QUALITY DOCUMENTATION
CONTENTS

1. Documentation
   a. General Assembly Drawing
   b. Assessment, Repair, Inspection & Test – Photo gallery
   c. Rod Plating Assessment Sheet
   d. Borescope Inspection Report – (Pre-Honing)
   e. Borescope Inspection Report – (Post-Honing)
   f. General Inspection Report – Barrel
   g. Wall Thickness Inspection Report – Barrel
   h. Cylinder Test Certificate for Bottomside (including chart recording)
   i. Cylinder Test Certificate for Rodside (including chart recording)
   j. Paint Inspection Report
   k. Correspondence
STRIPPING OF HYD CYLINDER BARREL

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
ASSESSMENT OF ROD

DAMAGE ON CHROME SURFACE

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
HONING OF HYD CYLINDER BARREL

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
BORESCOPE OF HYD CYLINDER BARREL
BEFORE AND AFTER HONING

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
ASSEMBLY OF BARREL

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
BOTTOMSIDE UNDER TEST

RODSIDE OPENED
(NO LEAKAGE)

PRESSURE TESTING OF BOTTOMSIDE
@ 300 BAR

Q1-20480 TRANSOCEAN – DISCOVERER SPIRIT
BOTTOMSIDE OPENED (NO LEAKAGE)

RODSIDE UNDER TEST

PRESSURE TESTING OF RODSIDE @ 420 BAR

Q1-20480 TRANSOCEAN – DISCOVERER SPIRIT
AFTER SAND BLASTING

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
AFTER SPRAYING

Q1-20480  TRANSOCEAN – DISCOVERER SPIRIT
Harlequin International (Gh) Ltd.

Rod Plating Assessment Sheet

CUSTOMER: TRANSOCEAN DISCOVERER SPIRIT
QUOTE NUMBER: Q1-20480
DESCRIPTION: KNUCKLE JIB HYDRAULIC CYLINDER ROD

DATE: 5/6/2012
PAGE: 1 OF 1

Rod Ø = 220mm
Chrome L = 4290mm
Centre L = 4520mm

<table>
<thead>
<tr>
<th>CHROME THICKNESS READING</th>
<th>0°</th>
<th>90°</th>
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<tbody>
<tr>
<td>1</td>
<td>332</td>
<td>353</td>
</tr>
<tr>
<td>2</td>
<td>343</td>
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<td>353</td>
<td>357</td>
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<tr>
<td>4</td>
<td>341</td>
<td>342</td>
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<tr>
<td>5</td>
<td>339</td>
<td>344</td>
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<tr>
<td>6</td>
<td>326</td>
<td>341</td>
</tr>
<tr>
<td>7</td>
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<td>337</td>
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<tr>
<td>9</td>
<td>343</td>
<td>328</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Average Reading: 337 343

TOTAL PLATING AREA (mm²) 11650
(cm²) 116.5

NOTES
LINISH
STRAIGHTEN
BRUSH PLATE ✓
REPLACE COMPLETE

NOMINAL ROD DIAMETER
Metric: f7 219.95
Imperial: f7 -

ROD CLEVIS TYPE
Male Clevis ✓
Female Clevis
Trunnion

CLEVIS "BEARING" TYPE
Bearing(s) ✓ Bushe(s)

Assessed By: BP1 Date: 5/6/2012
### Borescope Inspection Report

**Customer:** TRANSOCEAN - DISCOVERER SPIRIT  
**Job Number:** Q1-20480  
**Description:** VISUAL INSPECTION OF THE BARREL OF A HYDRAULIC KNUCKLE JIB CYLINDER USING RVI EQUIPMENT  
**Date:** 04/06/12  
**Quantity:** 01  
**Results of Physical Examination:**

**Photographs:**

[Series of images showing visual inspection results]

#### Limitation Of Liability

A borescope inspection is intended to provide a representative sample of items' condition. While every attempt will be made to identify all items considered to be abnormal, items may be missed that could cause future damage. In no event shall HIT be liable for compensatory, consequential, incidental, special, punitive or other damages whether the claim for damages is based on contract, tort, or otherwise.

**Conclusion:** No Damages Found  
**Equipment Used for Inspection:** IBAK Borescope  
**Equipment No.:** HSB001

**Comments:** SIGNIFICANT RUST FOUND INSIDE BARREL. PRE-HONING REQUIRED BEFORE FINAL DECISION CAN BE MADE.

**Inspected By:** QA4  
**Reviewed By:** QA1

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HIT-QA/F044 Rev.1
Borescope Inspection Report

CUSTOMER: TRANSOCEAN - DISCOVERER SPIRIT
JOB NUMBER: Q1-20480
DESCRIPTION: VISUAL INSPECTION OF THE BARREL OF A HYDRAULIC KNUCKLE JIB CYLINDER USING RVI EQUIPMENT

RESULTS OF PHYSICAL EXAMINATION:

PHOTOGRAPHS:

Limitation Of Liability
A borescope inspection is intended to provide a representative sample of items' condition. While every attempt will be made to identify all items considered to be abnormal, items may be missed that could cause future damage. In no event shall HIT be liable for compensatory, consequential, incidental, special, punitive or other damages whether the claim for damages is based on contract, tort, or otherwise.

CONCLUSION: No Damages Found

Equipment Used for Inspection: IBAK Borescope
Comments: BARREL HONED & POLISHED. NO RUST AND AXIAL SCORE MARKS WERE FOUND.

Inspected By: QA3
Reviewed By: QA1

Equipment No.: HSB001
Harlequin International (Gh) Ltd.

General Inspection Report

CUSTOMER: TRANSOCEAN - DISCOVERER SPIRIT

JOB NUMBER: Q1-20480

DESCRIPTION: INSPECTION OF THE BARREL OF A HYDRAULIC KNUCKLE JIB CYLINDER (AFTER HONING)

Drawing/Sketch

Parameters / Specific Value | Tolerance | 0° | 90° |
----------------------------|-----------|----|-----|
A. 340mm                    |           | 340.08 | 340.09 |
B. 340mm                    |           | 340.07 | 340.05 |
C.                           |           |       |      |
D.                           |           |       |      |
E.                           |           |       |      |
F.                           |           |       |      |
G.                           |           |       |      |
H.                           |           |       |      |

Comments: BORE DIMENSIONS WITHIN THE RANGE OF H8 HOLE BASIS SYSTEM.

Inspected By: QA3

Reviewed By: QA1

HIT-QA/F020 Rev.2
### Wall Thickness Inspection Report

**Customer:** Transocean  
**Job Number:** Q1-20480  
**Report #:** WT/12/003  
**Surface Condition:** Coated  
**Material:** Carbon Steel  
**Quantity:** 1  
**Temperature:** 28 °C

### Readings (mm)

<table>
<thead>
<tr>
<th>Position</th>
<th>Original</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Mean</th>
<th>% Loss</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td></td>
<td>29.5</td>
<td>30.5</td>
<td>30.3</td>
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<td></td>
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<tr>
<td>2</td>
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<td>30.6</td>
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<td>30.0</td>
<td>34.3</td>
<td>30.4</td>
<td></td>
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<tr>
<td>3</td>
<td></td>
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<td>29.6</td>
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<td>32.2</td>
<td>30.2</td>
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<tr>
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<td>30.1</td>
<td>30.0</td>
<td>29.8</td>
<td>30.1</td>
<td>30.0</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:** Original Thickness Not Known  
**Results:** REJECT / ACCEPT

**Monitor S/No.:** 4119  
**Type:** CYGNUS 3  
**Inspected By:** QA3  
**Reviewed By:** QA1

**Calibration Block:** 5-25mm LSW  
**Probe:** 13mm RED FACE  
**Frequency:** 2.25 MHZ  
**Couplant:** HYD OIL
# Cylinder Test Certificate

**CUSTOMER**  TRANSOCEAN - DISCOVERER SPIRIT  
**CERT NO.**  TC/12/053  
**JOB NUMBER**  Q1-20480  
**DATE**  10/06/12  
**DESCRIPTION**  HYDRAULIC KNUCKLE JIB  
**QUANTITY**  1  
**CYLINDER (BOTTOMSIDE)**  
**S/N**  0000298362  
**LOAD**  NO LOAD  

<table>
<thead>
<tr>
<th>CLOSED CENTRES</th>
<th>4850mm</th>
<th>BORE SIZE</th>
<th>340mm</th>
</tr>
</thead>
</table>

**TEST TEMPERATURE**  40°C  
**ROD SIZE**  220mm  
**TEST PRESSURE**  300BAR (4350PSI)  
**STROKE**  3700mm  

**PHOTO REQ'D?**  YES  
**PASSED**  YES  
**FAILED**  NO  

## CHECKLIST

<table>
<thead>
<tr>
<th>ITEM</th>
<th>YES</th>
<th>NO</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECK GLAND FOR OIL LEAKS</td>
<td>✓</td>
<td></td>
<td>NO LEAKAGE</td>
</tr>
<tr>
<td>CHECK WELDS FOR OIL LEAKS &amp; CRACKS</td>
<td>✓</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td>CHECK FOR BEARING/BUSHES</td>
<td>✓</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td>CHECK FOR GREASE NIPPLES</td>
<td>✓</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>CHECK FOR PORT FITTING OLD/NEW</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHECK PORT THREADS</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CYLINDER HEAD SCREWS</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHECK VALVE / MANIFOLD BLOCK</td>
<td>✓</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>CHECK FOR INTERNAL LEAKAGE</td>
<td>✓</td>
<td></td>
<td>NO LEAKAGE</td>
</tr>
<tr>
<td>CHECK TRANSFER TUBE</td>
<td>✓</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

**COMMENTS**  TEST SUCCESSFUL (PRESSURE HELD FOR 30 MINUTES)  
**TESTED BY**  H2  
**DATE**  10/6/2012  
**APPROVED BY**  QA3  
**DATE**  10/6/2012
# Cylinder Test Certificate

**Customer:** TRANSEOCEAN - DISCOVERER SPIRIT  
**Cert No.:** TC/12/054  
**Job Number:** Q1-20480  
**Date:** 10/06/12  
**Description:** HYDRAULIC KNUCKLE JIB  
**Quantity:** 1  
**Cylinder (Rod Side):**  
**S/N:** 0000298362

<table>
<thead>
<tr>
<th>Load</th>
<th>NO Load ✓</th>
</tr>
</thead>
</table>

- **Closed Centres:** 4850mm  
- **Bore Size:** 340mm  
- **Test Temperature:** 40°C  
- **Rod Size:** 220mm  
- **Test Pressure:** 420Bar (6090PSI)  
- **Stroke:** 3700mm

**Photo Req'd:** YES ✓  
**Passed ✓**  
**Failed □**

<table>
<thead>
<tr>
<th>Checklist</th>
<th>YES ✓</th>
<th>NO □</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Gland for Oil Leaks</td>
<td>✓</td>
<td></td>
<td>NO LEAKAGE</td>
</tr>
<tr>
<td>Check Welds for Oil Leaks &amp; Cracks</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check for Bearing/Bushes</td>
<td>✓</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td>Check for Grease Nipples</td>
<td>✓</td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td>Check for Port Fitting Old/NEW</td>
<td>✓</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Check Port Threads</td>
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</tr>
<tr>
<td>Cylinder Head Screws</td>
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<td></td>
</tr>
<tr>
<td>Check Valve / Manifold Block</td>
<td>✓</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Check for Internal Leakage</td>
<td>✓</td>
<td></td>
<td>NO LEAKAGE</td>
</tr>
<tr>
<td>Check Transfer Tube</td>
<td>✓</td>
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<td>N/A</td>
</tr>
</tbody>
</table>

**Comments:** TEST SUCCESSFUL (PRESSURE HELD FOR 30 MINUTES)

**Tested By:**  
**Date:** 10/6/2012

**Approved By:**  
**Date:** 10/6/2012
# Paint Inspection Report

**Harlequin International (Gh) Ltd.**

**CUSTOMER:** TRANSGEAN-DISCOVERER SPIRIT  
**JOB NUMBER:** Q1-20480  
**DATE:** 11/06/12  
**DESCRIPTION:** KNUCKLE JIB HYDRAULIC CYLINDER  
**LOCATION:** SPRAY BOOTH  
**TIME START:** 08:00  
**TIME FINISH:** 17:00

## CLIMATE CONDITIONS:

<table>
<thead>
<tr>
<th>Date</th>
<th>Temperature (°C)</th>
<th>RH %</th>
<th>Temperature (°C)</th>
<th>Conditions</th>
<th>AM</th>
<th>PM</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Dry Bulb</td>
<td>Wet Bulb</td>
<td>Dew Point</td>
<td>Steel Temp.</td>
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<tr>
<td>11/06/12</td>
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<td>25.1</td>
<td>75.7</td>
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<td>28.2</td>
<td>OVERCAST</td>
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## SURFACE PREPARATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Batch Number</th>
<th>Coat</th>
<th>Method</th>
<th>DFT Before</th>
<th>WFT</th>
<th>Total DFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERSEAL 670HS</td>
<td>MH2587RG / NA0008GA</td>
<td>1</td>
<td>SPRAY</td>
<td>0 μm</td>
<td>-</td>
<td>100-175 μm</td>
</tr>
<tr>
<td>RAL 9010 PURE WHITE</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>INTERSEAL 670HS</td>
<td>MH2275RG / NA0009GA</td>
<td>2</td>
<td>SPRAY</td>
<td>100-175 μm</td>
<td>-</td>
<td>200-275 μm</td>
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<tr>
<td>RAL 9002 GREY WHITE</td>
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<tr>
<td>INTERSEAL 670HS</td>
<td>MH2587RG / NA0008GA</td>
<td>3</td>
<td>SPRAY</td>
<td>200-275 μm</td>
<td>-</td>
<td>300-400 μm</td>
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<td>RAL 9010 PURE WHITE</td>
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</tr>
</tbody>
</table>

## THICKNESS READING:

- **Minimum:** 332 μm
- **Maximum:** 451 μm
- **Average:** 378 μm

**Comments:** PASSED.

**Inspected By:** [QA4]  
**Reviewed By:** [QA1]