HYTORC®
Since 1968

SAFETY – QUALITY - SCHEDULE

THE NEW STANDARD IN BOLTING FOR PETRO- CHEMICAL

An Introduction to HYTORC

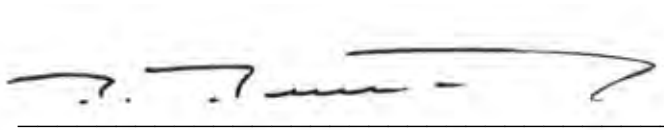
HYTORC was formed in 1968 by John Junkers. At that time tight was when the nut could not be turned any further. Today, 43 years later, HYTORC guarantees Joint Integrity with unmatched Bolt Load Precision, Speed and Safety.

HYTORC's first hydraulic ratcheting wrench was developed in 1972 in cooperation with the Westinghouse field service division. Since then, HYTORC literally invented every single major improvement in torque and tension tools. Realizing in the early nineties that further developments of hydraulic torque and tension tools are limited by the fact that, in the field, torque has unknown friction and tension has unknown bolt relaxation, HYTORC formed a Research & Development company called JETYD in 1993. It's challenge: to eliminate the unknown friction of torque and the unknown bolt relaxation of tension.

Existing bolting tools were already capable of accurate torque so JETYD focused on the fastener in order to achieve accurate bolt load through accurate torque, a previously unaccomplished feat. In 1995, JETYD engineered the world's first fastener that can be operated with a standard HYTORC torque tool. Its field use assures a torsion - and side load-free calibrated bolt load accuracy of ± 5% as well as a frictional turning resistance from nut to nut within 3%. Bolt and surface galling and nut loosening are eliminated, joint failures and lengthy bolt elongation measurements are no longer necessary, bolting time is literally cut in half over any other method including heat induction and best of all, our new technology is the safest in the world market.

Additionally, HYTORC sets the standard in its industry with 4 hydraulic tool lines: the economical solution for basic maintenance, the most frequently used torque tool in the world, the patented and universal Stretch-to-Load torque/tension machine and the fastest hydraulic tool in the market. With the largest worldwide sales and service network of Bolting Experts in its field, an alliance with ASME and OSHA for world-wide industrial bolting and safety courses and the certification of its technology by TUV, ISO and Lloyd, HYTORC reached the first plateau in its endeavor for perfection.

The following is a presentation of the HYTORC Technology for your kind consideration.



John K. Junkers, CEO

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HYTORC® Since 1968

Presentation Contents

Why HYTORC? Pages 4-5

HYTORC World-wide Service Pages 6

HYTORC Washer: Reactors Pages 7-19

HYTORC Washer: Heat Exchangers Pages 20-30

HYTORC Washer: Inlets-Outlets Pages 31-37

HYTORC Washer: Manways Pages 38-45

HYTORC Washer: Valves Pages 46-51

Hytorc Nut Operation Pages 52-53

Hytorc Nut: Applications Pages 54-57

HYTORC Torque Technology Pages 58-60

Installation Oversight Pages 61-62

Accreditations Pages 63-68

HYTORC® Since 1968

Why HYTORC®?

Since 1968

RELIABILITY

- HYTORC is the oldest and largest company in its field.
- Accredited by ASME and OSHA for bolting procedures and safety
- Worldwide 24/7 service by trained bolting experts
- The most experienced job supervision teams in the industry
- The only company in its field to provide free Safety Trainings on request

INNOVATIONS

- HYTORC invented every single major improvement in Torque and Tension since 1972
- The only technology in the industry that can reach the desired bolt load within 5% without requiring measurements
- The only hydraulic torque tool that is torque & tension compatible.
- The first torque wrench that can stretch bolts without side load, torsion, or bolt relaxation
- The only torque wrench that can be remote operated even on inverted applications for hands-free safety
- The first company to do the job in half the time of any other method
- The first wrench with Auto Release Mechanism

PRODUCTS

The Only Company in its Field with 4 Unique Product Lines:

The Economical Basic Maintenance Torque Wrench line

The World's Most Trusted, Field Proven Torque Wrench line

The Largest Selling Universal Torque & Tension Tool line

The World's Fastest Universal Torque & Tension Tool line

Why HYTORC®?

Since 1968

OUR GLOBAL SERVICE POLICY COVERS ALL HYTORC TOOL USERS

FREE SERVICES

- FREE User safety training upon receipt of merchandise
- FREE Semi-annual user safety training on request
- FREE Annual safety seminar on appointment
- FREE Loaner tools in case of product failure within 24 hours
- FREE Torque/Tension consultation/seminar
- FREE Half day, first use supervision
- FREE Annual product inspection on request
- FREE Product demonstration
- FREE 12 Month No-Questions-Asked Warranty
- FREE Lifetime safety/durability/function upgrades

(Above services are NOT subject to travel expense charges)

REPAIRS

- All Repairs are guaranteed for 6 months from date of repair
- Repairs are subject to labor and part cost, as outlined in the official HYTORC Price List
- All Warranty Repairs are free of all charges including return-freight
- All Repairs will be tested and calibrated to ensure the highest quality repairs

TOOL RENTALS

- 50% of all rentals will be applied as a discount toward new purchases for 12 months after rental period
- 100% of all rental fees will be applied if purchasing the same equipment
- User training for first time rentals is FREE of all cost
- Return freight charges are FREE
- Rental tools are guaranteed to perform and are subject to the FREE loaner tool policy of HYTORC

- **Money-Back Guarantee for leak-free/failure-free startup using new technology**
- **100% Satisfaction Guaranteed**

HYTORC® Since 1968

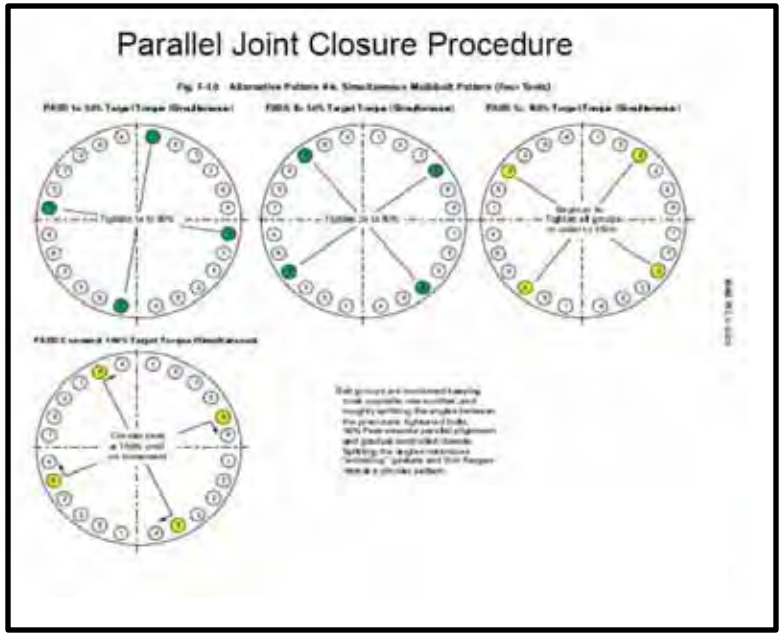
Why HYTORC?

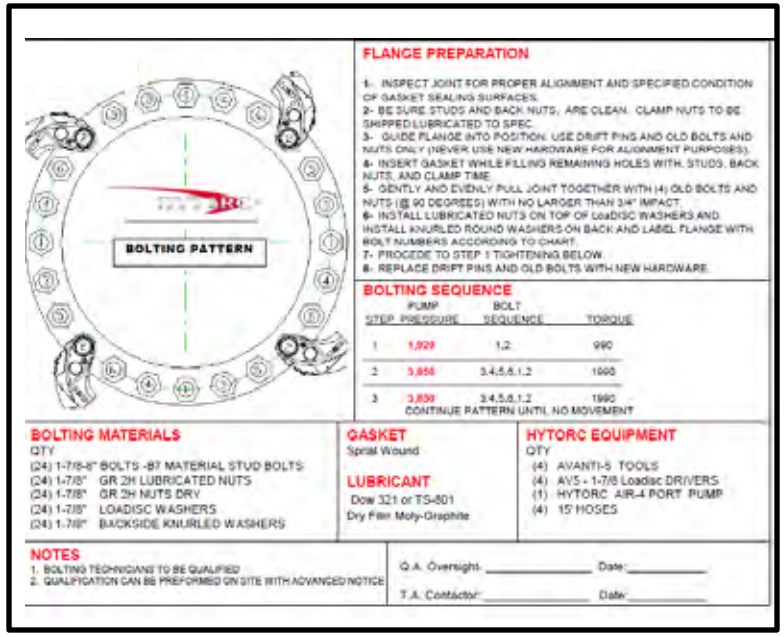
BECAUSE HYTORC SUPPORT IS WORLDWIDE

THE HYTORC WASHER™

Applications and Case Studies from Various Industries

THE HYTORC WASHER

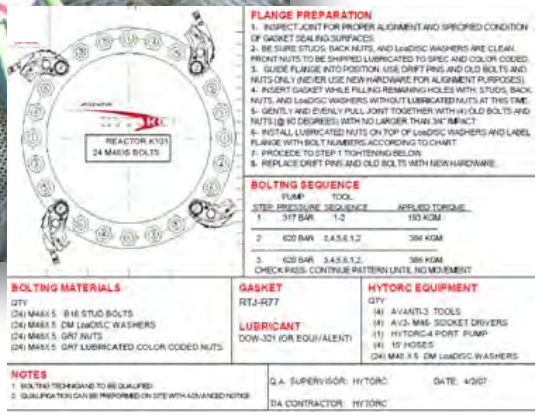




A Revolution in new standards, developed by HYTORC and recommended by ASME-PCC-1-2010

REACTORS

HYTORC Washer Installations



PLANGE PREPARATION

1. INSPECT JOINT FOR PROPER ALIGNMENT AND SPROPED CONDITION OF GASKET SEALING SURFACES.
2. BE SURE STUDS, BACK NUTS, AND LoadDISC WASHERS ARE CLEAN. FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND COLOR CODED.
3. GUIDE FLANGE INTO POSITION. USE DRIFT PINS AND OLD BOLTS AND NUTS ONLY (NEVER USE NEW HARDWARE FOR ALIGNMENT PURPOSES).
4. INSERT GASKET WHILE FILLING REMAINING HOLES WITH: STUDS, BACK NUTS, AND LoadDISC WASHERS WITHOUT LUBRICATED NUTS AT THIS TIME.
5. GENTLY AND EVENLY PULL JOINT TOGETHER WITH (4) OLD BOLTS AND NUTS (@ 90 DEGREES) WITH NO LARGER THAN 3/4" IMPACT.
6. INSTALL LUBRICATED NUTS ON TOP OF LoadDISC WASHERS AND LABEL FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
7. PROCEDE TO STEP 1 TIGHTENING BELOW.
8. REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

BOLTING SEQUENCE

STEP	PUMP PRESSURE	TOOL SEQUENCE	APPLIED TORQUE
1	317 BAR	1-2	193 KGM
2	620 BAR	3,4,5,6,1,2	386 KGM
3	620 BAR	3,4,5,6,1,2	386 KGM

CHECK PASS. CONTINUE PATTERN UNTIL NO MOVEMENT

BOLTING MATERIALS

QTY
(24) M48X5 B16 STUD BOLTS
(24) M48X5 DM LoadDISC WASHERS
(24) M48X5 GR7 NUTS
(24) M48X5 GR7 LUBRICATED COLOR CODED NUTS

GASKET
RTJ-R77

LUBRICANT
DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMENT
QTY
(4) AVANTI-3 TOOLS
(4) AV3- M48- SOCKET DRIVERS
(1) HYTORC-4 PORT PUMP
(4) 15' HOSES
(24) M48 X 5 DM LoadDISC WASHERS

NOTES
1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PERFORMED ON SITE WITH ADVANCED NOTICE

Q.A. SUPERVISOR: HYTORC DATE: 4/2/07

D/A CONTRACTOR: HYTORC

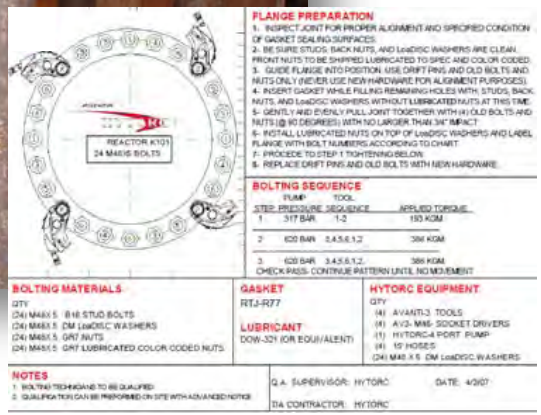
Reactor Head-Previously Leaking
Certified Leak-Free in 40 Minutes

Quality Procedures and Records

HYTORC® Since 1968

REACTORS

HYTORC Washer Installations



FLANGE PREPARATION

1. INSPECT JOINT FOR PROPER ALIGNMENT AND SPECIFIED CONDITION OF GASKET SEALING SURFACES.
2. BE SURE STUDS, BACK NUTS, AND LoadDISC WASHERS ARE CLEAN. FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND COLOR CODED.
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7. PROCEDE TO STEP 1 TIGHTENING BELOW.
8. REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

BOLTING SEQUENCE

STEP	PRESSURE	SEQUENCE	APPLIED TORQUE
1	517 BAR	1-2	193 KGM
2	620 BAR	3,4,5,6,1,2	386 KGM
3	620 BAR	3,4,5,6,1,2	386 KGM

CHECK PASS- CONTINUE PATTERN UNTIL NO MOVEMENT

BOLTING MATERIALS

QTY
(24) M48X5 B16 STUD BOLTS
(24) M48X5 DM LoadDISC WASHERS
(24) M48X5 GR7 NUTS
(24) M48X5 GR7 LUBRICATED COLOR CODED NUTS

GASKET

RTJ-R77

LUBRICANT

DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMENT

QTY
(4) AVANTI-3 TOOLS
(4) AV3- M48- SOCKET DRIVERS
(1) HYTORQ-4 PORT PUMP
(4) 10' HOSES
(24) M48 X 5 DM LoadDISC WASHERS

NOTES

1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PERFORMED ON SITE WITH ADVANCED NOTICE

Q.A. SUPERVISOR: HYTORC DATE: 4/2/07

QA CONTRACTOR: HYTORC

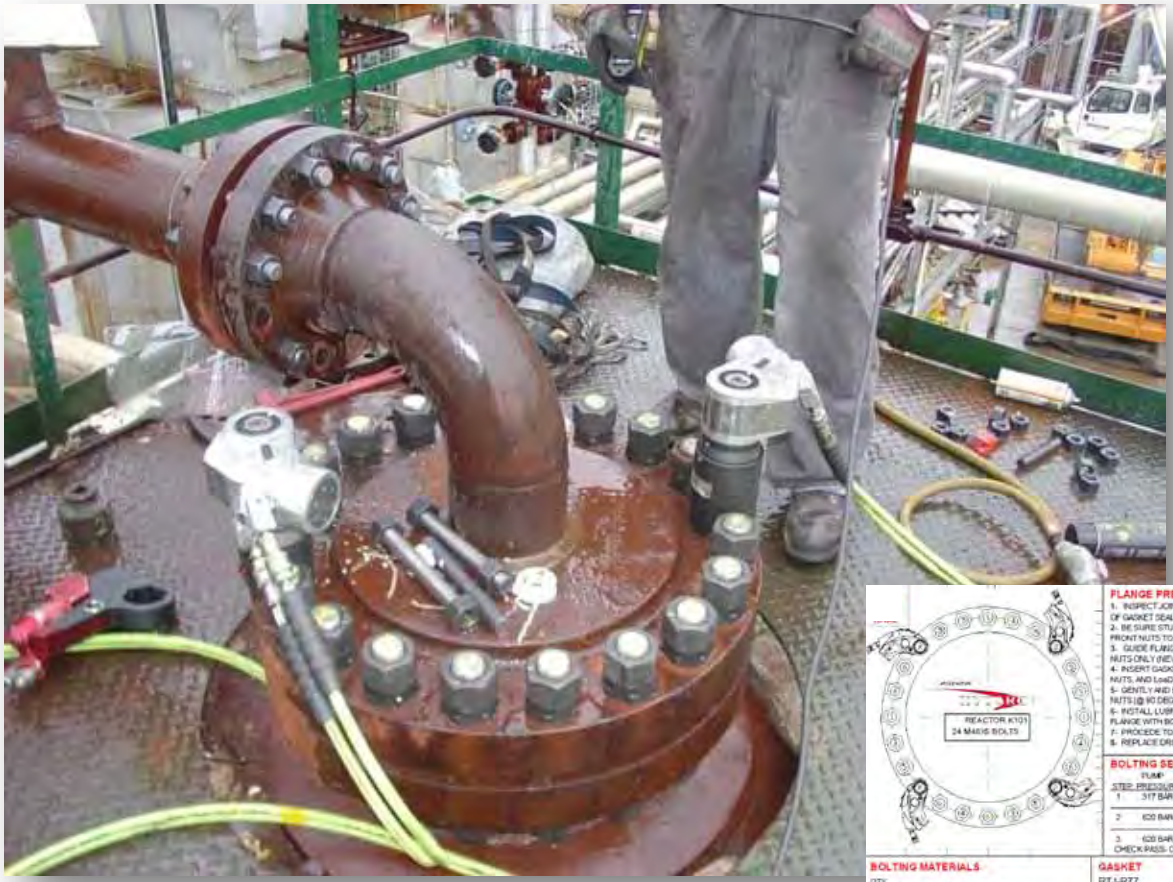
REACTOR OUTLET

HYTORC: 1 hours 50 minutes leak-free
IN THE PAST: 5 hours 20 minutes-with Ultrasonic & leaking
TIME SAVINGS: 3 hours 30 minutes

Quality Procedures and Records

REACTORS

HYTORC Washer Installations



Reactor Head-Sealed in just 35 Minutes-Hands-Free

FLANGE PREPARATION

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2. BE SURE STUDS, BACK NUTS, AND LoadDISC WASHERS ARE CLEAN. FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND COLOR CODED.
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5. GENTLY AND EVENLY PULL JOINT TOGETHER WITH (4) OLD BOLTS AND NUTS @ 90 DEGREES WITH NO LARGER THAN 3/4" IMPACT.
6. INSTALL LUBRICATED NUTS ON TOP OF LoadDISC WASHERS AND LABEL FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
7. PROCEDE TO STEP 1 TIGHTENING BELOW.
8. REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

BOLTING SEQUENCE

STEP	PRESSURE	SEQUENCE	APPLIED TORQUE
1	317 BAR	1-2	193 KGM
2	620 BAR	3,4,5,6,1,2	384 KGM
3	620 BAR	3,4,5,6,1,2,	386 KGM

CHECK PASS- CONTINUE PATTERN UNTIL NO MOVEMENT

BOLTING MATERIALS

QTY
(24) M48X5 B16 STUD BOLTS
(24) M48X5 DM LoadDISC WASHERS
(24) M48X5 GR7 NUTS
(24) M48X5 GR7 LUBRICATED COLOR CODED NUTS

GASKET
RTJ-R77

LUBRICANT
DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMENT
QTY
(4) AVANTI-3 TOOLS
(4) AV3- M48- SOCKET DRIVERS
(1) HYTORQ-4 PORT PUMP
(4) 10' HOSES
(24) M48 X 5 DM LoadDISC WASHERS

NOTES
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Q.A. SUPERVISOR: HYTORC DATE: 4/2/07

QA CONTRACTOR: HYTORC

Quality Procedures and Records

HYTORC® Since 1968

REACTORS

HYTORC Washer Installations

FLANGE PREPARATION

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7. PROCEDE TO STEP 1 TIGHTENING BELOW.
8. REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

REACTOR K101
24 M48X6 BOLTS

BOLTING SEQUENCE

STEP	PRESSURE	SEQUENCE	APPLIED TORQUE
1	517 BAR	1-2	193 KGM
2	620 BAR	3,4,5,6,1,2	386 KGM
3	620 BAR	3,4,5,6,1,2	386 KGM

CHECK PASS- CONTINUE PATTERN UNTIL NO MOVEMENT

BOLTING MATERIALS

QTY
(24) M48X5 B16 STUD BOLTS
(24) M48X5 DM LoadDISC WASHERS
(24) M48X5 GR7 NUTS
(24) M48X5 GR7 LUBRICATED COLOR CODED NUTS

GASKET
RTJ-R77

LUBRICANT
DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMENT
QTY
(4) AVANTI-3 TOOLS
(4) AV3- M48- SOCKET DRIVERS
(1) HYTORQ-4 PORT PUMP
(4) 10' HOSES
(24) M48 X 5 DM LoadDISC WASHERS

NOTES
1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PERFORMED ON SITE WITH ADVANCED NOTICE

Q.A. SUPERVISOR: HYTORC DATE: 4/2/07

QA CONTRACTOR: HYTORC

Parallel Joint Closure
Flange make up in ½ the time.

Quality Procedures and Records

REACTORS

HYTORC Washer Installations

FLANGE PREPARATION

1. INSPECT JOINT FOR PROPER ALIGNMENT AND SPECIFIED CONDITION OF GASKET SEALING SURFACES.
2. BE SURE STUDS, BACK NUTS, AND LoaDISC WASHERS ARE CLEAN. FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND COLOR CODED.
3. GUIDE FLANGE INTO POSITION. USE DRIFT PINS AND OLD BOLTS AND NUTS ONLY (NEVER USE NEW HARDWARE FOR ALIGNMENT PURPOSES).
4. INSERT GASKET WHILE FILLING REMAINING HOLES WITH STUDS, BACK NUTS, AND LoaDISC WASHERS WITHOUT LUBRICATED NUTS AT THIS TIME.
5. GENTLY AND EVENLY PULL JOINT TOGETHER WITH (4) OLD BOLTS AND NUTS @ 90 DEGREES WITH NO LARGER THAN 3/4" IMPACT.
6. INSTALL LUBRICATED NUTS ON TOP OF LoaDISC WASHERS AND LABEL FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
7. PROCEDE TO STEP 1 TIGHTENING BELOW.
8. REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

BOLTING SEQUENCE

STEP	PRESSURE	SEQUENCE	APPLIED TORQUE
1	517 BAR	1-2	193 KGM
2	620 BAR	3,4,5,6,1,2	386 KGM
3	620 BAR	3,4,5,6,1,2,	386 KGM

CHECK PASS- CONTINUE PATTERN UNTIL NO MOVEMENT

BOLTING MATERIALS

QTY
(24) M48X5 B16 STUD BOLTS
(24) M48X5 DM LoaDISC WASHERS
(24) M48X5 GR7 NUTS
(24) M48X5 GR7 LUBRICATED COLOR CODED NUTS

GASKET
RTJ-R77

LUBRICANT
DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMENT
QTY
(4) AVANTI-3 TOOLS
(4) AV3- M48- SOCKET DRIVERS
(1) HYTORC-4 PORT PUMP
(4) 10' HOSES
(24) M48 X 5 DM LoaDISC WASHERS

NOTES
1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PERFORMED ON SITE WITH ADVANCED NOTICE

Q.A. SUPERVISOR: HYTORC DATE: 4/2/07

QA CONTRACTOR: HYTORC

Safe and Hands Free Bolting
For all Pressure Vessels

Quality Procedures and Records

HYTORC® Since 1968

REACTORS

HYTORC Washer Installations

Reactor Outlet Flanges-15 Minutes

Quality Procedures and Records

REACTORS

HYTORC Washer Installations

INVERTED REACTOR OUTLET

(32) 1-1/2" BOLTS (4-Tool Parallel Joint Closure)

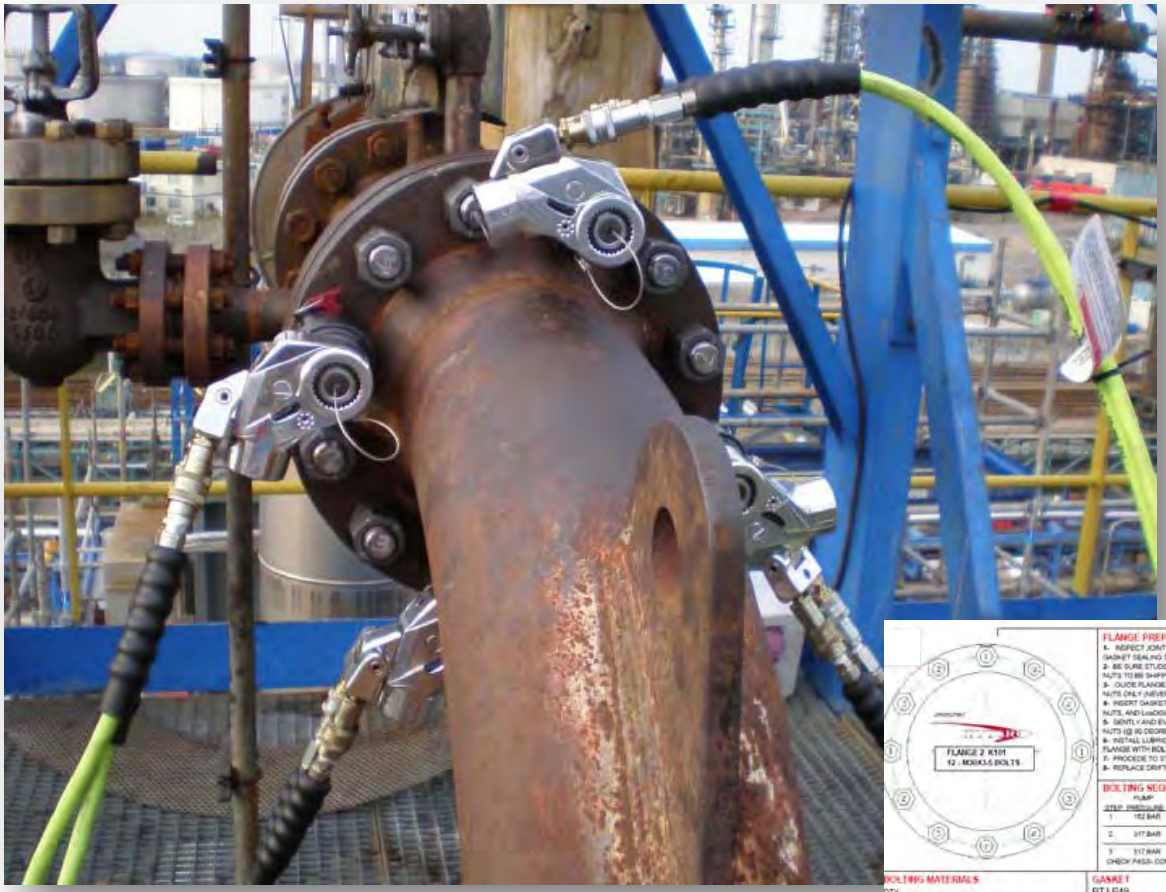
HYTORC: 27 MINUTES

IN THE PAST: 2 HOURS 54 MINUTES

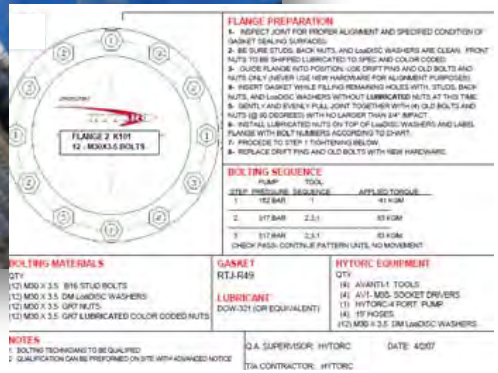
OVER 2 HOURS OF TIME SAVED!

REACTORS

HYTORC Washer Installations



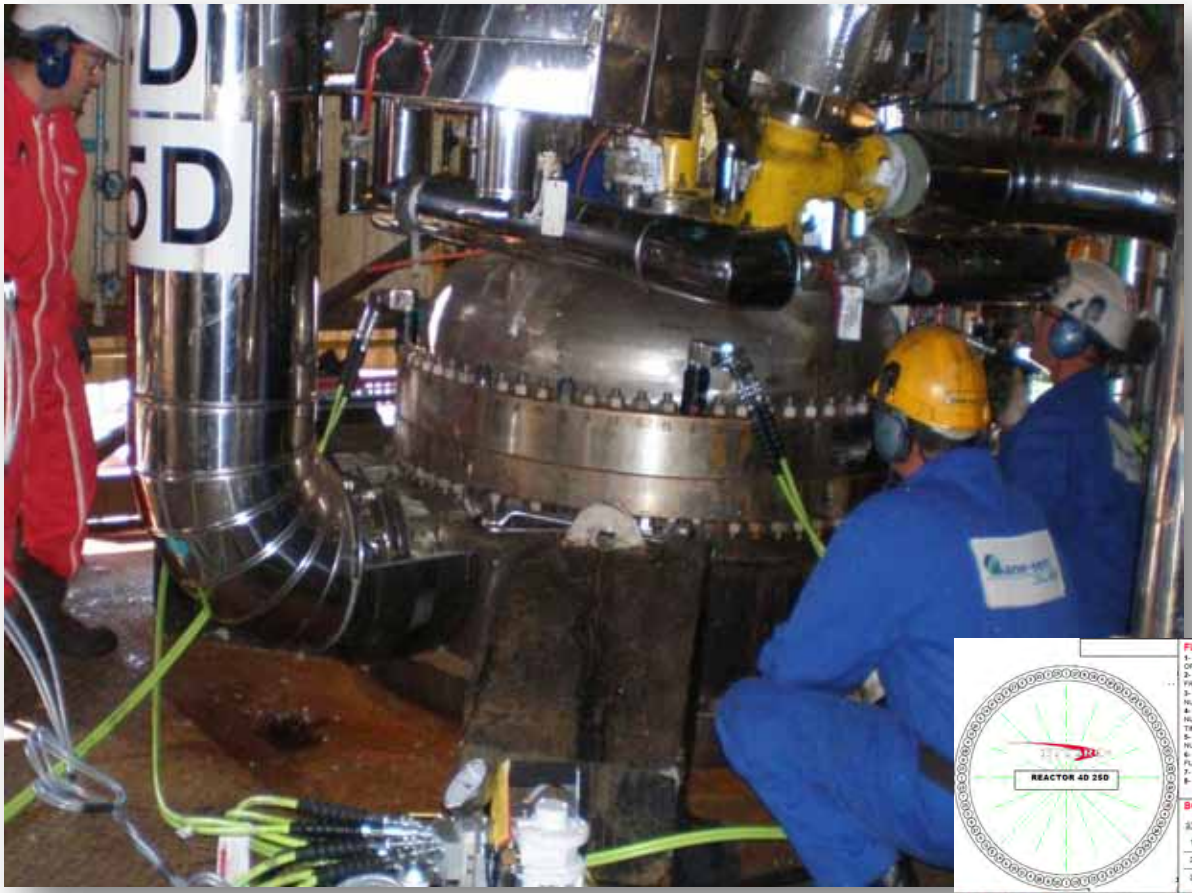
Reactor Elbows: 1 Craft, Hands Free

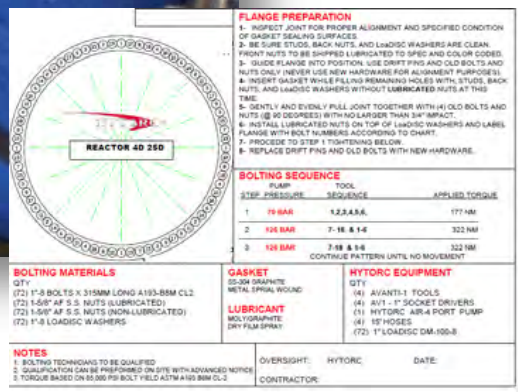


Quality Procedures and Records

REACTORS

HYTORC Washer Installations





FLANGE PREPARATION

1- INSPECT JOINT FOR PROPER ALIGNMENT AND SPECIFIED CONDITION OF GASKET SEALING SURFACES.
2- BE SURE STUDS, BACK NUTS, AND LoaDISC WASHERS ARE CLEAN. FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND COLOR CODED.
3- GUIDE FLANGE INTO POSITION, USE DRIFT PINS AND OLD BOLTS AND NUTS ONLY (NEVER USE NEW HARDWARE FOR ALIGNMENT PURPOSES).
4- INSERT GASKET WHILE FILLING REMAINING HOLES WITH, STUDS, BACK NUTS, AND LoaDISC WASHERS WITHOUT **LUBRICATED** NUTS AT THIS TIME.
5- GENTLY AND EVENLY PULL JOINT TOGETHER WITH (4) OLD BOLTS AND NUTS (@ 90 DEGREES) WITH NO LARGER THAN 3/4" IMPACT.
6- INSTALL LUBRICATED NUTS ON TOP OF LoaDISC WASHERS AND LABEL FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
7- PROCEDE TO STEP 1 TIGHTENING BELOW.
8- REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARDWARE.

REACTOR 4D 25D

BOLTING SEQUENCE

STEP	PUMP PRESSURE	TOOL SEQUENCE	APPLIED TORQUE
1	70 BAR	1,2,3,4,5,6,	177 NM
2	126 BAR	7- 18, & 1-6	322 NM
3	126 BAR	7-18 & 1-6 CONTINUE PATTERN UNTIL NO MOVEMENT	322 NM

BOLTING MATERIALS
QTY:
(72) 1"-8 BOLTS X 315MM LONG A193-B8M CL2
(72) 1-5/8" AF S.S. NUTS (LUBRICATED)
(72) 1-5/8" AF S.S. NUTS (NON-LUBRICATED)
(72) 1"-8 LOADISC WASHERS

GASKET
SS-304 GRAPHITE METAL SPIRAL WOUND

LUBRICANT
MOLYGRAPHITE DRY FILM SPRAY

HYTORC EQUIPMENT
QTY:
(4) AVANTI-1 TOOLS
(4) AV1 - 1" SOCKET DRIVERS
(1) HYTORC AIR-4 PORT PUMP
(4) 15' HOSES
(72) 1" LOADISC DM-100-8

NOTES
1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PREFORMED ON SITE WITH ADVANCED NOTICE
3. TORQUE BASED ON 85,000 PSI BOLT YIELD ASTM A193 B8M CL-2

OVERSIGHT: HYTORC DATE:
CONTRACTOR:

(72) Bolt Reactor Leak-Free

Quality Procedures and Records

HYTORC® Since 1968

REACTORS

HYTORC Washer Installations

REACTOR DOME

(84) 1-5/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 5 HOURS 15 MINUTES
IN THE PAST: 18 HOURS 10 MINUTES
OVER 13 HOURS OF TIME SAVED!

REACTORS

HYTORC Washer Installations

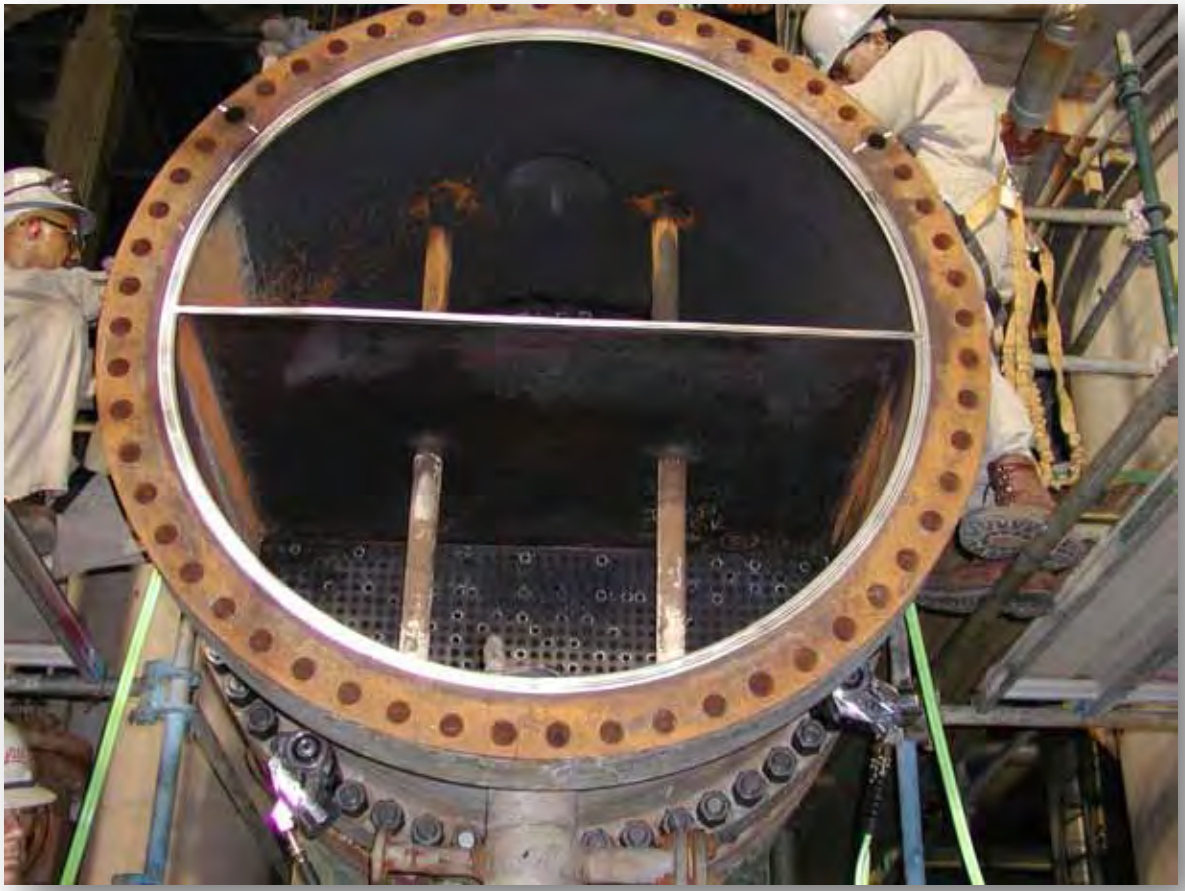
REACTOR INLET JOINT

(32) 1-5/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 1 HOURS 50 MINUTES
IN THE PAST: 5 HOURS 50 MINUTES-LEAKING
OVER 4 HOURS OF TIME SAVED!

HYTORC® Since 1968

HEAT EXCHANGERS

HYTORC Washer Installations



CHANNEL HEADS

(56) 1-5/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 5 HOURS 15 MINUTES
IN THE PAST: 15 HOURS
OVER 9 HOURS OF TIME SAVED!

HEAT EXCHANGERS

HYTORC Washer Installations

DOLLAR PLATES

(56) 1-5/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 4 HOURS 15 MINUTES
IN THE PAST: 14 HOURS 10 MINUTES
OVER 9 HOURS OF TIME SAVED!

HYTORC® Since 1968

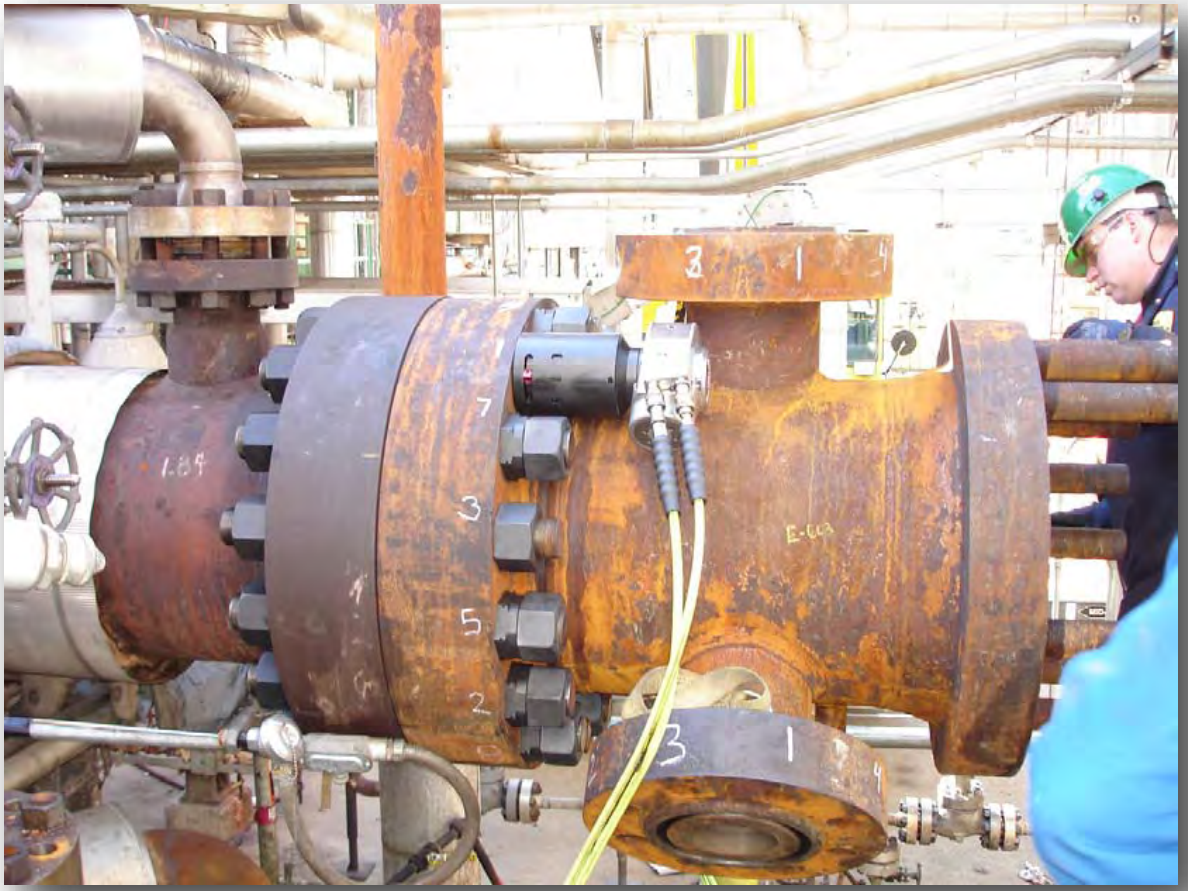
HEAT EXCHANGERS

HYTORC Washer Installations

BELL HEADs Completed in half the time

HEAT EXCHANGERS

HYTORC Washer Installations



CHANNEL HEADS

(16) 2-1/2" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 35 MINUTES
IN THE PAST: 2 HOURS 40 MINUTES
OVER 2 HOURS OF TIME SAVED!

HEAT EXCHANGERS

HYTORC Washer Installations

CHANNEL HEADS

(64) 1-3/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 1 HOUR 50 MINUTES
IN THE PAST: 2 HOURS 40 MINUTES

HEAT EXCHANGERS

HYTORC Washer Installations

DOLLAR PLATES

(64) 1-3/8" BOLTS (4-Tool Parallel Joint Closure)

HYTORC: 1 HOUR 5 MINUTES

IN THE PAST: Leaking with Bellville Washers

Quality Procedures and Records

HYTORC® Since 1968

HEAT EXCHANGERS

HYTORC Washer Installations

Vertical Exchanger
(36) 1-5/8″ bolts in under 50 minutes

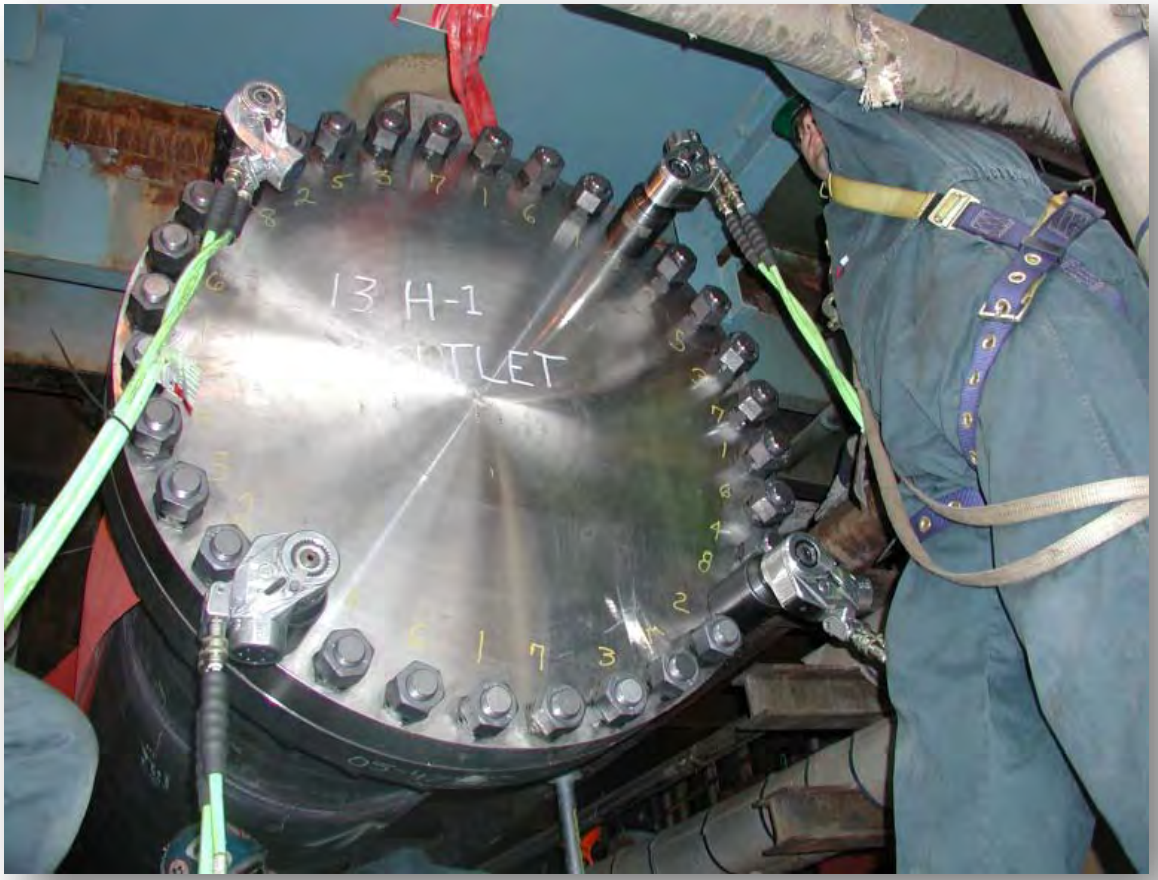
HEAT EXCHANGERS

HYTORC Washer Installations

Exchanger Bell-Head, warped from past impacting Solution-Parallel Joint Closure.

HEAT EXCHANGERS

HYTORC Washer Installations



REDUCTION EXCHANGER
(32) 1-5/8" BOLTS (4-Tool Parallel Joint Closure)
HYTORC: 1 HOUR 30 MINUTES
IN THE PAST: 5HOURS

HEAT EXCHANGERS

HYTORC Washer Installations

Vertical Exchanger Dollar Plate
Bolting: 1 Man-1Hour

HEAT EXCHANGERS

HYTORC Washer Installations

Vertical Exchanger Nozzle
Limited Access, No Problem

INLETS/OUTLETS

HYTORC Washer Installations

TUBE INLET-Pinch Point Free

INLETS/OUTLETS

HYTORC Washer Installations

SHELL INLET-Via Remote Control

INLETS/OUTLETS

HYTORC Washer Installations

HYDROGEN OUTLET, Previously Leaking.
Solution: 2 Craft & Parallel Joint Closure

INLETS/OUTLETS

HYTORC Washer Installations

REACTOR OUTLET-AKA: Bad Actor
This Joint Needed a Solution, not a quick fix

INLETS/OUTLETS

HYTORC Washer Installations

PRE-HEATER OUTLET: Previously Leaking

INLETS/OUTLETS

HYTORC Washer Installations

INLET HEADERS: Installed with HYTORC Precision

INLETS/OUTLETS

HYTORC Washer Installations

DUMP NOZZLE Bolting Made Simple

MANWAYS

HYTORC Washer Installations

VAPOR LINE MANWAY Bolted Hands-Free

MANWAYS

HYTORC Washer Installations

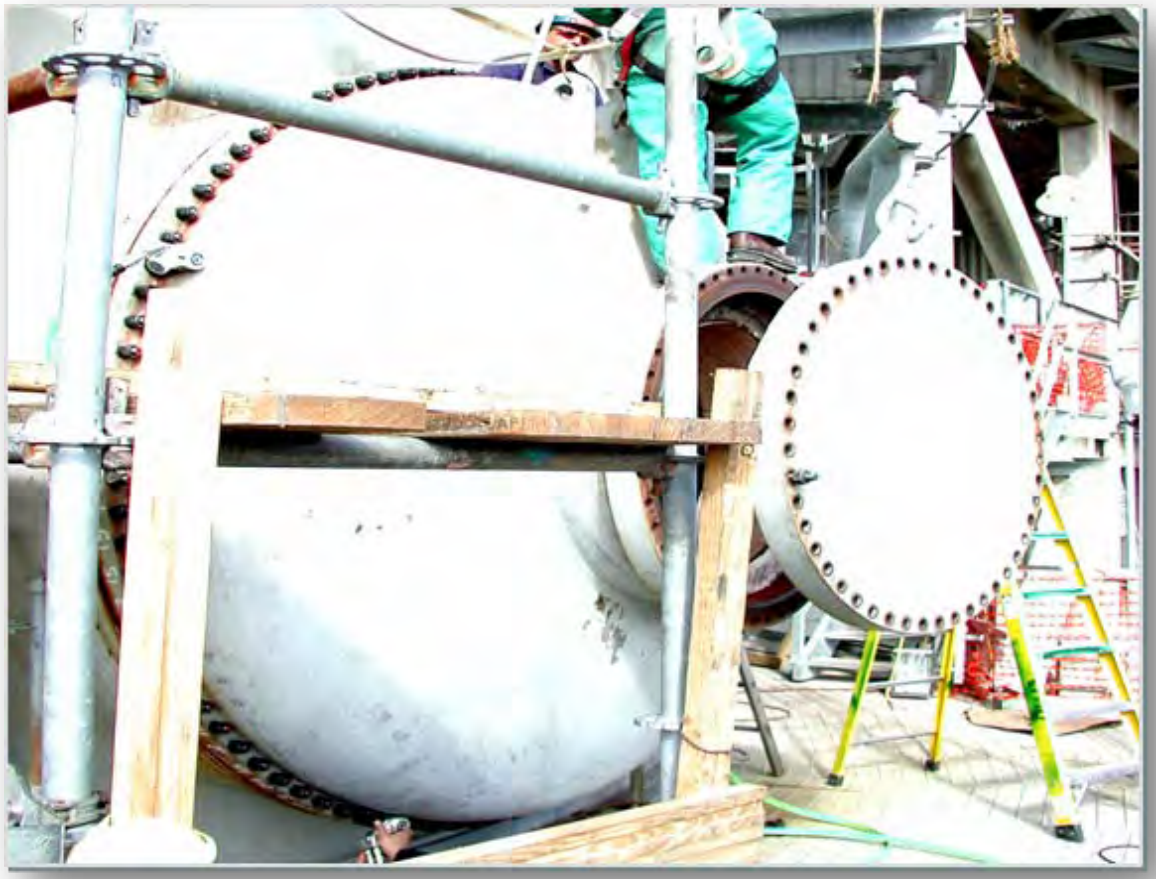
60" REACTOR MANWAY (44 Bolts)

HYTORC:	**2 hours 30 minutes leak-free**
IN THE PAST:	**8 hours 0 minutes - Ultrasonic & leaking**
TIME SAVINGS:	**5 hours 30 minutes**

HYTORC® Since 1968

MANWAYS

HYTORC Washer Installations



REGENERATOR DOME MANWAY
Bolted in 1 Hour with 1 Craft

MANWAYS

HYTORC Washer Installations

16″ MANWAY

1 Craft -1 QA: Completed and Documented in 30 Minutes

MANWAYS

HYTORC Washer Installations

REGENERATOR MANWAY
When it's that Easy, everyone gets a Break!

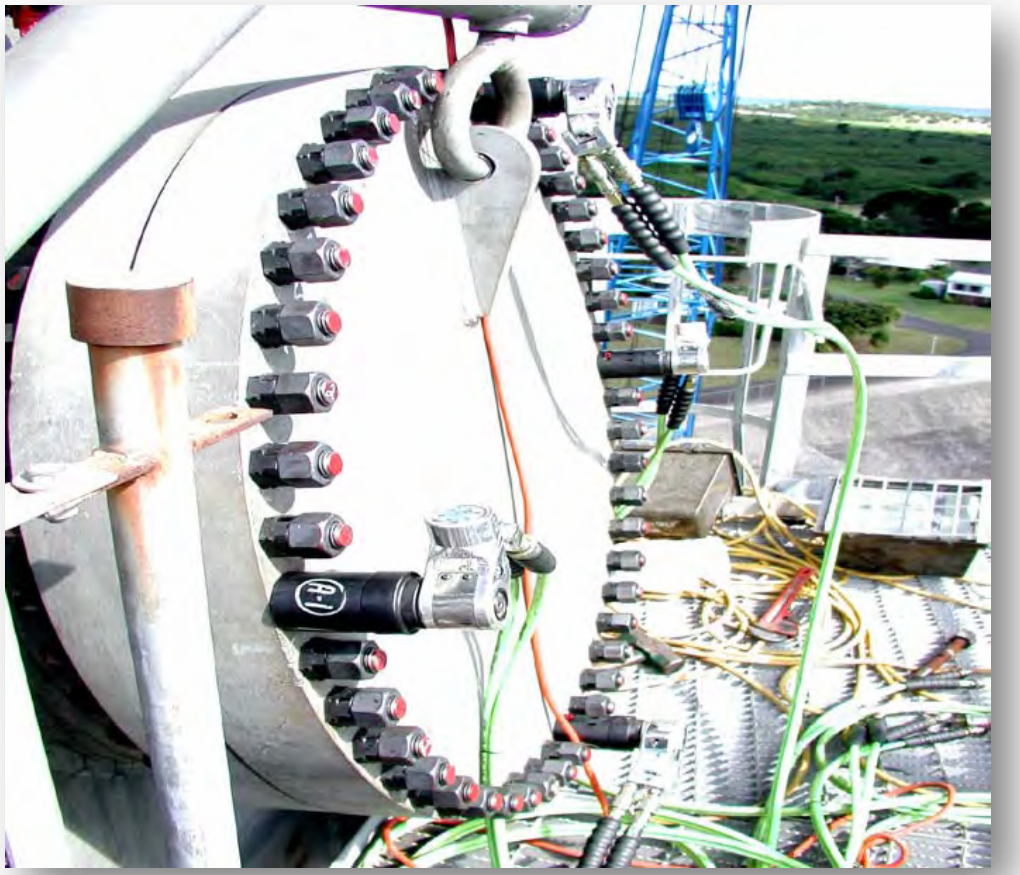
MANWAYS

HYTORC Washer Installations

60” R-2 REACTOR MANWAY
Parallel Joint Closure Applied
Hands-Free via Remote Control

MANWAYS

HYTORC Washer Installations



REACTOR MANWAY COVER (48 bolts)
HYTORC: 3 hours 10 minutes leak-free
IN THE PAST: 7 hours 18 minutes leaking.
TIME SAVINGS: 4 hours 8 minutes

MANWAYS

HYTORC Washer Installations

REACTOR INLET MANWAY
(24) 1-1/8″ Bolts: Completed In just 30 Minutes

VALVES

HYTORC Washer Installations

PRESSURE REDUCTION VALVE
50% Coverage applied for precision closure

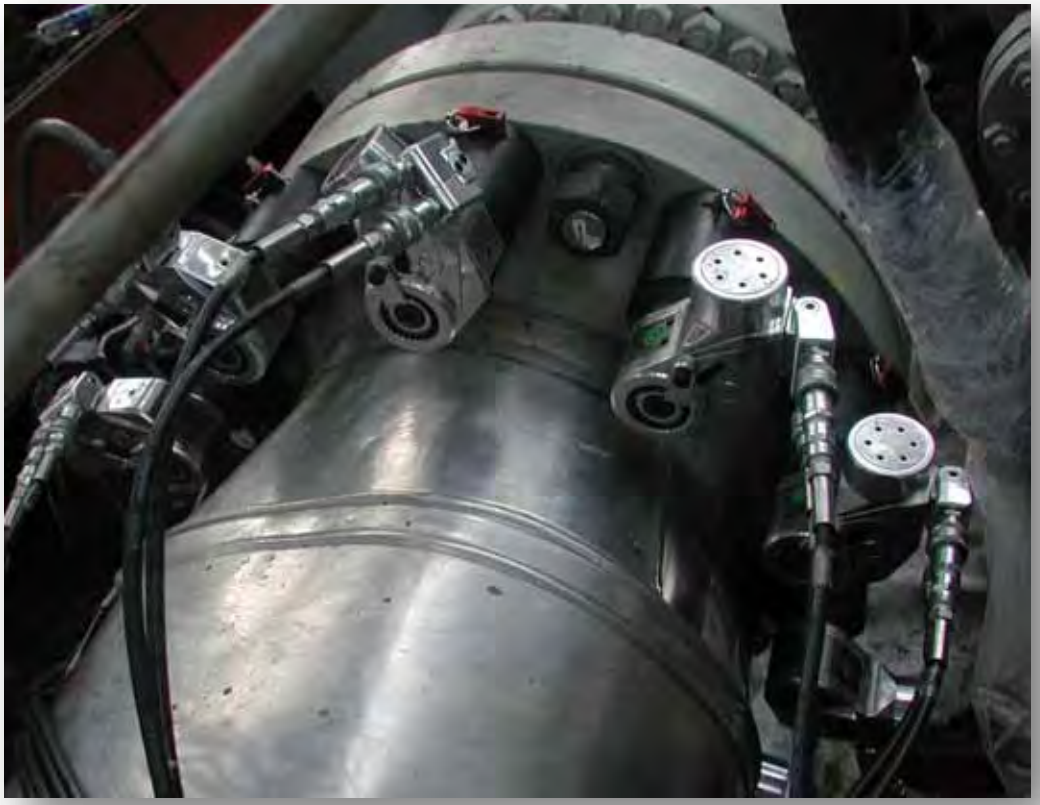
VALVES

HYTORC Washer Installations

SDV INLET VALVE- 50% Coverage
When it has to get done in 20 Minutes

VALVES

HYTORC Washer Installations



SDV OUTLET VALVE

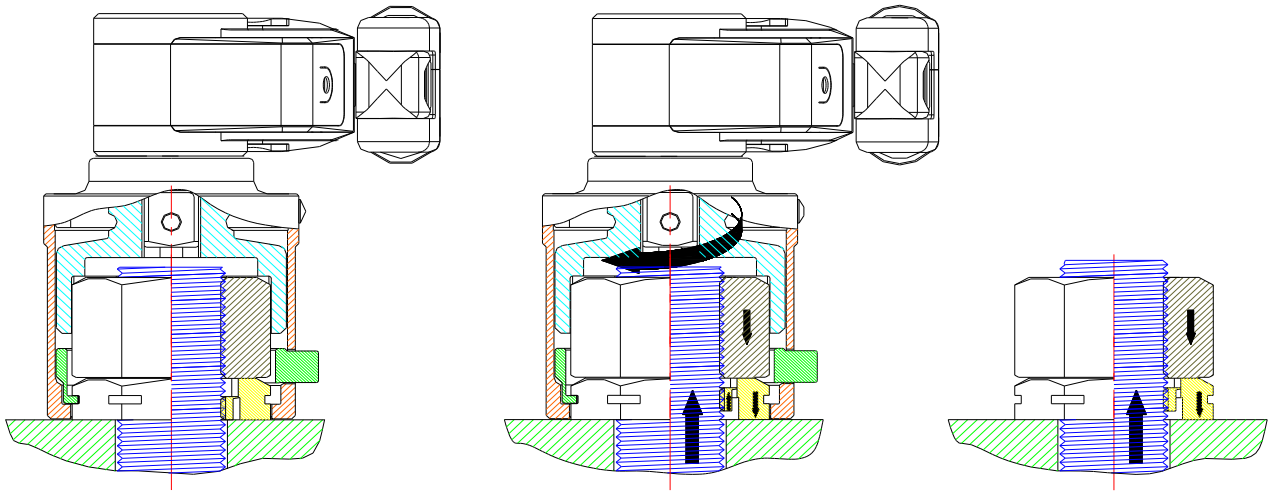
VALVES

HYTORC Washer Installations

SDV OUTLET VALVE

THE HYTORC WASHER

HOW DOES IT WORK?



The HYTORC Torque Machine can be equipped with an inner and an outer socket. The nut is dry-lubed to reduce the usual frictional scatter. The inner socket turns the nut and the outer socket locks on to the economical HYTORC washer underneath the nut. Hands-free operation in any position and a reliable facial friction of the nut is assured.

Action and reaction become coaxial. The usual friction-causing side load is eliminated.

A threaded segment in the inside of the HYTORC washer creates a counter-nut effect with the nut thread. It stops the bolt from turning with the nut. Further turning of the nut creates an axial bolt elongation, which pulls along the thread segment in the inside of the washer.

The counter-nut effect remains intact throughout the assembled state of the fastener, so that despite the use of a low-friction, dry lubricant, inadvertent nut-loosening is eliminated.

An inexpensive ASTM compliant washer perfects bolting by providing even bolt load within 10% without affecting the integrity of your fastener.

PLATFORMER

#1 PREHEATER OUTLET
36" ID FLANGE

FLANGE PREPARATION

1- INSPECT JOINT FOR PROPER ALIGNMENT AND SPECIF
OF GASKET SEALING SURFACES.
2- BE SURE STUDS, BACK NUTS, AND LoaDISC WASHERS
FRONT NUTS TO BE SHIPPED LUBRICATED TO SPEC AND
3- GUIDE FLANGE INTO POSITION. USE DRIFT PINS AND C
NUTS ONLY (NEVER USE NEW HARDWARE FOR ALIGNMEN
4- INSERT GASKET WHILE FILLING REMAINING HOLES WIT
NUTS, AND LoaDISC WASHERS WITHOUT **LUBRICATED** NU
5- GENTLY AND EVENLY PULL JOINT TOGETHER WITH (4)
NUTS (@ 90 DEGREES) WITH NO LARGER THAN 3/4" IMPAC
6- INSTALL LUBRICATED NUTS ON TOP OF LoaDISC WASH
FLANGE WITH BOLT NUMBERS ACCORDING TO CHART.
7- PROCEDE TO STEP 1 TIGHTENING BELOW.
8- REPLACE DRIFT PINS AND OLD BOLTS WITH NEW HARD

BOLTING SEQUENCE

STEP	PUMP PRESSURE	TOOL SEQUENCE	APPLIED TORQUE
1	3,000	1,2,3	925 FT LBS.
2	6,000	4,5,6,7,8,1,2,3	1,850 FT LBS.
3	6,000	4,5,6,7,8,1,2,3.... CONTINUE PATTERN UNTIL NO MOVEME	1,850 FT LBS.

BOLTING MATERIALS

QTY (INCLUDES 7% SPARES)
(35) 1-5/8"-8 X 13.5" LONG B16 STUD BOLTS
(35) 1-5/8"-8 DM LoaDISC WASHERS
(35) 1-5/8"-8 GR7 NUTS
(35) 1-5/8"-8 GR7 **LUBRICATED** COLOR CODED NUTS

GASKET
KAMMPROFILE

LUBRICANT
DOW-321 (OR EQUIVALENT)

HYTORC EQUIPMEN
QTY
(4) AVANTI-3 TOOLS
(4) AV3- 1-5/8"- SOCKE
(1) HYTORC-4 PORT P
(4) 15' HOSES
(35) 1-5/8"-8 DM LoaDIS

NOTES
1. BOLTING TECHNICIANS TO BE QUALIFIED
2. QUALIFICATION CAN BE PREFORMED ON SITE WITH ADVANCED NOTICE
3. CALL 610-247-8990 FOR ASSISTANCE

Q.A. SUPERVISOR: HYTORC DATE: 8

T/A CONTRACTOR: JJ WHITE

HYTORC® Since 1968

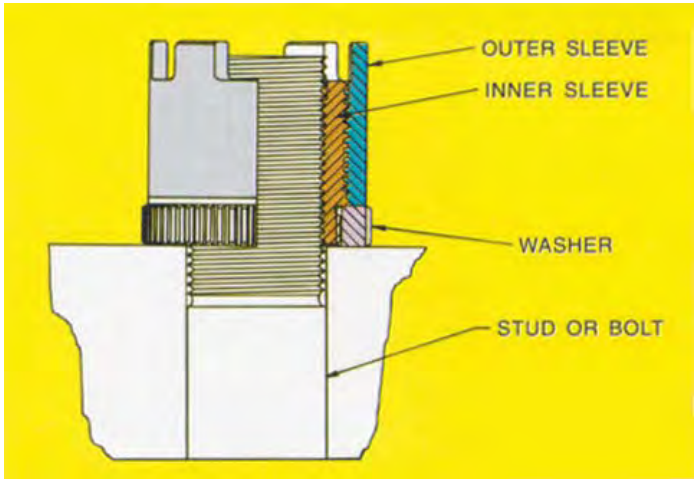
LEAKAGE-ZERO!™

THE HYTORC NUT ™

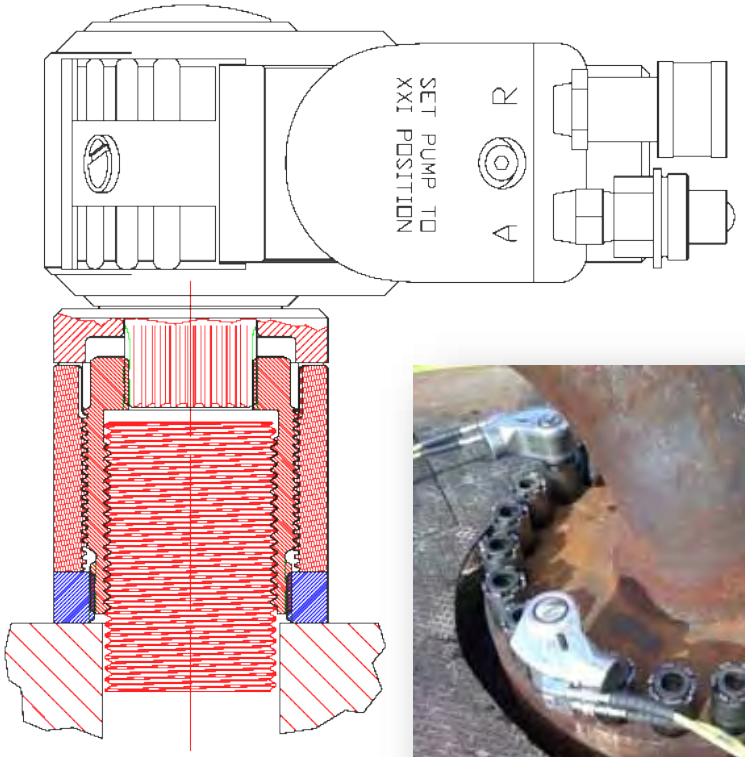
HOW DOES IT WORK?

THE HYTORC NUT

HOW DOES IT WORK?



THE HYTORC NUT® **has an Inner Sleeve, an Outer Sleeve and a Washer, which is spline-connected with the Inner Sleeve. Inner Sleeve and Washer have a higher turning friction than Outer Sleeve. When a Precision HYTORC reacts on the Inner Sleeve or the Washer and acts on the Outer Sleeve, only the Outer Sleeve turns. This raises the Inner Sleeve. As the Outer Sleeve turns at a known coefficient of friction, the bolt is stretched without side-load or torsion to the desired calibrated bolt load within 5%.**



HYTORC Nut Installation

REACTOR HEAD

HYTORC Nut Installation

EXCHANGER OEM – HEADER FLANGE

HYTORC Nut Installation

EXCHANGER – CHANNEL HEAD

HYTORC Nut Installation

STEAM VALVES

NEW METHOD: PARALLEL JOINT CLOSURE
(16) 1- 3/4" BOLTS – NEW TIME: 35 MINUTES
OLD METHOD-PREVIOUS TIME: 6 HOURS 10 MINUTES
OVER 5 HOURS OF TIME SAVED!

HYTORC TORQUE TECHNOLOGY

HYTORC TORQUE TECHNOLOGY

84″ JOINT - Loaded with 11 Tool System

HYTORC TORQUE TECHNOLOGY

Hands Free - Parallel Joint Closure

HYTORC JOB OVERSIGHT

The Installation Process from Start to Finish

From Survey to Leak-Free Startup!

1

SURVEY

3

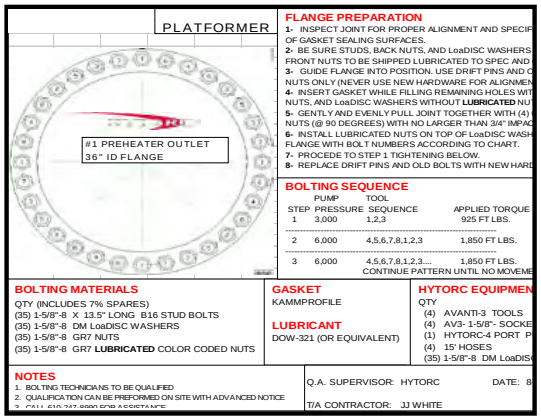
HARDWARE INSPECTION

5

INSTALLATION

HYTORC® Since 1968

2



PROCEDURES

4

FLANGE PREPARATION

6

START UP

www.HYTORC.com

HYTORC ACCREDITATIONS

CERTIFICATES AND RECOMMENDATIONS

CERTIFICATES & ACCREDITATIONS

Confirmation

This is to confirm that

Hytorc Devision Unex Corporation,
Jetyd Corporation
333 route 17 north
USA – 7430 Mahwah, New Jersey

having satisfied the criteria of a QA system survey performed on the basis of

Standard KTA 1401

fulfills the conditions for

planning (design) and manufacturing of tools and other products to achieve the desired bolt tension with precision on safety related components in the nuclear industry.

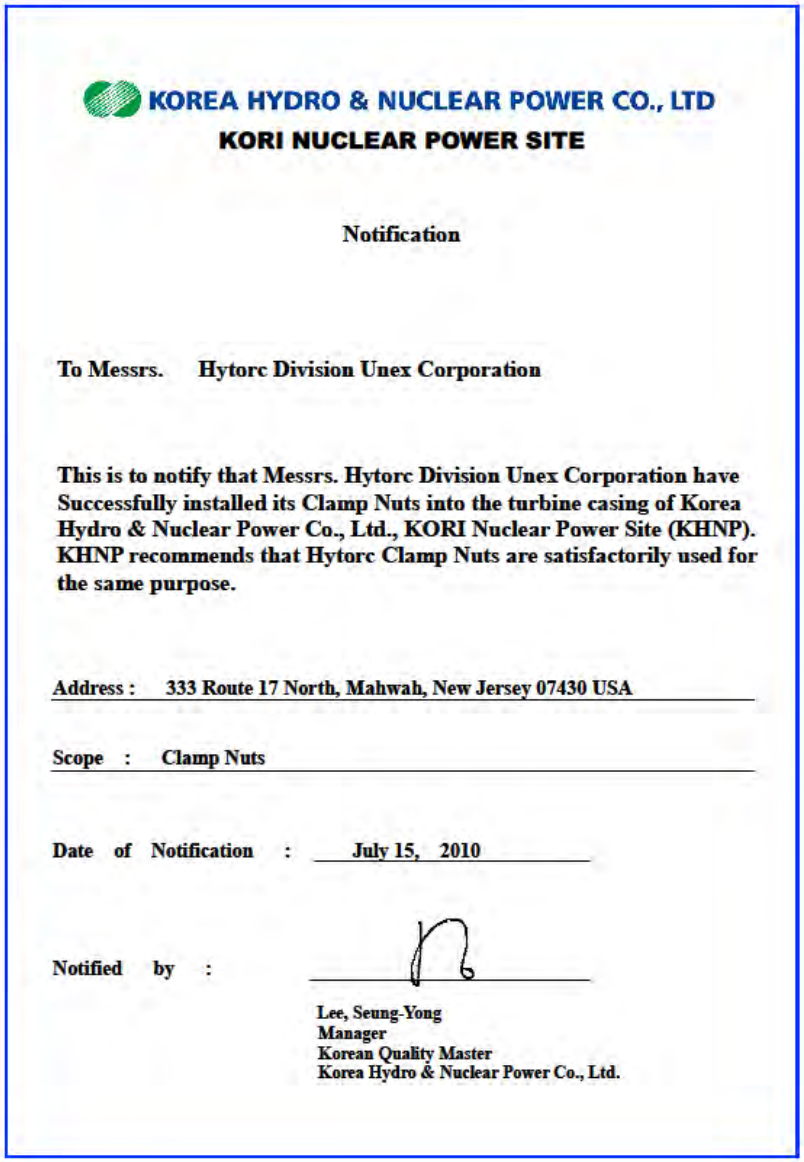
The confirmation is valid until

October 21, 2011

provided that the conditions underlying the evaluation have not changed.
Evaluation details are given in report STE-G/2008/en/0097.

AREVA NP GmbH
Erlangen, November 6, 2008

Gräber Managing Director | Reimann Head of Department



KOREA HYDRO & NUCLEAR POWER CO., LTD
KORI NUCLEAR POWER SITE

Notification

To Messrs. Hytorc Division Unex Corporation

This is to notify that Messrs. Hytorc Division Unex Corporation have Successfully installed its Clamp Nuts into the turbine casing of Korea Hydro & Nuclear Power Co., Ltd., KORI Nuclear Power Site (KHNP). KHNP recommends that Hytorc Clamp Nuts are satisfactorily used for the same purpose.

Address : 333 Route 17 North, Mahwah, New Jersey 07430 USA

Scope : Clamp Nuts

Date of Notification : July 15, 2010

Notified by :

Lee, Seung-Yong
Manager
Korean Quality Master
Korea Hydro & Nuclear Power Co., Ltd.

CERTIFICATES & ACCREDITATIONS

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of

HYTORC Division UNEX Corporation
ADBA
JETYD Corporation
Mahwah, New Jersey, USA

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards

ISO 9001:2008

The Quality Management System is applicable to:

Design, Management of Manufacture and the In-house Service and Repair of Hydraulic Torque Wrenches, Links, Pumps, Sockets, Control Systems, One-off Tools for Special Applications, Load Disc, Three Piece Clamp Assemblies and Pneumatic Torque Guns.

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

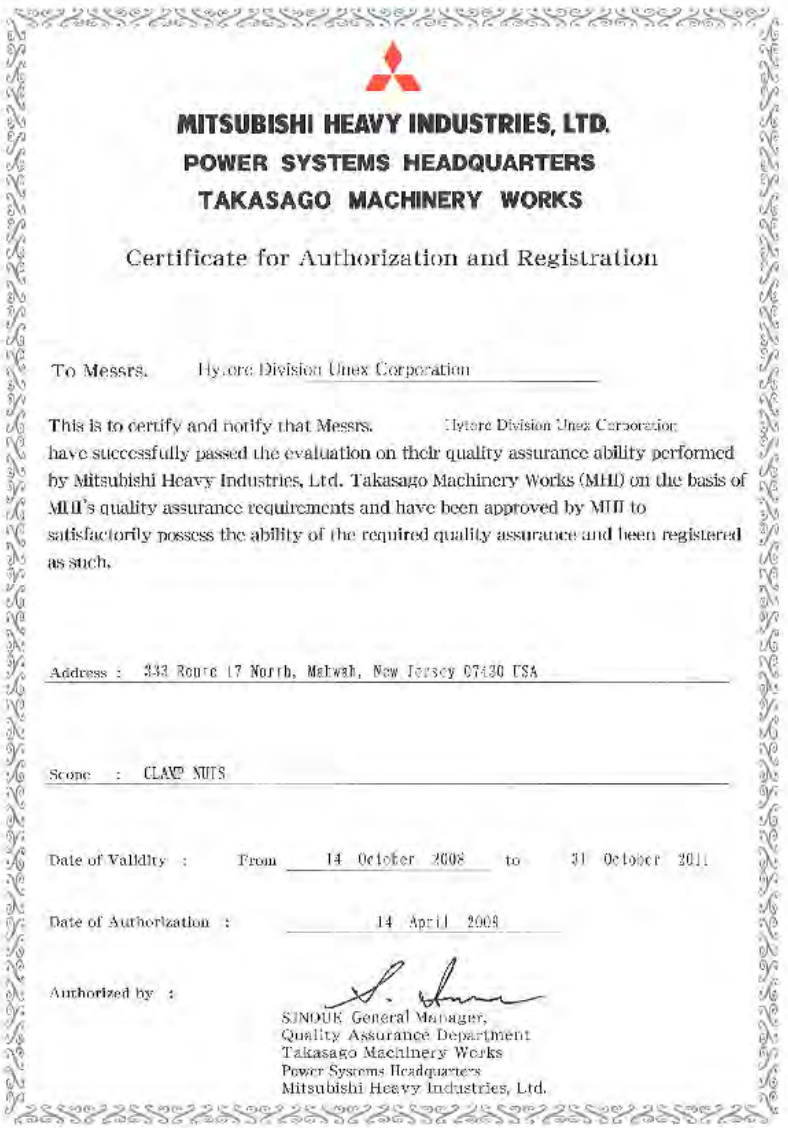
Approval Certificate No: UQA 0103383

Orgina Approval: November 8, 1994
Current Certificate: June 6, 2010
Certificate Expiry: November 10, 2012

Issued by: Lloyd's Register Quality Assurance, Inc.

ANAB ACCREDITED

This document is subject to the provision on the reverse
1401 Enclave Parkway, Suite 200, Houston, Texas 77077, USA



MITSUBISHI HEAVY INDUSTRIES, LTD.
POWER SYSTEMS HEADQUARTERS
TAKASAGO MACHINERY WORKS

Certificate for Authorization and Registration

To Messrs. Hytorc Division Unex Corporation

This is to certify and notify that Messrs. Hytorc Division Unex Corporation have successfully passed the evaluation on their quality assurance ability performed by Mitsubishi Heavy Industries, Ltd. Takasago Machinery Works (MHI) on the basis of MHI's quality assurance requirements and have been approved by MHI to satisfactorily possess the ability of the required quality assurance and been registered as such.

Address : 333 Route 17 North, Mahwah, New Jersey 07430 USA

Scope : CLAMP NUTS

Date of Validity : From 14 October 2008 to 31 October 2011

Date of Authorization : 14 April 2009

Authorized by :

SINOUE General Manager,
Quality Assurance Department
Takasago Machinery Works
Power Systems Headquarters
Mitsubishi Heavy Industries, Ltd.

HYTORC® Since 1968

CERTIFICATES & ACCREDITATIONS

Reduction of Maintenance Time by using HYTORC® Fastening Elements

Scope of Supply

The duration of maintenance or inspection activities can in many cases be considerably reduced by optimization of the fasteners. Our intention is to prevent the replacement of overstressed or damaged bolts, the reworking of surfaces, additional maintenance time, which is caused by the connection operations, and also to reduce the time required for such operations.

Siemens Power Generation and HYTORC® have concluded a master agreement to implement HYTORC® fastener solutions for different areas of application on power plants.

Main areas of application for HYTORC® fastening elements

The concept includes the replacement of cap nuts, round nuts and hexagonal nuts with HYTORC® Clamp Nuts or HYTORC® Smart Studs.

- **Valves**
  These are among the most service-intensive components of a turbine. Shortening the screw-in time can directly affect the duration of the downtime
- **Turbine casing**
  By using HYTORC® fasteners up to two days of turbine inspection duration can be saved for bolting and unbolting process of the casing. This can be especially important, if turbine maintenance requires more time than maintenance of the other components included in the revision scope
- **Coupling**
  Coupling bolts in combination with HYTORC® Clamp Nuts are stretched to the required pretensioning force without torsional or lateral loading. Use of this combination not only speeds up the connecting operation, it also limits potential impact on the turbine shaft, and a crane is not required
- **Bearing housing**
  Bearing play adjustment is simplified due to the transverse-force-free screw-in action
- **Flange bolts**
  All relative movements take place within the HYTORC® fastening elements, which protects the bolts and the contact surfaces. This is particularly important with ductile pressure vessels and flange materials.

As a general rule, nearly all bolts can be optimized using HYTORC® fastening elements. The most important advantages are achieved, when the duration of an outage can be minimized by the connection task, and when damage to stud bolts and contact surfaces due to frequent connecting operations can be avoided.

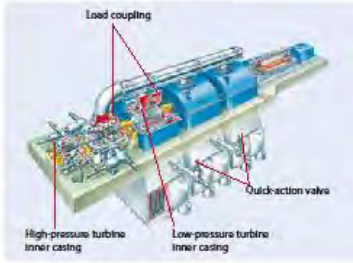


Fig. 1: Main areas of application for HYTORC® fastening elements

Corrective & Preventive Maintenance – Steam Turbine

Power Generation Service

SIEMENS

LABORATORY TESTING INC.
www.labtesting.com

Nadcap ACCREDITED

800-219-9095
Fax: 800-219-9096
E-mail: sales@labtesting.com

2331 Topaz Drive, Hatfield, PA 19440

July 27, 2010

Mr. Koshy Sachariak.
Quality Manager
Jetyd Hytorc Corporation
333 Route North
Mahwah, NJ 07430

Reference: Quality Assurance Audit/Survey, July 20, 2010 – Audit No. Hytorc-2010-01

Dear Mr. Sachariak:

On July 20, 2010, Laboratory Testing, Inc. conducted an Audit / Survey to approve Hytorc as a source to calibrate Hytorc equipment.

The audit focused on the implementation of Hytorc's Quality Manual Version 1 0, dated 1/07/2010. Verification of conformance to the above manual was completed using an audit / survey checklist to document the supporting objective evidence and there were no discrepancies found.

Hytorc's Quality Manual complies with the requirements of Laboratory Testing, Inc. Quality Program and is approved and placed on our Approved Vendors List. This approval will remain in effect for three years with acceptable annual evaluations.

We would like to take this opportunity to thank you for the time and courtesy extended to the lead auditor.

Yours truly,

Donald J. DiFilippo
Lead Auditor
Laboratory Testing, Inc.

Approved by,

Frank Peszka
QA Manager / Lead Auditor
Laboratory Testing, Inc.

Materials Testing • Nondestructive Testing • Specimen Machining • Failure Analysis • Calibration

CERTIFICATES & ACCREDITATIONS

PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

HYTORC, Division UNEX Corp
333 Route 17 North, Mahwah, NJ 07430
120 Wesley Street, South Hackensack, NJ 07606
222 Burgess Drive, Suite #1, Broussard, LA 70518
1105 East Broadway, Sweetwater, TX 79556

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2005

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (as outlined by the joint ISO-ILAC-IAF Communiqué dated January 2009):

Calibration of Hydraulic Pneumatic Torque Wrenches and Hydraulic Pressure Gauge
(As detailed in the supplement)

Such testing and/or calibration services shall only be offered at or from the address given above. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President/Operations Manager

The validity of this certificate is mandated through ongoing surveillance.

Perry Johnson Laboratory Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

Initial Accreditation Date:	Issue Date:	Expiration Date:
September 18, 2010	September 18, 2010	September 17, 2012
Accreditation No.:	Certificate No.:	Page No.:
66167	L10-140	Page 1 of 3

Det Norske Veritas
North America

MANUFACTURER'S REPEAT APPROVAL
Continuation of manufacturing according to AD-Standard W0 / TRD 100
pertaining to audit report No.: 1216 dated January 31, 2008

JETYD
120 Wesley Street
South Hackensack, New Jersey 07606
USA

1. We hereby confirm, with respect to the scope of approval listed in the annex, that the manufacturer's qualification pursuant to AD-Standard W0 / TRD 100 has been fulfilled.
2. According to our audit report # 1216 dated January 31, 2008, JETYD has the following:
2.1 Equipment and capability, that allows state of the art production and testing in accordance with applicable requirements.
2.2 A quality assurance system safeguarding the handling and processing of materials listed in the annex and to guaranteeing compliance with the relevant requirements.
2.3 Qualified personnel for supervision and testing, including works inspectors.
3. JETYD is obligated to notify the DNV inspector of essential changes or alterations regarding an expansion of the scope of approval, employment of new production processes and changes in supervisory and testing personnel and works inspectors. This may require a new facility audit and evaluation. The costs for such audits will be charged to JETYD, 120 Wesley Street, South Hackensack, New Jersey 07606 - USA.
4. This approval **expires December 2008** and is subject to the provisions of the agreement set fourth in the application. The validity may be extended upon request. The DNV inspector is entitled to verify compliance with the requirements in case of doubt at any time (i.e. audit). The costs for such audits will be charged to JETYD, 120 Wesley Street, South Hackensack, New Jersey 07606 - USA.

The conditions imposed in the Audit Reports previously issued remain effective.

Chicago, IL; May 30, 2008

Thomas Schmidt, Tel.: +1-312-243-3232

CERTIFICATES & ACCREDITATIONS

BASF Aktiengesellschaft
67056 Ludwigshafen

BASF

Materials Engineering

Report **202.1494**

Investigation of Bolting Processes

8-26-2003/wm
WLF/FF - L443
Dr. Rudolf Drumm
Phone 56370

Summary

The machine parts DISC and CLAMP developed by Hytorc were compared on the bolting apparatus developed in WLF/FF using normal DIN nuts.

In addition, two wrenches were tested, one was a Hytorc product that had a coarse-toothed ratchet with a torsion retention ratchet system, and the comparable product had a fine-toothed ratchet without a torsion retention ratchet system. The experiments showed that when the CLAMP is used, the bolts are elongated absolutely free of torsion and lateral load with only very small scatter.

With the completely newly developed DISC we found that it, like the CLAMP, allows bolting without support. The scatter is extremely small, and the ratio of longitudinal force to torsional moment is similar to that of DIN nuts.

Static tensile tests and dynamic fatigue tests showed that CLAMP and DISC do not cause weakening and that the failure site and type are similar to those for normal bolt connections.

WLF/FF
Drumm

Client
Mr. Junkers
Hytorc
Krailling
Account code:
55108587
Order:

Pages of text: 14
Pages of figures: 11
Attachments: 0

Wood Group Colombia S.A.

Bogotá, 26 of June 2007

Cra. 11 A # 93 - 67
Of. 501
Bogotá, Colombia
A.A. 253723

Tel: +57 (1) 621-2425
Fax: +57 (1) 621-2264
www.woodgroup.com

Sr.
WOOD GROUP

Ref.: Letter of Endorsement

For more than ten years HYTORC has been supporting Wood Group Colombia, in our maintenance activities with BP. They have been invaluable in helping us ensure the high standards of efficiency, quality and safety that we and our clients demand.

Recently HYTORC introduced their Load Disc technology to our operations. The Load Disc was used successfully on the latest turnaround at BP Cupiagua Production Facility on May 17-18, 2007. This outage had a potential impact of USD 3 million per day in lost production at risk.

The work performed by HYTORC with their new bolting system involved the removal and replacement of two critical valves. The result was a reduction of 20 hours in the turnaround vs. the previous time.

In addition we identified the following advantages and results from the new HYTORC Load Disc methodology:

- No leaks at startup or since
- Safety advantages which avoided bolting accidents because the Load Disc is a hands-free tool

Our experience with HYTORC has been most satisfactory. Their achievement helped us perform our maintenance much faster, with much greater safety and with zero leaks and full flange integrity.

Sincerely,

CARLOS LOZANO
GENERAL MANAGER O&M
Wood Group Colombia S.A.

Revisión No. 0 Fecha de Revisión: 30/11/2005 Página 1 de 1

Documento Impreso No Controlado

Notes

Notes

TORQUE / TENSION TOOLS

Contact

HYTORC, Division UNEX Corporation
333 Route 17N, Mahwah, NJ 07430. USA
Tel.: +1 201 512-9500
Fax: +1 201 512-9615

Email: info@hytorc.com
Web: www.HYTORC.com

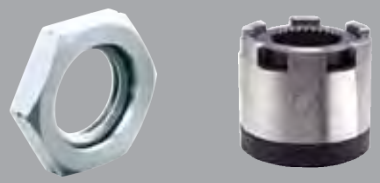
HYDRAULIC, 10,000 PSI PUMPS

Contact

HYTORC, Division UNEX Corporation
333 Route 17N, Mahwah, NJ 07430. USA
Tel.: +1 201 512-9500
Fax: +1 201 512-9615

Email: info@hytorc.com
Web: www.HYTORC.com

HYTORC NUT & HYTORC WASHER



Contact:

JETYD Corporation
120 Wesley Street, South Hackensack, NJ 07606
Tel.: +1 201 343-4570
Fax: +1 201 828-5224

Email: info@jetyd.com
Web: www.JETYD.com

HYTORC® Since 1968

HYTORC®
Since 1968