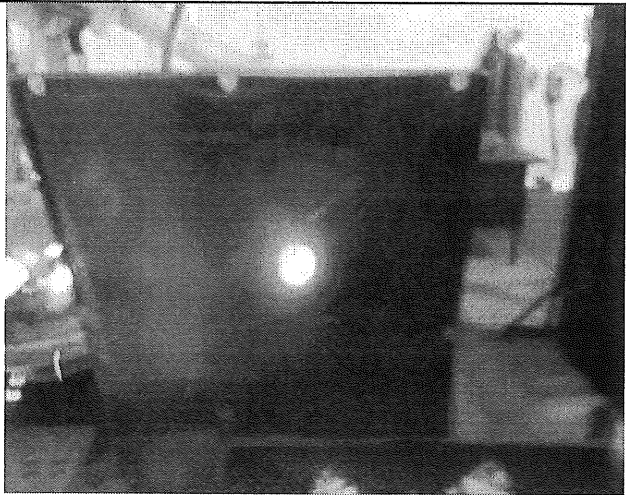
*Dye pen in progress. Spraying of solvent cleaner*



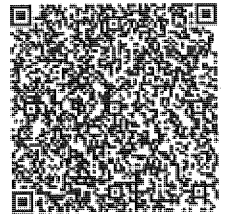
*Consumables used for the Dye pen test. Red ink, white background and solvent cleaner still within shelf life.*



*No damages on the twistlocks at the time of the inspections*

	
<p>No damages on the twistlocks at the time of the inspections</p>	<p>Welding in progress of more twistlocks</p>

J – ATTACHMENTS			
Item	Attachment Name	Total Pages	Description
<b>END OF REPORT</b>			



Type of Inspection : Initial	<input checked="" type="checkbox"/> Interim	Final	Resident	Remote
Inspection Requested by: Twistlock Africa				
Inspection performed as Recognised Authority: Yes, <span style="float: right;">No</span>				
BV Job Nr : BV.23313-IND				

<b>Inspection Report Nr:</b> BV-ZA 23313-IND-2023-002	<b>Revision Nr:</b> 0
<b>Project</b> Bolttable Twist lock Project	<b>BV Job Nr (local ref.)</b> ZA.23313-IND
<b>BV Client:</b> TWISTLOCK AFRICA	<b>IPO Ref (BV internal P/o):</b> NOT APPLICABLE.
<b>Manufacturer / Vendor:</b> NORTH REEF ENGINEERING	<b>P/O Nr (Client to BV):</b> NOT PROVIDED
<b>Sub-Vendor</b> NOT APPLICABLE.	<b>P/O Nr (Client to Manufacturer):</b> NOT PROVIDED
<b>Inspection Location</b> NO: 6 POWER ROAD ISANDO.	<b>Previous Inspection:</b> 01/08/2023
<b>Inspection Performed on:</b> 17/08/2023	<b>Total number of days inspection performed</b> 1

**MATERIAL / SUBJECT OF INSPECTION**

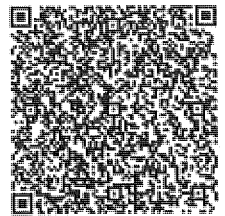
Equipment Category	Description	Item / Tag Nr	Quantity as per P/PO	Quantity Offered for Inspection
Mechanical	SINGLE TWIST LOCKS	NO TAG NUMBERS	51	2
Mechanical	DOUBLE TWISTLOCKS	NO TAG NUMBERS	51	2

**A - INSPECTION RESULT**

<input checked="" type="checkbox"/>	Satisfactory (Without comments)	Satisfactory with comments (Any new or trailing Punch or Non Conformity items open)	Not Satisfactory (NCR raised during the inspection)
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<b>Inspection Summary:</b> A total of 51 Single Lock Twistlocks and 51 of the double Lock Twist locks were provided for Inspections from Batch number three. Two sample of Each type was provided to testing and no defect indications were detected.			
Open Non Conformities:	Yes, details in section G	<input checked="" type="checkbox"/> No	
Open Punch List Items:	Yes, details in section H	<input checked="" type="checkbox"/> No	
Release Note Issued:	Yes	<input checked="" type="checkbox"/> No	Release Note number(s):
BV Traceability Stamping	<input checked="" type="checkbox"/>	<input type="checkbox"/> No	

<b>BV Inspector: Louis PHAHLANE</b>	<b>BV Coordinator: Tyron MOODLEY</b>
-------------------------------------	--------------------------------------



*[Handwritten signature]*

<b>BV Office:</b> BVSA	<b>Inspection Report Date :</b> 17/08/2023
<b>Distribution:</b> to BV: ✓ to Client: ✓ to Manufacturer: to Other:	<b>Attachments Report:</b> Yes, details in section J                      No attachment

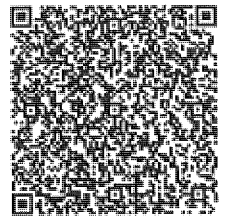
**B - REFERENCE DOCUMENTATION**

Title	Reference Nr	Revision	Approval Status	Approved by	Date
QCP		00	Approved as final	Client	
QCP		00	Approved as final	Client	

**C - ATTENDEES**

Name	Position	Representing	Email	Phone
Theron GOVENDOR	NDT Technician	North Reef Eng		
Musa	Quality Controller	North Reef Eng	inspection@northreef.co.za	
Louis Phahlane	Inspector	Bureau Veritas	louis.phahlane@bureauveritas.com	
Denford	Manager	North Reef Eng	denford@northreef.co.za	

Equipment Used	Equipment Identity Nr	Last Calibration Date	Expiry Date
DYE PENETRANT INK	BN:409987		30/04/2028
WHITE DEVELOPER	BN:409940		30/03/2028
WELD CLEANER	BN:406662		04/03/2025
ELECTRO MACNETIC YORKE	2202128	08/03/2023	08/04/2024
ADROX WHITE CONTRAST PAINT	22B106		20/02/2025
ADROX BLANK INK	BN:22K120		21/09/2027



## E - INSPECTION DETAILS

### General

A TOTAL OF 51 DOUBLE TWIST LOCK AND 51 SINGLE TWIST LOCKS WERE PROVIDED FOR PICKING TWO RANDOM SAMPLES FROM EACH TYPE AND TO BE TESTED NDT. DYE PENETRANT TESTING AND 50% MPI WAS DONE ON TWO RANDOMLY CHOSEN SAMPLE FROM THE TOTAL QUANTITIES PROVIDED FOR INSPECTION. ALL TWIST LOCKS HAVE A SPECIAL MARKING OF G.L.S ON THEM. 100% DYE-PEN TESTING TOOK PLACE ON ALL FOUR SAMPLES AND NO DEFECT INDICATIONS WERE FOUND. A 50% MPI WAS DONE ON THE CENTRE WELD OF THE DOUBLE TWIST LOCKS AND NO DEFECT INDICATIONS WERE FOUND.

### E1 – Details of Witness (W) & Hold (H) Inspection Points

- 100% DYE-PENETRANT TESTING WAS WITNESSED BY BV REPRESENTATIVE AND NO DEFECT INDICATIONS WERE FOUND.
- 50% MPI WAS WITNESSED ONLY ON THE CENTRE WELD OF THE DOUBLE TWIST LOCKS AND NO DEFECT INDICATIONS WERE FOUND.

### E2 – Details of Monitoring and Surveillance Patrols

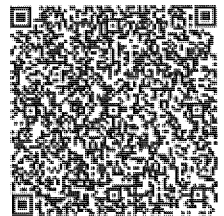
All parties that were present at the time of inspection agreed to the final results of the tests that were done on all items provided for inspection.

### E3 – Details of Certificates Review

- Technicians Qualifications were provided for review and found acceptable.
- Calibrations Certificate for the MPI yoke was provided for review and found acceptable.

## F - HEALTH, SAFETY & ENVIRONMENT COMMENTS

All safety pre-cautions were taken into considerations and All North Reef ENG and BV Rep had safe PPE.



**2 minutes for my safety**

**Hazards**

	Yes/No/NA
Is the equipment / energy isolated?	NA
If a permit is required, eg. confined space entry, do I have it?	NA
Are tools and equipment in good condition and tagged?	Yes
In my work environment, is all necessary equipment (vehicle, conveyors, etc.) isolated?	Yes
Is the walking surface free of slip, trip and fall hazards?	Yes
Is the appropriate barricading for the task in place?	Yes
If someone works above me, am I protected from a falling object?	Yes
Have I communicated with the other groups about their activities?	Yes

**Personal Health**

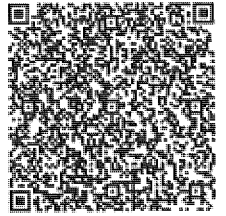
	Yes/No/NA
Am I fit for this task?	Yes
If the task involves heavy lifting, am I equipped to manage this factor?	Yes

**Conditions**

	Yes/No/NA
If extreme weather conditions are a factor on this job, are there measures in place to manage it?	Yes
Am I familiar with the equipment I inspect?	Yes

**G - NON-CONFORMITIES**

Defect Type	Description	Status	Raised on	Report No. (Raised)	Closed on	Report No. (Closed)	Comments



**H - PUNCH LIST**

Defect Type	Description	Status	Raised On	Report No. (Raised)	Closed On	Report No. (Closed)	Comments

**I - DIGITAL PICTURES**

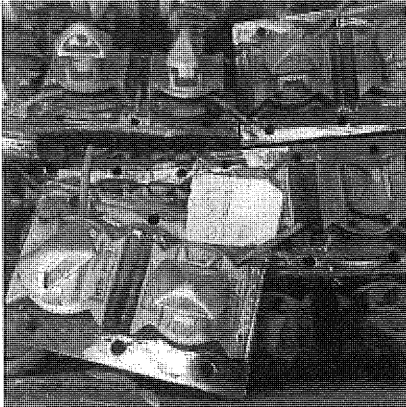
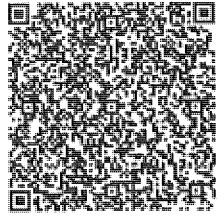


Photo 001 - Total Quantity of double twist lock to be sent for galvanizing.

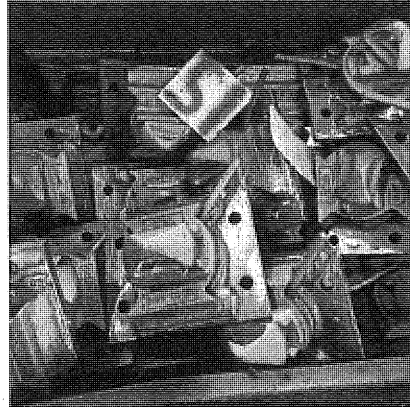


Photo 002 - total QTY of Single Twistlocks to be sent for galvanizing

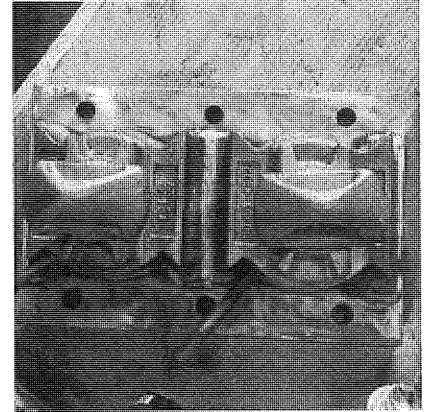


Photo 003 - DYE-PEN TEST ON DOUBLE TWIST LOCK NO INDICATIONS FOUND

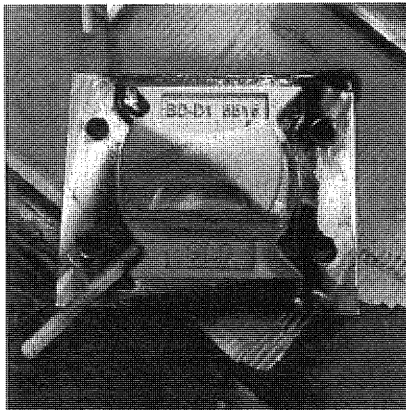


Photo 004 - SINGLE TWIST LOCK WITH NO INDICATIONS FOUND.



Photo 005 - CONSUMABLES USED FOR DYE-PEN TESTING

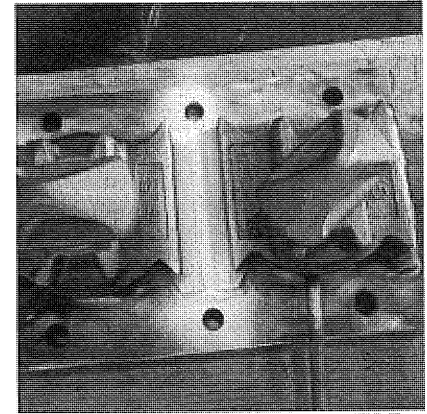


Photo 006 - MPI DONE ON CENTRE WELDS ONLY ON THE DOUBLE TWIST LOCKS

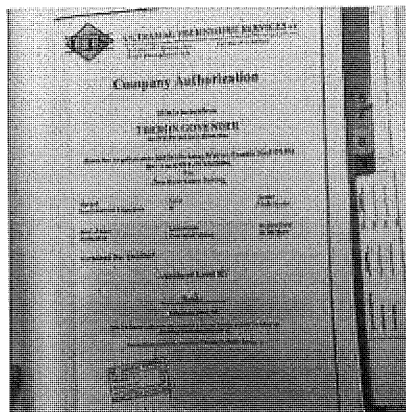


Photo 007 - NDT TECH QUALIFICATIONS

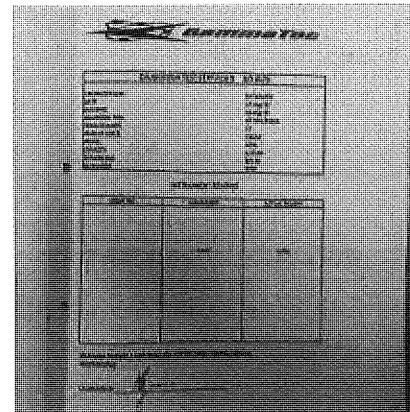


Photo 008 - CALIBRATION CERTIFICATES

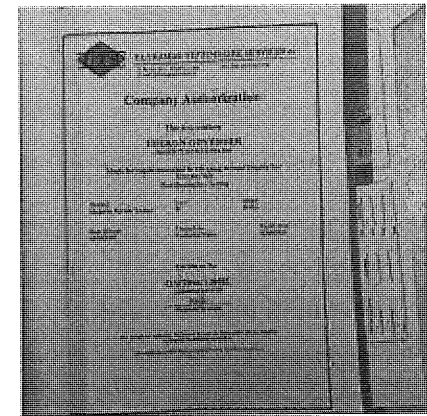
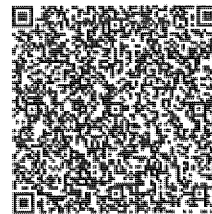


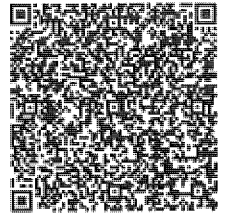
Photo 009 - NDT TECH QUALIFICATIONS



**J - ATTACHMENTS**

Item	Description / Attachment name	Attachment	Total Pages

**END OF REPORT**



Type of Inspection : Initial    Interim <input checked="" type="checkbox"/> Final    Resident    Remote
Inspection Requested by: Twistlock Africa
Inspection performed as Recognised Authority: Yes, <span style="float: right;">No</span>
BV Job Nr : BV.23313-IND

<b>Inspection Report Nr:</b> V-ZA 23313-IND-2023-003	<b>Revision Nr:</b> 0
<b>Project</b> Boltable Twist lock Project	<b>BV Job Nr (local ref.)</b> BV.23313-IND
<b>BV Client:</b> TWIST LOCK AFRICA	<b>IPO Ref (BV internal P/o):</b> Not Applicable
<b>Manufacturer / Vendor:</b> NORTH REEF ENGINEERING.	<b>P/O Nr (Client to BV):</b> Not provided
<b>Sub-Vendor</b> NOT APPLICABLE.	<b>P/O Nr (Client to Manufacturer):</b> Not provided
<b>Inspection Location</b> NO: 6 POWER ROAD ISANDO.	<b>Previous Inspection:</b> 17/08/2023
<b>Inspection Performed on:</b> 24/08/2023	<b>Total number of days inspection performed</b> 1

**MATERIAL / SUBJECT OF INSPECTION**

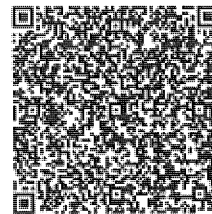
Equipment Category	Description	Item / Tag Nr	Quantity as per P/PO	Quantity Offered for Inspection
Mechanical	SINGLE TWIST LOCKS	NO TAG NUMBERS	51	2
Mechanical	DOUBLE TWIST LOCKS	NO TAG NUMBERS	51	2
Mechanical	SINGLE TWIST LOCKS	NO TAG NUMBERS	51	2

**A - INSPECTION RESULT**

<input checked="" type="checkbox"/> Satisfactory (Without comments)	<input type="checkbox"/> Satisfactory with comments (Any new or trailing Punch or Non Conformity Items open)	<input type="checkbox"/> Not Satisfactory (NCR raised during the inspection)
---	--	--

<b>Inspection Summary:</b> No defect indications found on all items inspected and inspection overall results were satisfactory without comments.			
Open Non Conformities:	Yes, details in section G	<input checked="" type="checkbox"/> No	
Open Punch List Items:	Yes, details in section H	<input checked="" type="checkbox"/> No	
Release Note Issued:	Yes	<input checked="" type="checkbox"/> No	Release Note number(s):
BV Traceability Stamping	<input checked="" type="checkbox"/>	No	

<b>BV Inspector: Louis PHAHLANE</b>  	<b>BV Coordinator: Tyron MOODLEY</b>
---	--------------------------------------



<b>BV Office:</b> BVSA (JOAHNNESBURG)	<b>Inspection Report Date :</b> 24/08/2023
<b>Distribution:</b> to BV: ✓ to Client: ✓ to Manufacturer: to Other:	<b>Attachments Report:</b> Yes, details in section J      ✓ No attachment

**B - REFERENCE DOCUMENTATION**

Title	Reference Nr	Revision	Approval Status	Approved by	Date
QCP	A-001	0	Approved as final	TWIST LOCK AFRICA	
QCP	B-001	0	Approved as final	TWIST LOCK AFRICA	

**C - ATTENDEES**

Name	Position	Representing	Email	Phone
Denford Muhoni	QC	North Reef ENG	denford@northreef.co.za	
Louis Phahlane	Inspector	Bureau Veritas	louis.phahlane@bureauveritas.com	
Trevor Moodley	NDT Technician	North Reef Eng		

Equipment Used	Equipment Identity Nr	Last Calibration Date	Expiry Date
WELD CLEANER	409662		28/02/2028
DYE PENETRANT			30/01/2028
DEVELOPER			28/03/2028

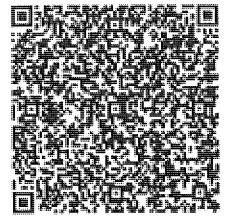
**E - INSPECTION DETAILS**

**General**

total of 51 Single Lock Twistlocks and 51 of the double Lock Twist locks were provided for Inspections from Batch number three. Two sample of Each type was provided to testing and no defect indications were detected.

**E1 – Details of Witness (W) & Hold (H) Inspection Points**

DYE PENETRANT TESTING WAS PERFORMED ON BOTH TWIST LOCKS PROVIDED FOR INSPECTION AND NO DEFECT INDICATIONS WERE FOUND.



## E2 – Details of Monitoring and Surveillance Patrols

A FINA LINSOECTOIN AND REALEASE FOR GALVERNISING WAS PERFORMED ON THE TWIST LOCKS PROVIDED FOR INSPECTION.

## E3 – Details of Certificates Review

- QCP A-001 WAS PROVIDED FOR REVIEW AND SIGNATURE.
- QCP B-001 WAS PROVIDED FOR REVIEW AND SIGNATURE.

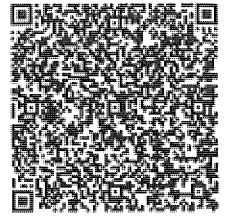
## F - HEALTH, SAFETY & ENVIRONMENT COMMENTS

No audit and inspection happend on this part.

## 2 minutes for my safety

## Hazards

	Yes/No/NA
Is the equipment / energy isolated?	NA
If a permit is required, eg. confined space entry, do I have it?	NA
Are tools and equipment in good condition and tagged?	Yes
In my work environment, is all necessary equipment (vehicle, conveyors, etc.) isolated?	Yes
Is the walking surface free of slip, trip and fall hazards?	Yes
Is the appropriate barricading for the task in place?	Yes
If someone works above me, am I protected from a falling object?	Yes
Have I communicated with the other groups about their activities?	Yes



**Personal Health**

	Yes/No/NA
Am I fit for this task?	Yes
If the task involves heavy lifting, am I equipped to manage this factor?	Yes

**Conditions**

	Yes/No/NA
If extreme weather conditions are a factor on this job, are there measures in place to manage it?	Yes
Am I familiar with the equipment I inspect?	Yes

**G - NON-CONFORMITIES**

Defect Type	Description	Status	Raised on	Report No. (Raised)	Closed on	Report No. (Closed)	Comments

**H - PUNCH LIST**

Defect Type	Description	Status	Raised On	Report No. (Raised)	Closed On	Report No. (Closed)	Comments

**I - DIGITAL PICTURES**

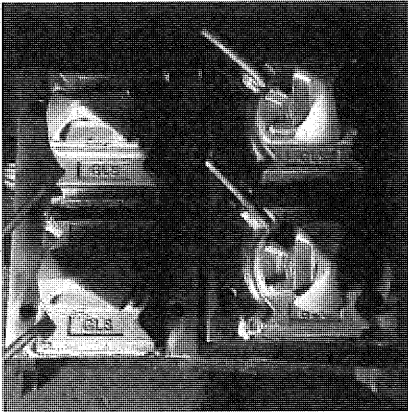
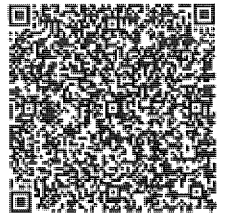


Photo 001

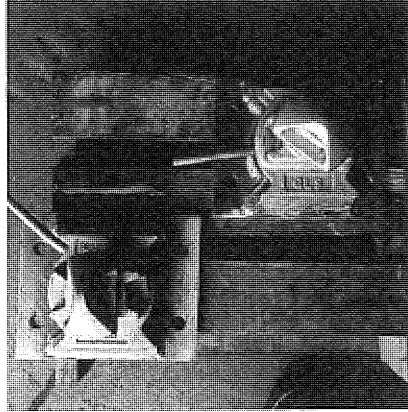


Photo 002 - Double locks prior testing

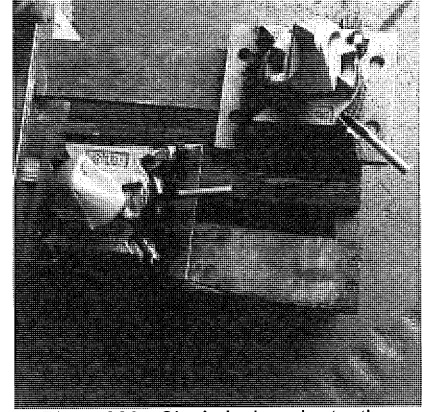


Photo 003 - Single locks prior testing

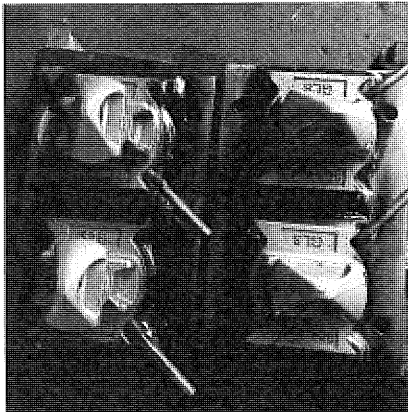


Photo 004 - Dwell time on single locks 20 mins

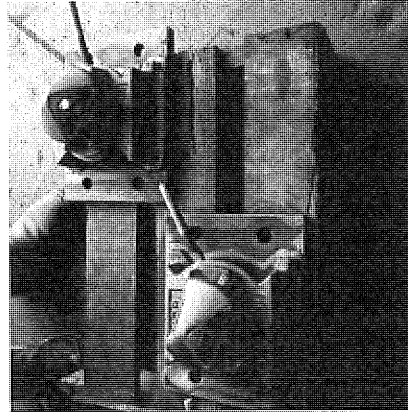


Photo 005 - Dwell time on Double twist locks 20mins

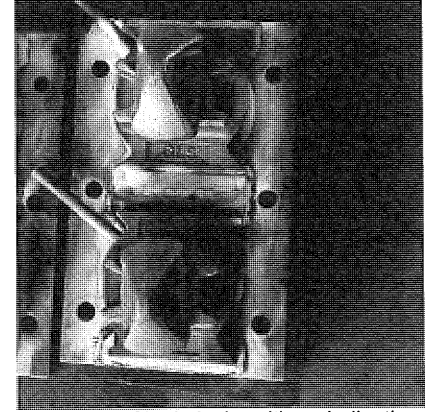


Photo 006 - Single locks with no indications

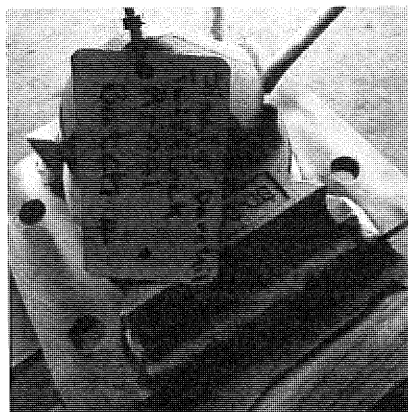


Photo 007 - Double lock with no defect indications



Photo 008 - No Defect Indications found



Reg. No. 20101443092  
**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P.O. Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

## **1.9 FINAL INSPECTION, RELEASE AND PACKAGING**



**NORTH REEF**  
ENGINEERING (Pty) Ltd

6 Power Street, Isando  
P O Box 369 Isando 1600  
Tel: 011 974-1961  
Fax: 011 974-1833

**INSPECTION CERTIFICATE**

Inspection Type	PAGE 01		CERT NO	23/166
<input checked="" type="checkbox"/> COMPONENT <input checked="" type="checkbox"/> VISUAL <input checked="" type="checkbox"/> DIMENSIONAL <input checked="" type="checkbox"/> NDT <input checked="" type="checkbox"/> ASSEMBLY	CUSTOMER	TWIST LOCK AFRICA		
	CUSTOMER ORDER NO.	RALPH (1221)		
	PROJECT	DOVETAIL TWISTLOCK 45-1 & 45-2		
	INVENTORY No.	TLA/001 & TLA/002		
	SHOP ORDER NO.	30881 & 30882		

Item	Description + Drawing Number	Qty Ordered	Unit	Qty Released	Total released to date
1	Doventail Twistlock 45-1 (Double)	246	EA	246	246
	Drawing Number: BOLTABLE TWISTLOCK 368 x 237				
2	Doventail Twistlock 45-2 (Single)	490	EA	490	490
	Drawing Number: BOLTABLE TWISTLOCK 191 x 237				

REMARKS

ORDER COMPLETE

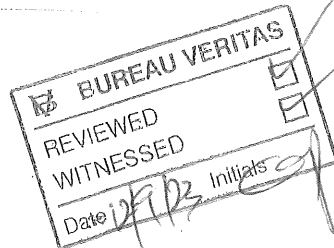
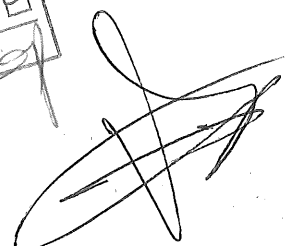
CONCESSION NO: (IF APPLICABLE)

CERTIFICATES

AS PER DATA PACK

QA INSPECTOR: Musa Khoza DATE: 2023/09/12

SIGNED: 

## CERTIFICATE OF TEST

**Test one double twistlock**

Application Received: 08 March 2024

Certificate No.: T31475

Order No.: 1292

Date of test: 08 March 2024

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, one double twistlock was submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Shear test (X – Axis)

**Table 1. Project identification**

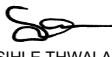
Project name:	Proposal CADG 23 January 2023 REV 0
---------------	-------------------------------------

### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The double twistlock was installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

The test procedure was as follows:

### Shear testing (X direction)

For the shear testing, the X-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.

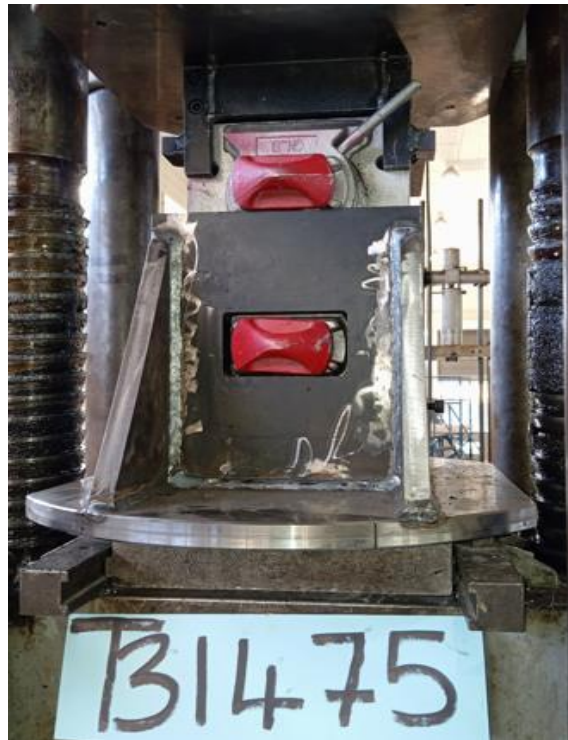


Figure 1- Double twistlock installed in the testing machine

## 5. TEST RESULTS

The results of the destruction tests carried out on the double twistlock are summarised in Table 1.

Table 1. Test results for double twistlock.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-DD-0168	616.0	The test was halted
Refer to page 4 of this report to see the plotted graph.			

**Notice:**

ONLY the original signed report must be regarded as the official document.

Testing Officer: 

SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

## 6. TEST COMMENTS


1. The customer's specifications mandate that the double twistlock, with a safe working load (SWL) of 21.4 t (210 kN), must reach a maximum breaking load of 42.8 t (420 kN).
2. The test was halted when the load reached 616.0 kN, surpassing the maximum breaking load specified by the customer. Therefore, the double twistlock adhere to the customer's specifications.

## 7. DISCLAIMER

1. The CSIR cannot be held responsible for product indifferences and cannot be held responsible for any accidents or incidents as a result thereof.
2. Due to the limited amount of sample(s) tested and the type of testing done, CSIR can only account for the results from those specific samples tested.
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**Notice:**

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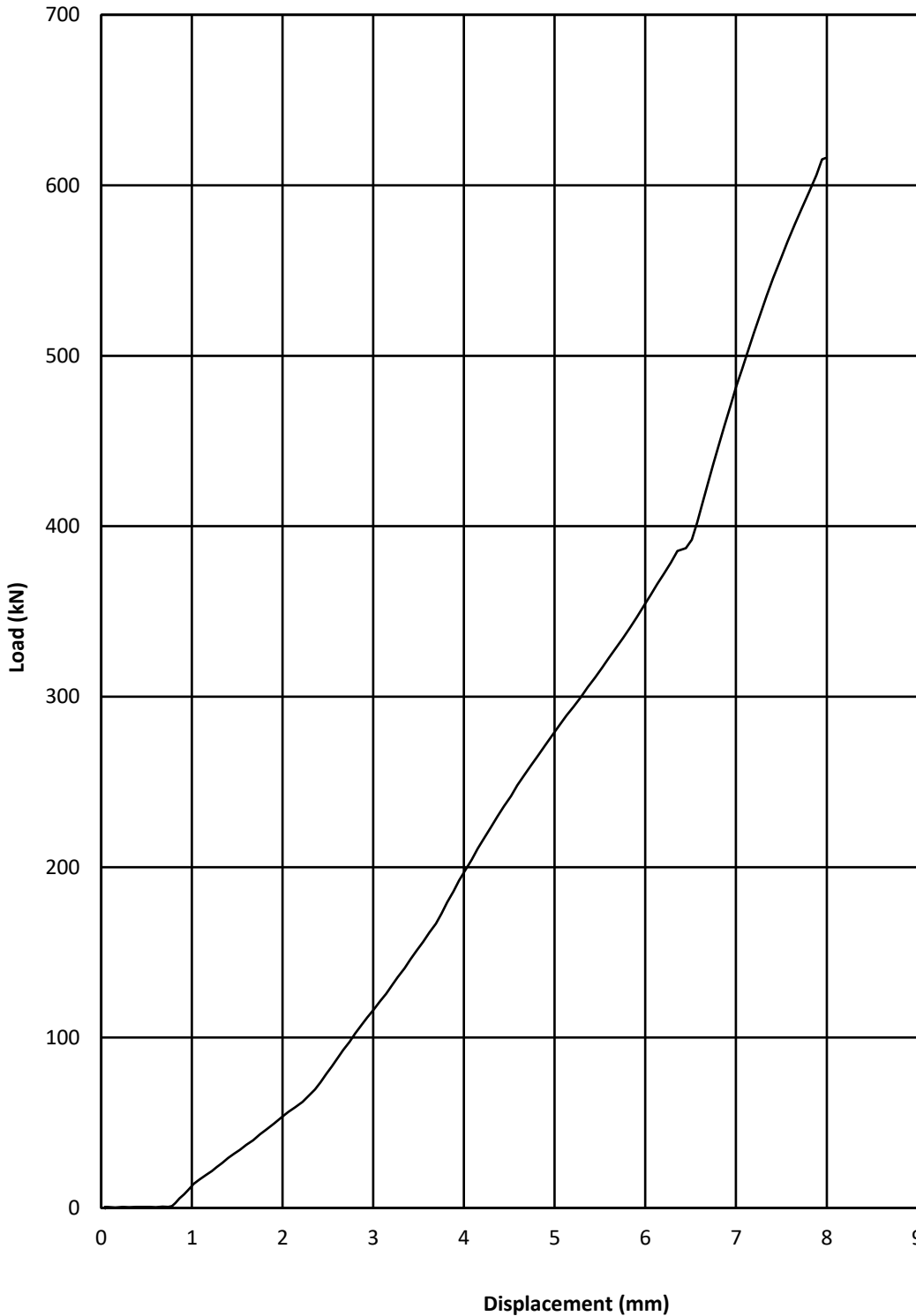
Testing Officer: 

SIHLE THWALA


Engineer:   
MICHAEL SEHLABANA

Certificate No.: T31475  
Date of test: 08 March 2024  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Double twistlock

Test No:	1
Batch Number:	CADG-DD-0168
Maximum Force:	616.0 kN



**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA  
Engineer:   
MICHAEL SEHLABANA

## CERTIFICATE OF TEST

**Test one double twistlock**

Application Received: 08 March 2024

Certificate No.: T31476

Order No.: 1292

Date of test: 08 March 2024

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, one double twistlock were submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Shear test (X – Axis)

**Table 1. Project identification**


Project name:	Proposal CADG 23 January 2023 REV 0
---------------	-------------------------------------

### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The double twistlock was installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
ONLY the original signed report must be regarded as the official document.

Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

The test procedure was as follows:

### Shear testing (X direction)

For the shear testing, the X-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.

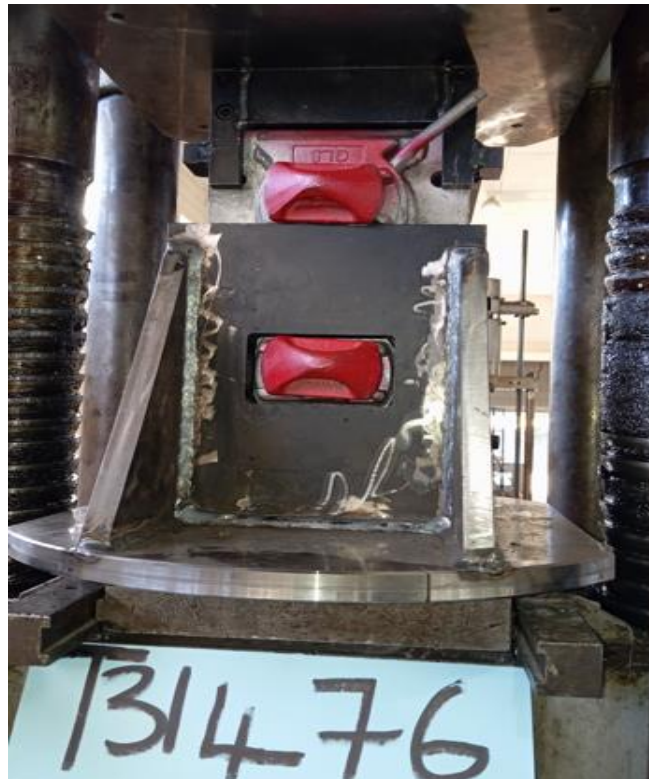


Figure 1- Double twistlock installed in the testing machine

## 5. TEST RESULTS

The results of the destruction tests carried out on the double twistlock are summarised in Table 1.

Table 1. Test results for double twistlock.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
2	CADG-DD-0168	625.25	The test was halted
Refer to page 4 of this report to see the plotted graph.			

**Notice:**

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## 6. TEST COMMENTS


1. The customer's specifications mandate that the double twistlock, with a safe working load (SWL) of 21.4 t (210 kN), must reach a maximum breaking load of 42.8 tons (420 kN).
2. The test was halted when the load reached 625.2 kN, surpassing the maximum breaking load specified by the customer. Therefore, the double twistlock adhere to the customer's specifications.

## 7. DISCLAIMER

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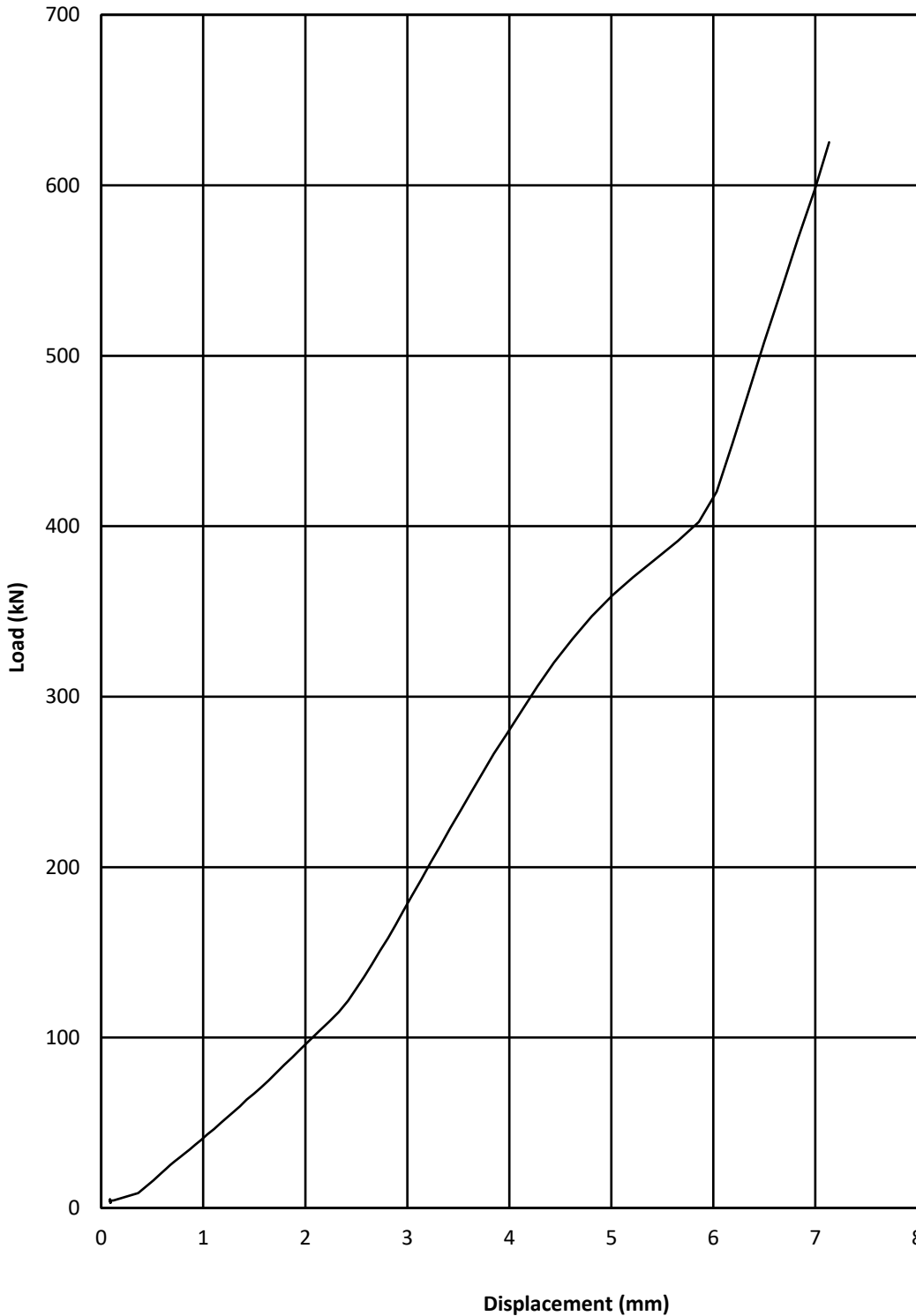
Testing Officer: 

SIHLE THWALA


Engineer:   
MICHAEL SEHLABANA

Certificate No.: T31476  
Date of test: 08 March 2024  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Double twistlock

Test No:	2
Batch Number:	CADG-DC-0120
Maximum Force:	625.2 kN



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Testing Officer:   
SIHLE THWALA  
Engineer:   
MICHAEL SEHLABANA

---

## CERTIFICATE OF TEST

**Test one single twistlock**

Application Received: 08 March 2024

Certificate No.: T31477

Order No.: 1292

Date of test: 08 March 2024

---

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, one single twistlock was submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

1. Shear test (X – Axis)

**Table 1. Project identification**

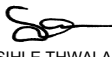
Project name:	Proposal CADG 23 September 2023 REV 0
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### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The single twistlock was installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

The test procedure was as follows:

### **Shear testing (X direction)**

For the shear testing, the X-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.



Figure 1- Single twistlock installed in the testing machine

## 5. TEST RESULTS


The results of the destruction tests carried out on the single twistlock are summarised in Table 1.

Table 1. Test results for single twistlocks.

Test No.	Batch number	Maximum load carried (kN)	Mode of failure
1	CADG-SF-0371	554.7	The test was halted
Refer to page 4 of this report to see the plotted graph.			

**Notice:**

ONLY the original signed report must be regarded as the official document.

Testing Officer: 

SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

## 6. TEST COMMENTS

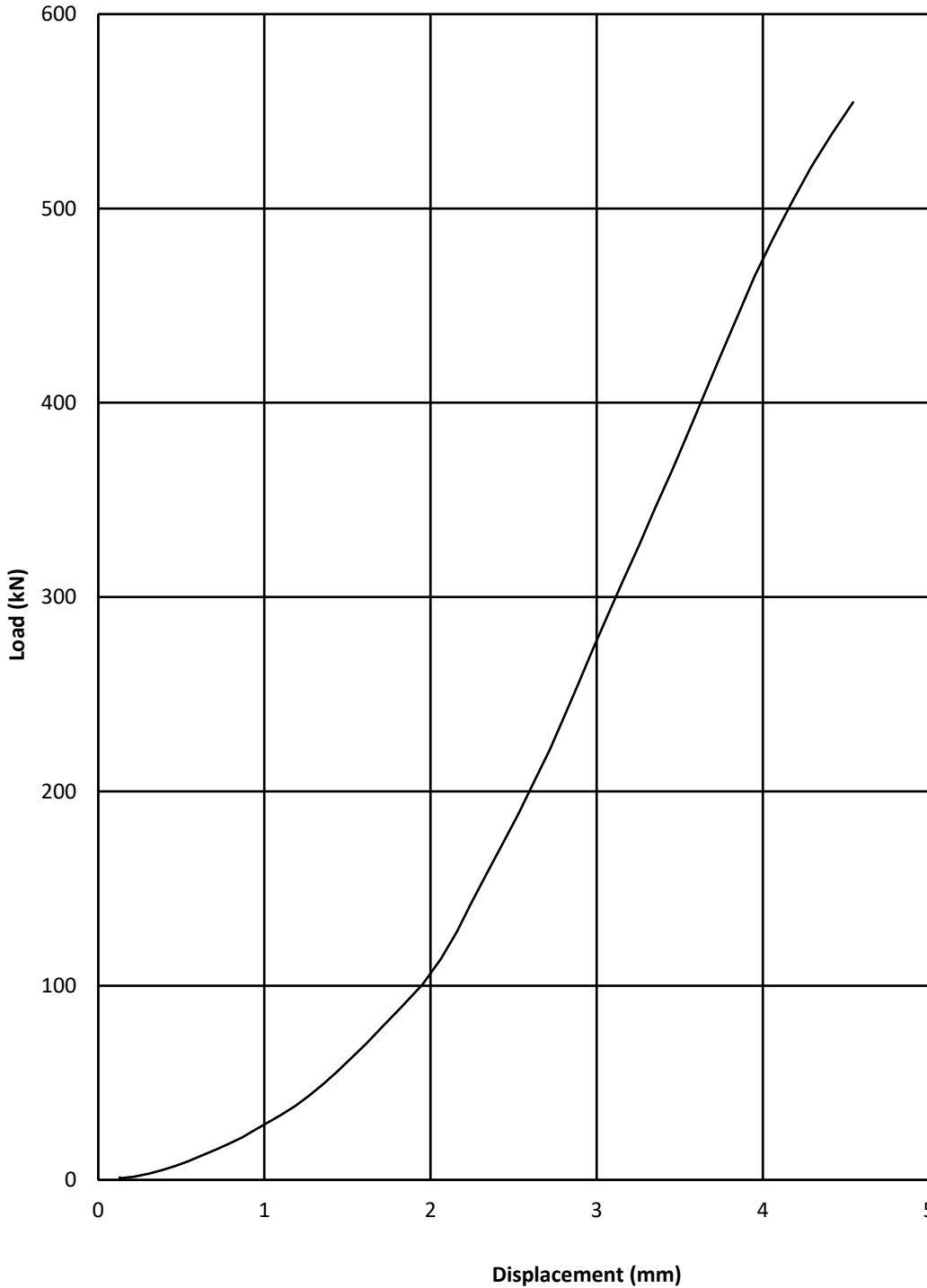
1. The customer's specifications mandate that the single twistlock, with a safe working load (SWL) of 210 t (210 kN), must reach a maximum breaking load of 42.8 tons (420 kN).
2. The test was halted when the load reached 554.7 kN, surpassing the maximum breaking load specified by the customer. Therefore, the single twistlock adhere to the customer's specifications.

## 7. DISCLAIMER

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Certificate No.: T31477  
Date of test: 08 March 2024  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Single twistlock

Test No.:	1
Batch Number:	CADG-SF-0371
Maximum Force:	554.7 kN



**Notice:**  
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Testing Officer:   
SIHLE THWALA  
Engineer:   
MICHAEL SEHLABANA

## CERTIFICATE OF TEST

**Test one single twistlock**

Application Received: 08 March 2024

Certificate No.: T31478

Order No.: 1292

Date of test: 08 March 2024

### SUBMITTED TO

Mr Ralph A. Siebenhaar  
Container Hoardings Africa (Pty) Ltd  
100 8th Avenue,  
Edenvale,  
Gauteng

### 1. INTRODUCTION

At the request of Mr Ralph A. Siebenhaar of Container Hoardings Africa (Pty) Ltd, one single twistlock was submitted for shear testing to destruction. The test was conducted according to the customer's specification (TLA-CADG-0001).

Safe working load indicated by applicant for GLS dovetail twistlocks in shear: 21.4 t (210 kN)  
Ultimate load expected in shear: 42.8 t (420 kN)

### 2. PURPOSE

The purpose of the destructive tests are to confirm that the fabricated twistlocks are equal to or stronger than the twistlocks in both tensile and shear specified by the twistlock fabricator (GLS).

### 3. SUMMARY

Three different destructive test types that are to be performed for each type of twistlock:

2. Shear test (X – Axis)

**Table 1. Project identification**


Project name:	Proposal CADG 23 September 2023 REV 0
---------------	---------------------------------------

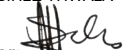
### 4. TEST PROCEDURE

Testing machine: 1 000 kN Amsler Universal testing machine  
Test type: Destruction in shear  
Test specification: Customer's request

The single twistlock was installed in the 1 000 kN Amsler Universal testing machine using suitable fittings as shown in Figure 1. A gradually increasing tensile load was applied to each specimen until failure occurred.

**Notice:**  
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Testing Officer:   
SIHLE THWALA

Engineer:   
MICHAEL SEHLABANA

The test procedure was as follows:

### Shear testing (X direction)

For the shear testing, the X-direction testing jigs are to be installed into the testing machine. This procedure is applicable to both the single and double twistlocks.

To secure the twistlock to the tensile testing machine, the following procedure is to be followed to prepare a twistlock for destructive testing:

1. Ensure that the cradle is securely placed onto the tensile testing machine.
2. Place the sample twistlock into the cradle.
3. Install the load distribution bracket on top of the twistlock.
4. The twistlock can be either the open or closed position.
5. The shelf that the cradle and twistlock are located on is raised until the twistlock are jig are beginning to be compressed.
6. The shear test is ready to commence.



Figure 1- Single twistlock installed in the testing machine

## 5. TEST RESULTS

The results of the destruction tests carried out on the single twistlock are summarised in Table 1.

Table 1. Test results for single twistlocks.


Test No.	Batch number	Maximum load carried (kN)	Mode of failure
2	CADG-SA-0005	590.9	The test was halted
Refer to page 4 of this report to see the plotted graph.			

**Notice:**

ONLY the original signed report must be regarded as the official document.

Testing Officer:

  
 SIHLE THWALA

  
 Engineer: .....  
 MICHAEL SEHLABANA

## 6. TEST COMMENTS

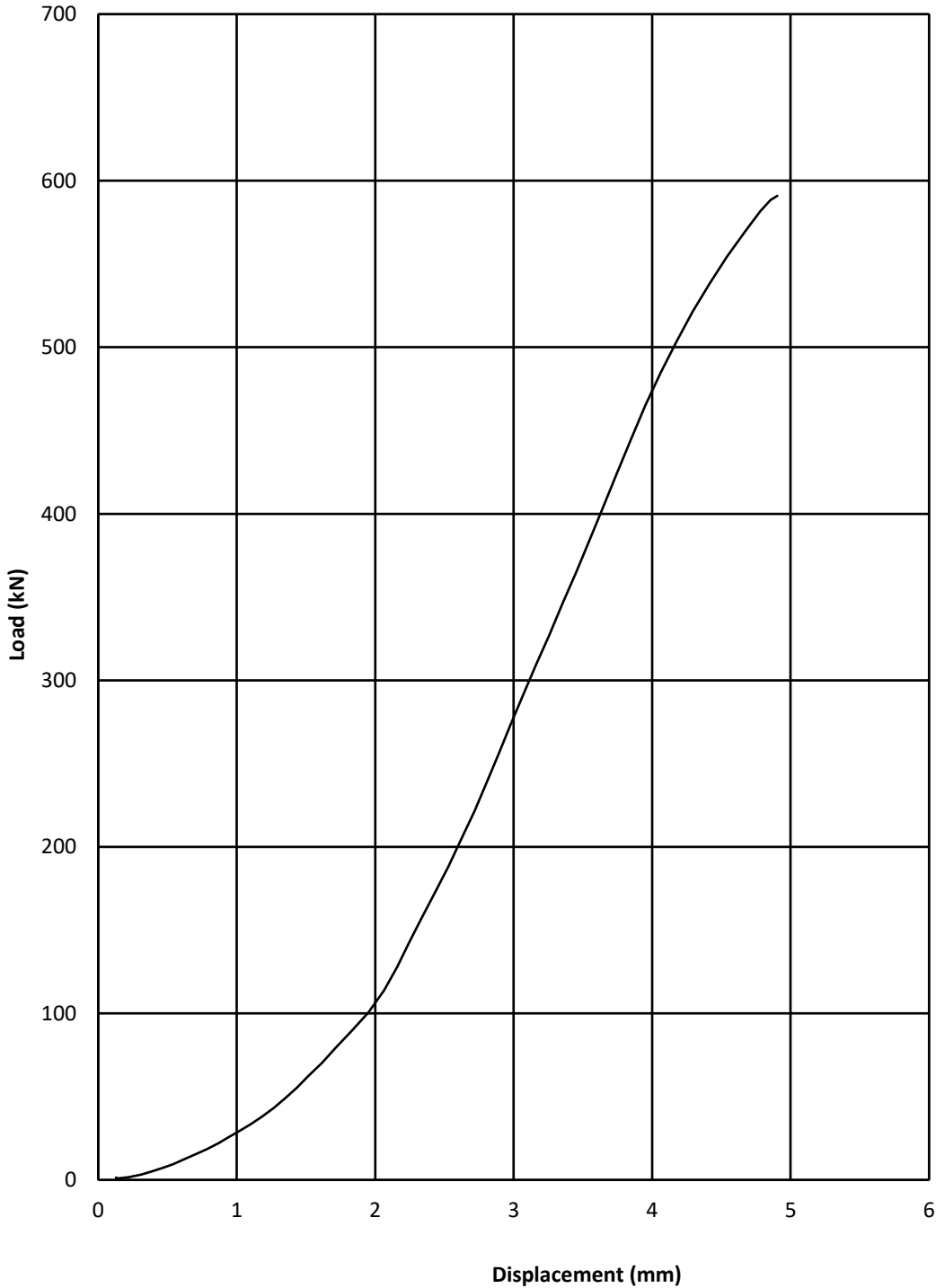
1. The customer's specifications mandate that the single twistlock, with a safe working load (SWL) of 210 t (210 kN), must reach a maximum breaking load of 42.8 tons (420 kN).
2. The test was halted when the load reached 554.7 kN, surpassing the maximum breaking load specified by the customer. Therefore, the single twistlock adhere to the customer's specifications.

## 7. DISCLAIMER


1. The CSIR cannot be held responsible for product indifferences and cannot be held responsible for any accidents or incidents as a result thereof.
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Certificate No.: T31478  
Date of test: 08 March 2024  
Applicant: Container Hoardings Africa (Pty) Ltd  
Description: Single twistlock

Test No.:	2
Batch Number:	CADG-SA-0005
Maximum Force:	590.9 kN



**Notice:**  
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Testing Officer:   
SIHLE THWALA  
Engineer:   
MICHAEL SEHLABANA