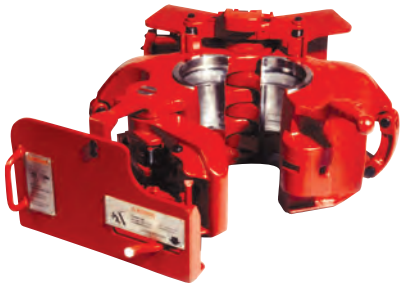
USER'S MANUAL

Elevators

Air Operated Elevators



REFERENCE Air Operated Elevators	REFERENCE DESCRIPTION Elevators
	VarcoBJ BV Nijverheidsweg 45 4879 AP Etten-Leur P.O. Box 17 4870 AA Etten-Leur The Netherlands Tel + 31-76-5083000 Fax + 31-76-5046000 www.nov.com
DOCUMENT NUMBER **50000830-MAN-001**	REV **C** Print: Okt 2016

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NATIONAL OILWELL VARCO

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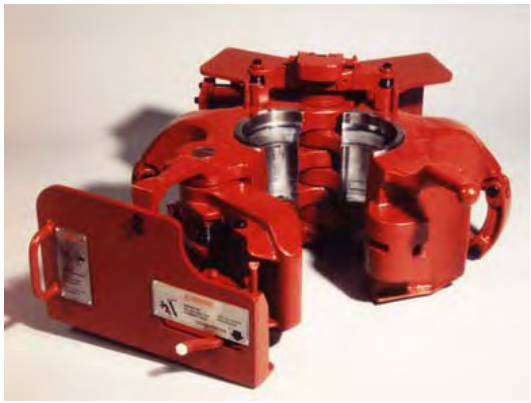

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	NOVBJ BV Nijverheidsweg 45 4879AP Etten-Leur Tel: +31-76-5083000 Fax: +31-76-5046000	
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Revision History

Rev	Date	Reason for issue
C	Oktober 2016	Update
B	December 2015	Update
A	20.05.2008	Reprint + update
-	Sept. 2005	First release

Change Description

Revision	Change Description
A	Chapter Installation and Commissioning: Caution added with regard to pneumatics
A	Chapter Drawings: Trigger fingers lists updated and corrected and various partnumbers corrected
A	Chapter Maintenance: Weekly inspection updated
A	Chapter General information: Part numbers corrected
B	Chapter Parts & Spare parts added
B	Chapter Specifications: Dimensions and weights slips HYC and DC Dolly added
B	Chapter Lubrications and Maintenance: maintenance and inspection schedules added
B	Chapter Operation: determining pipe crushing loads HYC added
B	Chapter Assembly: assembly TA and G elevator added, small changes
B	Chapter Trouble shooting: Pipe is stuck in elevator added
B	Chapter Drawings: MSDS added, Bore code drawings and Wedge measuring instructions added
B	Assembly drawings with parts moved from Chapter Drawings to Chapter Parts & Spare parts
C	Chapter assembly: changed lockbar assembly procedure
C	Chapter installation and commissioning / operation: emphesized safe operation, indication pin

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General information

Instructions

Original Instructions are published in English; in the event the end-user may wish to obtain a translation of these in the official language of the country in which the machinery is to be used please contact your local NOV representative. Please note that this service may not be free of charge. Original Instruction can be downloaded from www.NOV.com/drilling

Оригиналните инструкции са публикувани на английски език; в случай, че крайният потребител желае да получи превод на тези инструкции на официалния език на държавата, в която се използва оборудването, моля, свържете се с вашия местен представител на NOV. Моля, имайте предвид, че тази услуга може да не е безплатна. Оригиналните инструкции могат да бъдат изтеглени от: www.NOV.com/drilling

Původní návod je zveřejněn v angličtině; pokud si koncový uživatel přeje získat překlad návodu v úředním jazyce země, ve které se zařízení bude používat, může se obrátit na místního zástupce společnosti NOV. Upozorňujeme, že tato služba nemusí být zdarma. Původní návod je k dispozici ke stažení na adrese www.NOV.com/drilling

Juhendi originaal on avaldatud inglise keeles. Kui lõppkasutaja soovib tõlget selle riigi ametlikus keeles, kus seadmeid kasutatakse, palume pöörduda NOV-i kohaliku esindaja poole. Palume silmas pidada, et see teenus ei pruugi olla tasuta. Juhendi originaali saab alla laadida veebisaidilt www.NOV.com/drilling.

Instrukcijų originalas yra skelbiamas anglų kalba. Jei galutinis vartotojas norėtų gauti šių instrukcijų vertimą į šalies, kurioje įrengimai turi būti naudojami, oficialiąją kalbą, reikėtų kreiptis į vietinį NOV atstovą. Prašome atkreipti dėmesį, kad ši paslauga gali būti mokama. Instrukcijų originalą galima parsisiųsdinti iš tinklalapio www.NOV.com/drilling

Šo norādījumu oriģinālvaloda ir angļu valoda; gadījumā, ja jūs kā gala lietotājs vēlaties saņemt norādījumu tulkojumu tās valsts oficiālajā valodā, kurā šī mašīna tiks lietota, lūdzu, sazinieties ar vietējo „NOV" pārstāvi. Lūdzu, ņemiet vērā, ka šis var nebūt bezmaksas pakalpojums. Norādījumus oriģinālvalodā varat lejupielādēt no vietnes www.NOV.com/drilling

A használati utasítások eredetileg angol nyelven kerülnek kiadásra. Amennyiben a végfelhasználó meg szeretne kapni azon ország hivatalos nyelvén készült fordításukat, ahol a gépet használni fogják, akkor kérjük, vegye fel a kapcsolatot a NOV helyi képviselőjével. Kérjük, vegye figyelembe, hogy ezt a szolgáltatást esetleg nem tudjuk díjmentesen nyújtani. Az eredeti használati utasítás a www.NOV.com/drilling oldalról tölthető le.

Oryginalne instrukcje zostały wydane w języku angielskim. Aby uzyskać tłumaczenie tych instrukcji na język kraju, w którym urządzenie ma być używane, należy skontaktować się z lokalnym przedstawicielem firmy NOV. Należy pamiętać, że taka usługa jest płatna. Oryginalną instrukcję można pobrać na stronie www.NOV.com/drilling

As Instruções Originais são publicadas em inglês; se o utilizador final pretender obter uma tradução destas instruções no idioma oficial do país onde a maquinaria vai ser utilizada, deverá contactar o representante local da NOV. Chamamos a atenção para o facto de este serviço poder não ser gratuito. As Instruções Originais podem ser transferidas a partir do site www.NOV.com/drilling

Instrucțiunile originale sunt publicate în limba engleză; în eventualitatea în care utilizatorul final doreşte să obțină o traducere a acestora în limba oficială a țării în care se vor folosi utilajele, vă rugăm să luați legătura cu reprezentantul NOV local. Vă rugăm să rețineți că este posibil ca acest serviciu să nu fie gratuit. Instrucțiunile originale pot fi descărcate de pe www.NOV.com/drilling

Pôvodný návod je vydaný v anglickom jazyku. Ak si koncový používateľ želá získať preklad v úradnom jazyku štátu, v ktorom sa stroj bude používať, obráťte sa na miestneho zástupcu spoločnosti NOV. Upozorňujeme, že táto služba nemusí byť bezplatná. Originálny návod je k dispozícii na prevzatie zo stránky www.NOV.com/drilling.

Originalna navodila so objavljena v angleščini; če končni uporabnik želi prevod teh navodil v uradnem jeziku države, kjer se bodo stroji uporabljali, se obrnite na lokalnega predstavnika podjetja NOV. Ta storitev mogoče ne bo brezplačna. Originalna navodila lahko prenesete s spletne strani www.NOV.com/drilling

De originale anvisninger er udgivet på engelsk. Måtte slutbrugeren ønske at få en oversættelse af disse i det officielle sprog af det land, hvor maskineriet skal bruges, henvises der til den lokale NOV-repræsentant. Bemærk venligst at denne service måske ikke er gratis. De originale anvisninger kan downloades fra www.NOV.com/drilling

Die Originalanleitung erscheint in englischer Sprache. Wünscht der Endverbraucher eine Übersetzung dieser Anleitung in der offiziellen Sprache des Landes, in dem die Maschine benutzt werden soll, dann wenden Sie sich bitte an Ihren örtlichen NOV-Vertreter. Bitte beachten Sie, dass diese Dienstleistung möglicherweise nicht kostenlos ist. Die Originalanleitung können Sie unter folgendem Link herunterladen: www.NOV.com/drilling.

Las instrucciones originales son publicadas en inglés. En el caso de que el usuario final quiera obtener una traducción en el idioma oficial del país donde la maquinaria será utilizada, debe ponerse en contacto con su representante local de NOV. Tenga en cuenta que este servicio puede conllevar gastos. Es posible descargar las instrucciones originales desde www.NOV.com/drilling.

Alkuperäiset ohjeet on julkaistu englannin kielellä; mikäli loppukäyttäjä haluaa saada niiden käännöksen sen maan virallisella kielellä, jossa konetta käytetään, on otettava yhteys paikalliseen NOV-edustajaan. On mahdollista, että tästä palvelusta peritään maksu. Alkuperäiset ohjeet voi ladata osoitteesta www.NOV.com/drilling

Les consignes originales sont publiées en anglais; dans le cas où l'utilisateur final demande une traduction de ces consignes vers la langue officielle du pays dans lequel la machine doit être utilisée, veuillez contacter le représentant NOV sur place. Le service de traduction peut être payant. Les consignes originales peuvent être téléchargées du site www.NOV.com/drilling.

Foilsítear Treoracha bunúsacha sa Bhéarla; i gcás ar mian leis an úsáideoir aistriúchán a fháil i dteanga oifigiúil na tíre ina bhfuil an t-innealra le húsáid déan teagmháil le d'ionadaí áitiúil NOV le do thoil. Bíodh a fhios agat gur féidir nach bhfuil an tseirbhís sin saor in aisce. Is féidir Treoir Bhunúsach a íoslódáil ag www.NOV.com/drilling

Οι αρχικές οδηγίες δημοσιεύθηκαν στην Αγγλική γλώσσα. Αν ο τελικός χρήστης θέλει να λάβει μια μετάφραση των οδηγιών στην επίσημη γλώσσα της χώρας που θα χρησιμοποιηθεί το μηχάνημα, μπορείτε να επικοινωνήσετε με τον τοπικό σας αντιπρόσωπο της NOV. Προσέξτε γιατί αυτή η υπηρεσία μπορεί να μην είναι δωρεάν. Τις αρχικές οδηγίες μπορείτε να τις κατεβάσετε από το www.NOV.com/drilling.

Le Istruzioni originali sono pubblicati in lingua inglese, nel caso in cui l'utente finale intenda ottenere una traduzione di queste istruzioni nella lingua ufficiale del paese in cui la macchina deve essere usata si prega di contattare il rappresentante locale della NOV. Facciamo inoltre rilevare che questo servizio può non essere a titolo gratuito. Le Istruzioni originali possono essere scaricate dal sito: www.NOV.com/drilling

Istruzzjonijiet oriġinali bl-Ingliż; jekk l-uttent aħħari jixtieq jakwista traduzzjoni ta' dawn fil-lingwa uffiċjali tal-pajjiż fejn il-makkinarju għandu jintuża kkuntattja r-rappreżentant lokali tan-NOV. Innota li dan is-servizz huwa b'xejn. L-istruzzjoni oriġinali jista' jitniżżel minn www.NOV.com/drilling

De oorspronkelijke instructies zijn in het Engels gepubliceerd. Als de eindgebruiker een vertaling van de instructies wil ontvangen in de officiële taal van het land waar de machine zal worden gebruikt, neem dan contact op met uw plaatselijke NOV vertegenwoordiger. Let op dat er kosten aan deze service verbonden kunnen zijn. De oorspronkelijke instructies kunnen worden gedownload op www.NOV.com/drilling.

Originalinstruktionerna publiceras på engelska. Om slutanvändaren önskar en översättning av dessa till det officiella språket i det land där utrustningen ska användas, kontakta den lokala NOV-representanten. Observera att denna tjänst eventuellt inte är kostnadsfri. Originalinstruktionerna kan laddas ned från www.NOV.com/drilling

Special information

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual may contain warnings about procedures which could damage equipment, make it unsafe, or cause PERSONAL INJURY. Please understand that these warnings cannot cover all conceivable ways in which service (whether or not recommended by NOV) might be done, or the possible hazardous consequences of each conceivable ways. Anyone using service procedures or tools, whether or not recommended by NOV, must be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized.

All information contained in this manual is based upon the latest product information available at any time of printing. We reserve the right to make changes at any time without notice.

Intended Audience

This manual contains installation, operation, maintenance and parts information. Information in this manual should enable qualified personnel to install, operate and troubleshoot this system.

Conventions

Notes, Cautions, and Warnings

Notes, cautions, and warnings provide readers with additional information, and to advise the reader to take specific action to protect personnel from potential injury or lethal conditions. They may also inform the reader of actions necessary to prevent equipment damage. Please pay close attention to these advisories.

Note:

Note: The note symbol indicates that additional information is provided about the current topics.

Caution:

Caution: *The caution symbol indicates that potential damage to equipment or injury to personnel exists. Follow instructions explicitly. Extreme care should be taken when performing operations or procedures preceded by this caution symbol.*

Warning:

Warning: **The warning symbol indicates a definite risk of equipment damage or danger to personnel. Failure to observe and follow proper procedures could result in serious or fatal injury to personnel, significant property loss, or significant equipment damage.**

Illustrations

Illustrations (figures) provide a graphical representation of equipment components or screen snapshots for use in identifying parts or establishing nomenclature, and may or may not be drawn to scale.

For component information specific to your rig configuration, see the technical drawings included with your NOV documentation.

Safety Requirements

NOV equipment is installed and operated in a controlled drilling rig environment involving hazardous operations and situations. Proper service and repair is important for safe and reliable operation. Operation and service procedures provided by NOV manuals are the recommended methods of performing those operations.

CAUTION: To avoid injury to personnel or equipment damage, carefully observe the following safety requirements.

General System Safety Practices

The equipment discussed in this manual may require or contain one or more utilities, such as electrical, hydraulic, pneumatic or cooling water.

⚠ *CAUTION: Read and follow the guidelines below before installing equipment or performing maintenance to avoid endangering exposed persons or damaging equipment.*

- Isolate energy sources prior to beginning work.
- Do not perform maintenance or repairs while the equipment is in operation.
- Wear proper protective equipment during equipment installation, maintenance, or repair.

Personnel Training

All personnel performing installation, operations, repair, or maintenance procedures on the equipment, or those in the vicinity of the equipment, should be trained on rig safety, tool operation, and maintenance to ensure their safety.

⚠ *CAUTION: During installation, maintenance, or repair of equipment, personnel should wear protective gear. Protective gear must be worn during certain operation.*

Contact the NOV training department for more information about equipment operation and maintenance training.

Recommended Tools

Service operations may require the use of tools designed specifically for the purpose being described. NOV recommends that only those tools specified be used when stated. Ensure that personnel and equipment safety are not jeopardized when using service procedures or tools not specifically recommended by NOV.

General System Safety Practices

The equipment discussed in this manual may require or contain one or more utilities, such as electrical, hydraulic, pneumatic, or cooling water.

⚠ *CAUTION: Before installing or performing maintenance or repairs on equipment, read the following instructions to avoid endangering exposed persons or damaging equipment.*

- Isolate all energy sources before beginning work.
- Avoid performing maintenance or repairs while the equipment is in operation.
- Wear proper protective equipment during equipment installation, maintenance, or repair.

Replacing Components

- Verify that all components (such as cables, hoses, etc.) are tagged and labelled during disassembly and reassembly of equipment to ensure correct installation.
- Replace failed or damaged components with NOV certified parts. Failure to do so could result in equipment damage, or personal injury.

Routine Maintenance

Equipment must be maintained on a regular and routine basis. See this manual for maintenance recommendations.

⚠ *CAUTION: Failure to conduct routine maintenance could result in equipment damage or injury to personnel.*

Proper Use of Equipment

NOV equipment is designed for specific functions and applications, and should be used only for their intended purpose.

Lifting

The lifting procedures should carefully be observed and carried out according to the manual.

Limited warranty

The warranty will be void if the tool or parts were either:

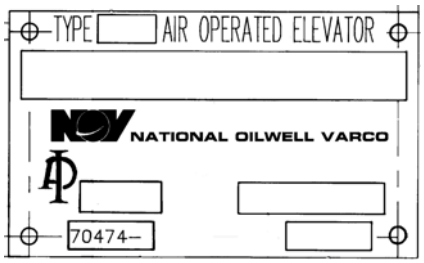
- unauthorized modified, repaired or serviced
- replacement parts not manufactured by NOV were utilized
- not properly stored or maintained(see maintenance and storage procedures)

Identification numbers

The serial number is preceded by NL.....

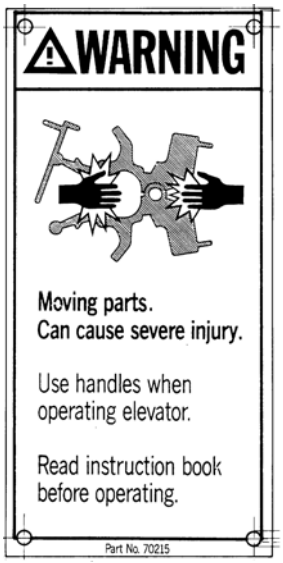
Warning plates

Warning plate part no.200005



Name plate part no. 70474-

Warning plate part no. 70216

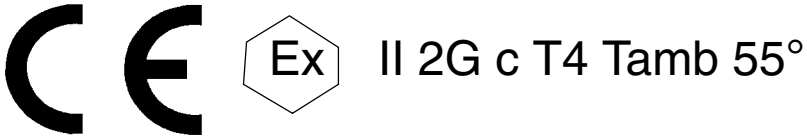


Warning plate part no. 70215

WARNING: Warning plates must be present on the Air Operated Elevator. Do not remove the labels. When a label or warning plate has disappeared, it must be replaced.

CE marking

The marking is as follows:



⚠ **WARNING: Care should be taken to avoid creating possible ignition sources, like sparks, due to improper use of the tool in combination with other equipment.**

General specifications

Air Operated Elevator use

The Air Operated Elevator is designed to be used as an elevator to to RIH (Run In Hole) and POOH (Pull Out Of Hole) drill collars with ZIP-lift and plain drill collars with lift plugs (TA), tubing and small casing (HYC) and drill pipe (MGG, GG and HGG).

Air Operated Elevator restrictions

The Air Operated Elevator is designed to be used as an elevator for lifting tubular goods in gas and oil well drilling environment and must not be used for any other purpose.

Unauthorised use

Under no circumstances should the loads applied to the elevator exceed the rated load.

Design rating according to API 8C

The design safety factor is as established per 8C according below table (for information only):

Load rating R in kN (ton)	Design safety factor SF_D
1334 kN (150 sTon) and less	3,00
1334 kN (150 sTon) to 4448 kN (500 sTon) inclusive	3,00 - (0,75 x (R - 1334) / 3114)[a] (3,00 - (0,75 x (R - 150) / 350))[b]
Over 4448 kN (500 sTon)	2,25

a In this formula, the value of R shall be in kilonewtons
b In this formula, the value of R shall be in short tons

⚠ **WARNING: The design safety factor is intended as a design criterion and shall not under any circumstances be construed as allowing loads on the equipment in excess of the load rating.**

⚠ **WARNING: To maintain API 8C compliance whenever re-manufacture or replacing any primary load bearing component, the complete unit must be load tested and MPI according NOV standards, by an authorized NOV repair facility.**

⚠ **WARNING: The load rating is the maximum operating load, both static AND dynamic, to be applied to the equipment. The design load is the sum of the static and dynamic loads that would induce the maximum allowable stress in an item.**

General specifications, requirements & sizes

Item	Subject	Description
Pneumatic system	Minimum working pressure	85 psi (585 kPa)
	Maximum working pressure	125 psi (860 kPa)
	Required volume for an opening cycle time of appr. 5 sec.	10.5 gpm (40 l/m)
Design temperatures*	Ambient temperature range	-4°F (-20°C) up to 131°F (+55°C)
	Surface temperature ATEX T5	Maximum 212°F / 100°C
*It is up to the user to ensure the temperatures as indicated will not be exceeded		
Environment	Maximum Humidity:	100% RH
	IP Rating:	IP66
Explosion safety	ATEX Category:	Category 2 G
	ATEX Gas Group:	IIB
	ATEX T Class:	T4
	ATEX EPL:	Gb
Limits	Use Limits:	Trained persons only (Users responsibility)
	Space Limits:	External limits defined by Defined in the Users Instructions
	Time Limits:	Design life = 20 years

Type and ratings (as stamped on the elevator).

			Rating	Weight	Link size	
Type	**Frame**	**Size range**	**sTon / Tonne**	**lbs / kg**	**Min**	**Max**
HYC	70166Y	2.7/8” - 7.5/8”	200 / 181	1415 / 642	2.1/4”	3.1/2”
TA	35636Y	4.3/4” - 8.5/8”	150 / 136	530 / 240	1.3/4”	3.1/2”
TA	39343Y	8.1/2” - 11.1/4”	150 / 136	550 / 249	1.3/4”	3.1/2”
MGG	36056Y	3.1/2” - 5.1/2”	250 / 226	720 / 327	2.1/4”	3.1/2”
MGG*	200057Y	3.1/2” - 5.1/2”	250 / 226	720 / 327	2.1/4”	3.1/2”
GG	35143Y	4 ” - 5.1/2”	350 / 317	720 / 327	2.1/4”	3.1/2”
HGG	70222Y	4.1/2” - 6.5/8”	500 / 453	1441 / 654	2.1/4”	3.1/2”
HGG*	200059Y	4.1/2” - 6.5/8”	500 / 453	1441 / 654	2.1/4”	3.1/2”

* with wear bushing

Dimensions & weights HYC slip assemblies

HYC

Size	Slip assembly part number	Slip setting ring part number	Insert part number	No. required	Bottom guide plate set part number	Weight Slip Ass'y		Weight Guide plate	
						[lbs]	[kg]	[lbs]	[kg]
3.1/2"	201353Y	55516	16441	24	26827-1	282	128	18	8
3.1/2" x 2.7/8" *	201355Y	201357	201356	24	201358	282	128	18	8
4.1/2" x 3.1/2"	55509Y	55516	24779	24	26827-1	275	125	15	7
4.1/2" x 4"	55510Y	55517	24781	24	26827	270	123	15	7
4.1/2"	55511Y	55518	BJ16408	24	24071-4	268	122	5	2
5.1/2" x 4.1/2"	55513Y1	55518	24785	36	24071-4	268	122	5	2
5.1/2" x 5"	55512Y	55520	24783	36	24071	251	114	14	6
5.1/2"	55513Y	55520	BJ16407	36	24071-1	238	108	13	6
7" x 5.3/4"	55515Y2	55520-1	29254	48	24071-7	238	108	13	6
7" x 6"	55515Y1	55520-1	24785	48	24071-5	234	106	10	5
7" x 6.5/8 "	55514Y	55521	24748	48	24071-3	234	106	10	5
7"	55515Y	55522	BJ16407	48	24071-2	229	104	8	4
7.5/8" x 6.5/8"	70009Y2	200217	25474-1	48	24071-3	229	104	8	4
7.5/8" x 7"	70009Y1	200440	26750-1	48	24071-2	229	104	8	4
7.5/8" x 7.1/4"	70009Y5	200440-1	39287-1	48	24071-9	230	105	7	3
7.5/8"	70009Y	70012	70010	48	24071-6	230	105	7	3
7.3/4"	70009Y4	201546	32477-1	48	24071-8	230	105	7	3

HYC-Slip sets

Ref. No	Description	No. Req.	Part. No
2 $^{7}/_{8}$" Slip size 201355Y			
170	Slip	4	201352Y1
171	Insert	48	201356
172	Insert retainer	4	201354
173	Slip setting ring	1	201357
49**	Guide plate	1	201358
4 ½" x 3 ½" Slip size 55509Y			
170	Slip	4	55303Y
171	Insert	24	24779
172	Insert retainer	4	30214
173	Slip setting ring	1	55516
49**	Guide plate	1	26827-1
4 ½" x 4" Slip size 55510Y			
170	Slip	4	55303Y
171	Insert	24	24781
172	Insert retainer	4	30214
173	Slip setting ring	1	55517
49**	Guide plate	1	26827
4 ½" Slip size 55511Y			
170	Slip	4	55303Y
171	Insert	24	BJ16408
172	Insert retainer	4	30214
173	Slip setting ring	1	55518
49**	Guide plate	1	24071-4
5 ½" Slip size 55513Y			
170	Slip	4	55304Y
171	Insert	36	BJ16407
172	Insert retainer	4	30224
173	Slip setting ring	1	55520
49**	Guide plate	1	24071-1

5 ½" x 5" Slip size 55512Y

170	Slip	4	55304Y
171	Insert	36	24783
172	Insert retainer	4	30221
173	Slip setting ring	1	55519
49**	Guide plate	1	24071

7" x 6 $^{5}/_{8}$" Slip size 55514Y

170	Slip	4	55305Y
171	Insert	48	24748
172	Insert retainer	4	30227
173	Slip setting ring	1	55521
49**	Guide plate	1	24071-3

7" Slip size 55515Y

170	Slip	4	55305Y
171	Insert	48	BJ16407
172	Insert retainer	4	30230
173	Slip setting ring	1	55522
49**	Guide plate	1	26827Y2

7 $^{5}/_{8}$" Slip size 70009Y

170	Slip	4	55305Y1
171	Insert	48	70010
172	Insert retainer	4	70011
173	Slip setting ring	1	70012
49**	Guide plate	1	24071-6

* Included in slip assembly **Not part of slip assembly

Major components

General description

The Air Operated Elevator is a tool to hoist pieces or sections of pipe up and down the derrick and is suspended from a set of links, which on their turn are suspended by a Top Drive or Hook. Depending on the type and size, the Air Operated Elevator is used to run the string to a maximum string weight up to 500 sTon (453 Tonne), pipe sizes (O.D.) from 3.1/2" up to 11.1/4".

The Air Operated Elevator can be used in combination with a link tilt to allow picking up pipe from or laying pipe down on the V-door.

How the Air Operated Elevator works

Actuation of the "Open elevator" button in the driller's console shifts a control valve that diverts air to the latch cylinder and to the main opening cylinder. See figure 1.

As pressure required to open the latch is less than that required to overcome the closing spring, the latch is opened first. When the latch cylinder opens followed by the main opening cylinder, the trigger finger found on the top of the elevator moves over center. See figure 2.

When the air flow for the cylinder "open" stops, and the elevator is fully open, the trigger mechanism will hold the elevator open.The latch assembly includes a bell cranck that holds the latch in the retracted position. See figure 3.

With latch and body/door fully open the maximum door opening is provided for moving it on to the pipe. When the open elevator moves onto the pipe, the pipe contacts the trigger finger to move the mechanism back over center and the closing spring closes the elevator. The bell crank contacts the door and releases the latch, permitting it to latch and lock over the lug on the door.

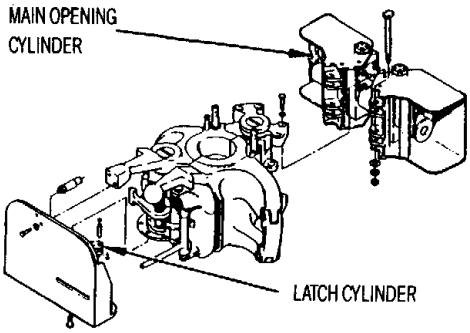


FIGURE 1

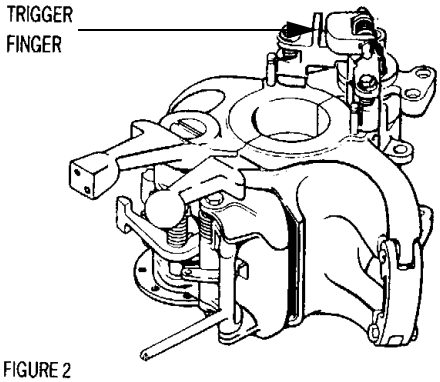


FIGURE 2

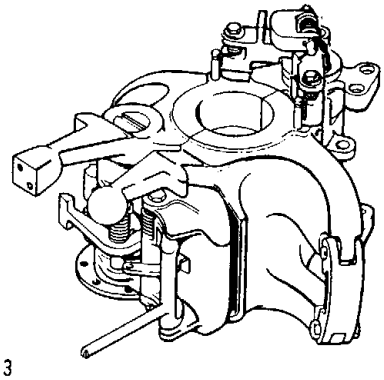


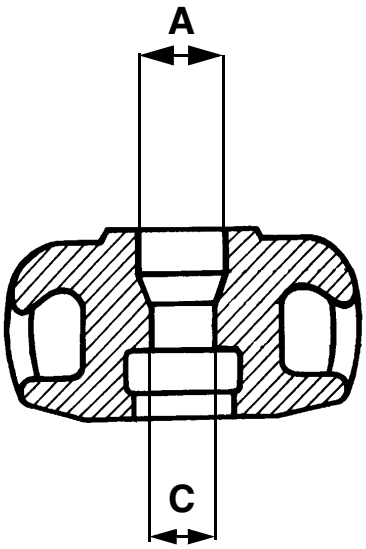
FIGURE 3

Elevator bore charts

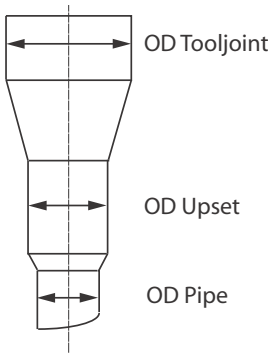
Procedure

- Prior to using any elevator, first determine the correct pipe size, bore code, rating resulting in a corresponding elevator frame part number from specification tables on these pages.
- Then determine correct bore code from bore charts on this and the following pages.
- Add this number to the frame part number for the complete elevator.
- Note that the bore diagrams give bore diagrams for all BJ elevators other than BJ 18° elevators.

18° taper elevator



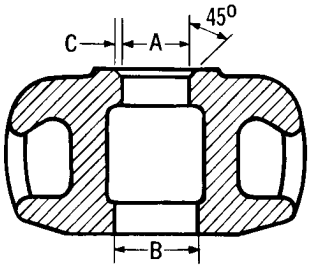
Drill pipe



Drill pipe bore codes

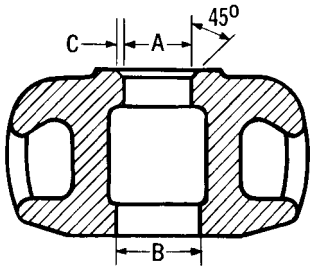
Drill pipe			Elevator			Standard	Connection	
Drill pipe size	Type Upset	Upset	Dimension	Dimension	Bore code			
Max OD		Max. OD	Center bore C (new)	Top bore A (new)	18° taper		Hydrill Wedge Thread	Grant Prideco
2.3/8"	EU	2.9/16"	2.21/32"	4.1/4"	116	OH	WT 14S, 23, 26	XT 24, 26
						NC 26 (IF)		HT 26
						SL H90		GPDS 26
						WO		
2.7/8"	EU	3.3/16"	3.9/32"	4.3/4"	118	NC 31(IF)	WT 14S, 31	XT 31
						OH		HT 31
						SL H90		GPDS 31
						WO		
3.1/2"	IU	3.11/16"	3.25/32"	5.1/2"	119	XH	WT 14S, 31	XT 31
						NC 31(SH)		HT 31
3.1/2"	EU	3.7/8"	3.31/32"	5.1/2"	120	NC 38(IF)	WT 31, 38	XT 38
						OH		HT 38
						SL H90		GPDS 38
						WO		
4"	IU	4.3/16"	4.9/32"	6.1/2"	121	NC 40(FH)	WT 31, 38, 39	XT 38, 39
						SH		HT 38, 40
						H90		GPDS 40
4"	EU	4.1/2"	4.25/32"	6.3/4"	122	NC 46(IF)	WT 40	
						OH		
						WO		
4.1/2"	IU	4.11/16"	4.25/32"	6.3/4"	122	H90	WT 38	
4.1/2"	IEU	4.11/16"	4.25/32"	6.3/4"	122	NC 46(XH)	WT 39, 40	XT 40, 46
						FH		HT 46
						NC 38(SH)		GPDS 46
						H90		
4.1/2"	EU	5" to 5.1/8"	5.1/4"	7.1/8"	123	NC 50(IF)	WT 46	XT 50
						OH		HT 50
						WO		
5"	IEU	5.1/8"	5.1/4"	7.1/8"	123	NC 50(XH)	WT 39, 40, 46, 50	XT 46, 50
								HT 50
								GPDS 50
5"	IEU	5.1/8"	5.1/4"	7.1/2"	756	5 1/2" FH		
5.1/2"	IEU	5.11/16"	5.13/16"	7.7/8"	124	FH	WT 46, 50, 54, 56	XT 54, 57
								HT 55
								GPDS 55
5.7/8"	IEU	6"	6.1/8"	8.1/4"	770			XR
5.1/2”	IEU	6"	6.1/8"	8.1/4"	770		WT 54, 56	XT 57
6.5/8"	IEU	6.3/4"	7.1/32"	8.7/8"	740	FH	WT 56, 66	XT 65
								HT 65
								GPDS 65
5.1/2"	EIU		6.233	8”	678	IF	Mannesmann	
5.7/8"		6”	6.1/4	7.7/8	789			

Drill collars with zip lift recess bore chart



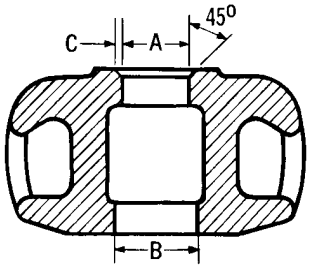
See drawing 15316-6

Plain drill collars with lift plugs bore chart



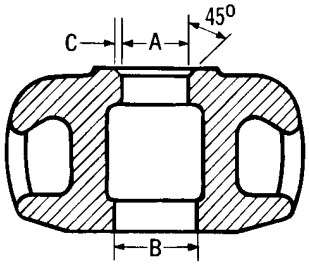
See drawing 15316-8

Tubing bore chart



See drawing 15316-3

Casing bore chart



See drawing 15316-2

DC Dolly

Part Number	Size [inches]	Rating [sTON / TONNE]	Weight [Lbs / kg]
18°type			
31189Y1	4.1/2" IF & 5" IEU	150 / 136	87 / 192
31189Y7	3.1/2" IF, Reg & FH	150 / 136	84 / 184
31189Y16	2.7/8" Plain	150 / 136	254 / 115
Collar type			
31189Y3	4.1/2" IF & 5" IEU	150 / 136	204 / 93
31189Y5	4" IF & 4.1/2" Reg & FH	150 / 136	198 / 90
31189Y9	4 FH	150 / 136	181 / 82
31189Y12	3.1/2" IF & 5" IEU	150 / 136	192 / 87
31189Y15	6.5/8" EU	150 / 136	254 / 115
31189Y10	5.1/2" IEU -18	150 / 136	209 / 95
31189Y18	5.7/8" IEU -18	150 / 136	253 / 115

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Lubrication and maintenance

Safety

WARNING: The elevator must always be in closed position, during repairs, storage and maintenance, unless it is absolutely required to work on an open elevator. In this case extreme caution must be taken to prevent injury. Ensure the safety pin is in place.

WARNING: Make sure that all pneumatic supply is isolated before ANY work is carried out to the Elevator. Shut off the Power Unit / Close the valves.

WARNING: NOV elevators are load tested after manufacture or repair. Load testing is mandatory on elevators which have not been load tested before. Load testing is required on elevators which have been overloaded, for example jarring operations or operations that have induced elevators to high accelerations or high impact loads.

WARNING: No grease or pipe dope should be used for lubricating the inserts and insert slots as this will reduce the friction coefficient resulting in higher loads on the slip toe and thus higher stress.

WARNING: Only original NOV parts must be used. Elevators are produced from cast alloy heat treated steel and must not be welded in the field. Improper welding can cause cracks and brittleness in heat-affected areas which can result in dramatic weakening of the part and possible failure. Repairs involving welding and/or machining should be performed only by an NOV authorized repair facility. Using an Elevator that has beenimproperly welded or repaired is dangerous.

NOTE: To reduce the chance of inserts seizing in the insert slots, NOV recommends to remove inserts after each job and coat the insert slot with a corrosion preventive like motor oil 10W40. .

Recommended grease

Use extreme pressure, lithium based, multi purpose grease classification according to ISO 6743-9:2003 Lubricants, industrial oil and related products (class L) - Classification - Part 9: Family X (greases) or equivalent.

Minimum requirements:

Operating temperature range	Grease type
Temp. above -20° C	EP2: L-XBAFB, NLGI grade 1 or 2
Temp. below -20°C	EP1: L-XCAFB, NLGI grade 1 or 2

Recommended slot coating

NOV recommends to coat the insert slot with a corrosion preventive like motor oil 10W40.

Recommended Air tool lubricant

It is recommended to use a proper air tool lubricant according to ISO 6743-11:1990 Lubricants, industrial oils and related products (class L) - Classification - Part 11: Family P (Pneumatic tools), classified as PAB and PBB. These fluids do not contain harmful additives that can cause damage or corrosion to components.

Operating temperature range	Lube oil type
Temp. between -40° to +20°C	ISO 5
Temp. between -30° to +30°C	ISO 10
Temp. between -8° to +64°C	ISO 32
Temp. between -2° to +73°C	ISO 46
Temp. between +4° to +84°C	ISO 68

Preventive maintenance

Maintenance schedule

Description	Daily	Weekly	Monthly	Every 6 Months	Every Year	Every 2 Years	Every 5 Years
Lubrication							
- Grease hinge, latch and latch lock pins	x						
- Grease hinges and latch pins through grease nipples	x						
- Grease underside of link ears	x						
- Grease top bore, taper surface and/ or back of slips	x						
- Grease all springs.	x						
- Grease link block fasteners	x						
- Apply grease in the grease nipples of the jaws. Grease should visible come out	x						
Maintenance							
Clean tool thoroughly				x			
Check all grease nipples are present and functioning				x			
Carry out a functional test				x			
Check tool completely							x

Inspection

Recommended inspections

NOTE: The owner / user should develop and update inspection, maintenance, repair and remanufacture procedures consistent with equipment application, loading, work environment, usage and operational conditions.

These factors may change as a result of new technology, product improvements or fundamental changes in service conditions.

Alternatively, NOV recommends using the Periodic inspection and maintenance Categories and Frequencies as mentioned in API RP8B Table 1. Long-term planning shall be adjusted in order not to interfere unnecessarily with the running operations.

Daily Inspection (when tool is in use)

Category I.

This category involves observing the equipment during operation for indications of inadequate performance. When in use, equipment shall be visually inspected on a daily basis for cracks, loose fits or connections, elongation of parts, and other signs of wear, corrosion or overloading. Any equipment found to show cracks, excessive wear, etc., shall be removed from service for further examination. The equipment shall be visually inspected by a person knowledgeable in that equipment and its function.

Category II.

This is Category I inspection plus further inspection for corrosion, deformation, loose or missing components, deterioration, proper lubrication, visible external cracks, and adjustment.

6 Monthly Inspection (when tool is in use)

Category III

This is Category II inspection plus further inspection, which should include NDT of critical areas and may involve some disassembly to access specific components and to identify wear that exceeds the manufacturer's allowable tolerances.

Annual (1 year) Inspection (when tool is in use)

Category IV

This is Category III inspection plus further inspection for which the equipment is disassembled to the extent necessary to conduct NDT of all primary-load-carrying components as defined by manufacturer. Equipment shall be:

Disassembled in a suitably-equipped facility to the extent necessary to permit full inspection of all primary-load-carrying components and other components that are critical to the equipment & Inspected for excessive wear, cracks, flaws and deformations.

Corrections shall be made in accordance with the manufacturer's recommendations. Prior to Category III and Category IV inspections, all foreign material such as dirt, paint, grease, oil, scale, etc. shall be removed from the concerned parts by a suitable method (e.g. paint-stripping, steam-cleaning, grit-blasting).* Depending on frequency and load pattern of strings handled with the elevator drill pipe bushing segments, it is recommended to decrease the time intervals for MPI inspection for drill pipe bushings to be carried out on a 3 monthly basis.

Recommended Inspection schedule

Description	Daily	6 Monthly	Annual
	Cat I & II	Cat III	Cat IV
Observe the function of the mechanism of the elevator as follows:	x		
1. Open and close the elevator 5 times to check the correct functionality. Check that both sides work flawlessly without interference	x		
2. Observe equipment during operations for indications of inadequate performance	x		
Additional inspection for HYC elevator:	x		
3. Check for proper slip movement by pressing the slip downward. The slips should come up upon releasw assuring proper condition of the slip springs	x		
4. Check that all 4 rubber bushings are installed under the slip setting ring. Replace if needed.	x		
Visually inspect and repair when needed (see figure 7)	x		
- check for leakage free fitting, tubes, hose, valves & cylinders	x		
- check hose for sings of cracks, wear or abrasion	x		
- check for worn and damaged parts	x		
- check for loose and missing parts	x		
- check condition if mechanical latch lock	x		
- check for cracks	x		
- check for corrosion	x		
- check the condition of the lock key pin	x		
- check the condition of the hinge pins	x		
- check the link adapter	x		
- check the adapter pins	x		
- check the condition of springs when present (damage, deformation, lack of tension)	x		
- check for the wear of lock key pins by checking the vertical play between body halfs	x		
- check air exhaust (on quick release valve)	x		
- check for lock-pin indicator clearance in the sleeve, both in locked and unlocked position on LH side, RH side and bottom-side of sleeve. If any interference occurs, take the elevator out of service and repair	x		
- check the proper locking of bolts and nuts, safety chains/wires, slotted nuts & cotter pins, snap rings, loching rings, lock wire	x		
Additional for HYC elevator	x		
- brush inserts clean and check for wear and missing teeth	x		
- check slip setting ring for spreading and wear in the seating area	x		
Disassemble the following parts for dimensional check acc to dwg WD-010/020/0300/ 40/050/ 51/060/080		x	
- hinge pins		x	
- hinge pin holes		x	
- link ear height		x	
MPI Link Ears as per MPI procedure		x	
- link ears			
Wedge elevator*			
- Check that latch is not forced outwards when elevator is wedged open; for wedge and measuring instruction of the inside diameter see chapter Drawings (also figure 2a)		x	
- Check there is clearance between latch and door lug at the top (figure 3)		x	
- Check latch and lug faces make contact and are parallel (figure 4)		x	
- Check that the lock hook has clearance all around the lug pin (figure 5)		x	
* For measuring the inside diameter of the elevator see Chapter Drawings: Wedge and Measuring Instructions			
Hang elevator in open position tilted forward			
Check for correct fixation of the top of the latch spring stop pin		x	

Description	Daily	6 Monthly	Annual
	Cat I & II	Cat III	Cat IV
MPI** elevator load bearing components critical areas as per MPI-procedure, using the Critical Area Drawings. Major load bearing components are:			
- Hinge/latch pins (considered 100% critical)			x
- Latches (CA-201)			x
- Elevator body (halves) (CA-300/302/304/306)			x
- Door (CA-301/303/305/307)			x
- Link adapters (considered 100% critical)			x
- Adapter pins (considered 100% critical)			x
- Inserts (considered 100% critical)			x

** Depending on frequency and load pattern of strings handled with the elevator drill pipe inserts, it is recommended to decrease the time intervals for MPI inspection for drill pipe bushings to be carries out on a 3 monthly basis

Magnetic Particle Inspection

The NOV critical area drawings will indicate which areas are considered as to be critical or non-critical. **In general; for load bearing components, in case no critical area drawing exists, the complete component is considered critical.**

Carry out MPI according to ASTM E709 or ASME BPVC sub section A, article 7 and subsection B, article 25; determine the type of defects and the degree by comparing defects to ASTM E125 reference photographs to the acceptance criteria.

Only cracks may develop and as such need to be reviewed. All other indication types have been addressed by the manufacturer during production. As such, the elevator has left the factory with indication (if at all) which were deemed acceptable. All cracks which have developed in service are relevant and need to be examined.

Machined surfaces shall be examined by the wet fluorecent method, other surfaces shall be examined by wet or dry method.

NOV elevators should be MPI examined according to the maintenance procedures. The areas subject to inspection shall be inspected according to the procedures developed by the user or, alternatively, as per API RP 8B.

Evaluations of indications

Relevant indications: Only those indications with major dimensions greater than 1/16 Inch (2 mm) and associated with a surface rupture shall be considered relevant. Relevant indications are indications that result from discontinuities within the test part.

NOTE: If any relevant indications are found, contact NOV to determine the next course of action. Preferably an inspection report (with photograph or sketch) detailing the serial number of the equipment and the type, length and location of the indication should be presented. NOV will be able to advise the proper and most efficient repair.

Qualifications and certification

All personnel performing and interpreting MPI shall be qualified in accordance with the guidelines of ASNT SNT-TC-1A (latest edition) or an equivalent standard and shall be trained in the use of the reference photographs and the interpretation of the MPI with regard to the acceptance criteria and ASTM E125 reference photographs.

Criteria for API 8A & 8C PSL 1 equipment

Type	Discontinuity description	Max. degree critical areas	Max. degree non-critical areas
I	Hot tears, cracks	None	Degree I
II	Shrinkage	Degree II	Degree II
III	Inclusions	Degree II	Degree II
IV	Internal chills and chaplets	Degree I	Degree I
V	Porosity	Degree I	Degree II

Criteria for API 8C PSL 2 equipment

Type	Discontinuity description	Max. degree critical areas	Max. degree non-critical areas
I	Hot tears, cracks	None	None
II	Shrinkage	None	Degree I
III	Inclusions	Degree I	Degree II
IV	Internal chills and chaplets	None	Degree I
V	Porosity	Degree I	Degree II

Grey area NOT applicable for MPI for equipment in service.

Wear data

Please refer to the wear data in this chapter and in chapter “Drawings”.

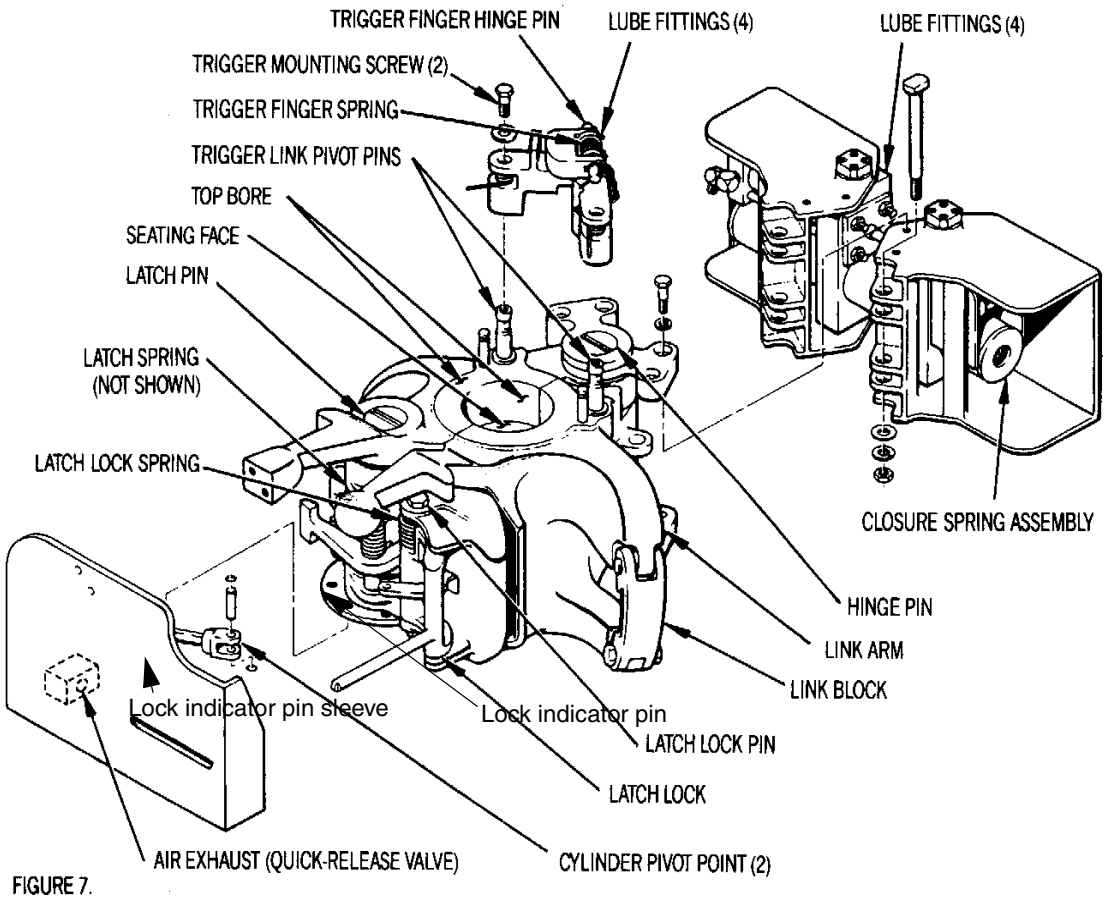


FIGURE 7.

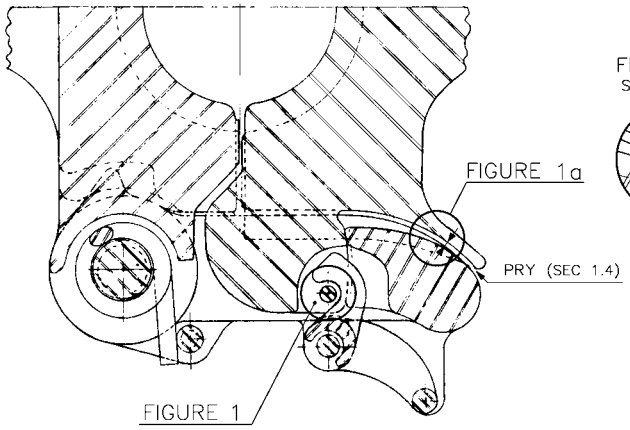


FIGURE 1a
SCALE 2:1

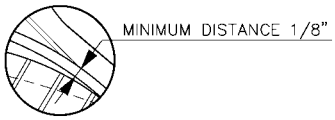


FIGURE 1
SCALE 2:1

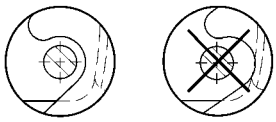
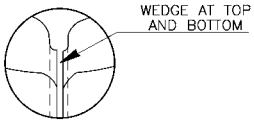


FIGURE 2a
SCALE 2:1



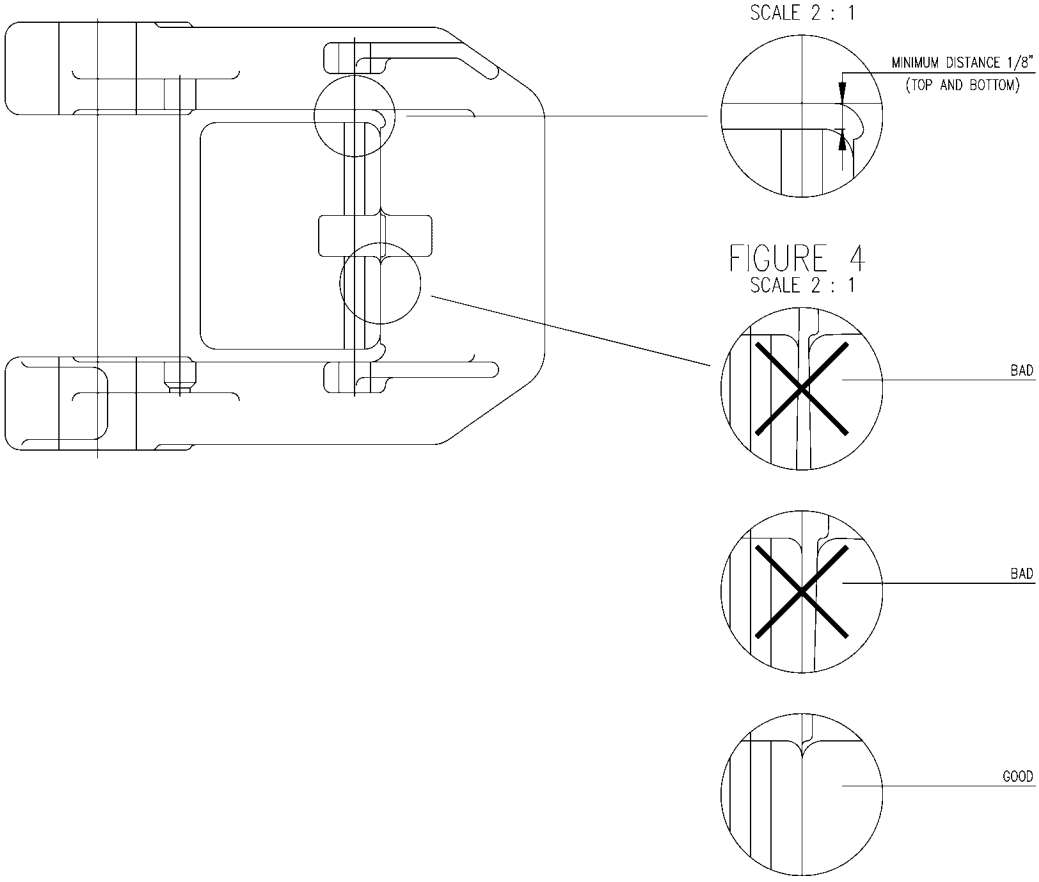


FIGURE 3
SCALE 2 : 1
MINIMUM DISTANCE 1/8"
(TOP AND BOTTOM)
FIGURE 4
SCALE 2 : 1
BAD
BAD
GOOD

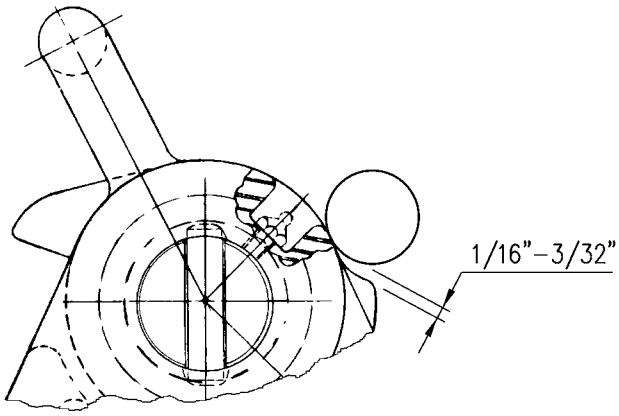

1/16"–3/32"

FIGURE 5

Wear criteria general notes

WARNING: The inspection criteria and maximum wear allowances contained in this (these) document(s) are only valid when the related equipment is in good condition, has not been misused, and does not have excessive wear, cracks or other defects, or previous weld repair. These inspection criteria and maximum wear allowances apply only to certain critical components and, as such, cannot on their own determine the overall condition of the equipment and its suitability for continued use

General dimensions

CAUTION: Ensure dimensions and requirements are according to API RP-7G

Casing & tubing

WARNING: Air Operated Elevators which have experienced wear beyond allowable limits or are found to have cracks must be replaced or repaired by a NOV authorized repair facility only.

CAUTION: Wear data are applicable for lifting casing & tubing with regular coupling with dimensions and tolerances according to API 5-CT

Drill collar with zip-lift recess bore acc. to API RP-7G

Table 1

Drill collar O.D. range	Top bore	Bottom bore	Bevel on top bore
4” to 4-5/8”	O.D. minus 5/16”	O.D. plus 1/8”	1/16”
4-3/4” to 5-5/8”	O.D. minus 3/8”	O.D. plus 1/8”	1/16”
5-3/4” to 6-5/8”	O.D. minus 1/2”	O.D. plus 1/8”	1/16”
6-3/4” to 8-5/8”	O.D. minus 9/16”	O.D. plus 1/8”	3/32”
8-3/4” and larger	O.D. minus 5/8”	O.D. plus 1/8”	1/8”

Table 2

Bores for drill collar size	Maximum wear
<= 5-5/8”	New bore + 1/32”
> 5-5/8”	New bore + 1/16”

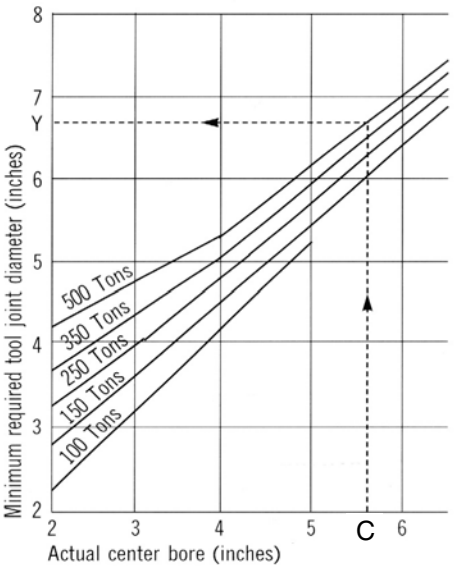
Example: See chapter “Drawings” for tables of maximum diameters

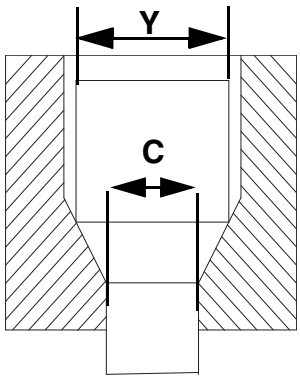
1. A new bore 4” drill collar with zip lift recess has a 4” minus 5/16” (see table 1) = **3.11/16”** top bore maximum.
2. The maximum allowable size is **3.11/16”** plus **1/32”** (see table 2) = **3.23/32”.**

Tool joint wear data drill-pipe

Procedure

1. Determine the center bore diameter of the bushing in inches (size C)
2. The maximum wear on the diameter of the center bore: Nominal size + 0.25 inch
3. In the table, follow the line corresponding with the rating of the elevator (in short tons)
4. On the left hand side, read out the minimum required tool joint diameter (Y) in inches that can be handled safely with the elevator.
5. As soon as the tool joint diameter falls below the corresponding rating line, the bushing or the pipe must be changed.





Installation and commissioning

Installation of the elevators

WARNING: Lift the elevator by the link ears only and never by other parts. Ensure the link blocks are closed.

WARNING: Prior to commencing work ensure no unsafe situations can occur.

NOTE: An elevator balancing strap may be used to adjust the tilt of the elevator. In general, it is desirable to have the handles pointing downward when open, so that the operator is in effect, lifting the elevator when closing.

Selecting the correct elevator

Procedure

1. Verify the load to be run; the load includes static and dynamic loads where the dynamic load depends on operation acceleration and in case of floaters roll and pitch.
2. Select the correct slips size. Load rating is stamped on the elevator, size on the slip.

Installing the elevator in the links

Procedure

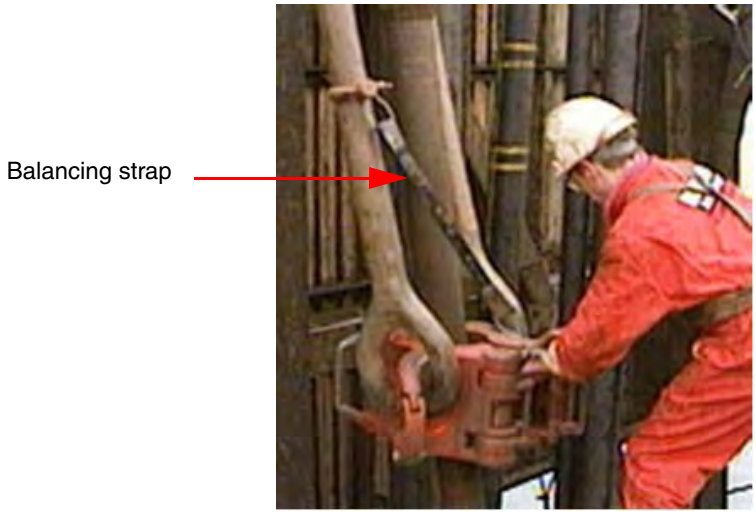
- ❑ Ensure the elevator is properly maintained (see chapter “Maintenance”)
- ❑ Ensure the elevator works properly (see chapter “Maintenance”)
- ❑ Lift the elevator to drill floor by using a two-legged sling or chain around the link ears only.
- ❑ Make sure the link block is closed and the retainer bolts are installed and secured when lifting.
- ❑ Place the elevator on the drill floor as close as possible to well center.
- ❑ Open the link blocks by removing the lower link block bolt assembly.
- ❑ Push the links in position around the elevator ears and close the link blocks
- ❑ Install the link block bolt and slotted nut.
- ❑ Secure the nuts with new cotter pins.
- ❑ Connect the pneumatic hoses
- ❑ Clean the pneumatic couplings on hose and elevator thoroughly
- ❑ Connect the pneumatic hoses with QD to the elevator.
- ❑ Balancing straps are recommended for improved elevator alignment to the pipe.
- ❑ Operate the elevator to open and close for verifying proper functioning.
- ❑ Verify that when elevator is in latched and locked position indication pin center has passed to right side of the black arrow.

Pneumatic circuit

⚠ *CAUTION: Ensure the pneumatic pressure is taken of the system once the elevator is open. A simple hand operated 2/2 normally open spring return valve is recommended.*

Installing the balancing strap (p/n 15320) for Y, G, A series

To reduce the chance the elevator tips over and help the operator to keep the elevator in the right position, a balancing strap can be installed.



Operations

Intended use

The Air Operated Elevator-elevator is designed to RUN IN HOLE (RIH) and to PULL OUT OF HOLE (POOH) of various tubulars

⚠ **WARNING: Ensure that all pneumatic lines are disconnected before ANY work is performed on the elevator.**

⚠ **WARNING: When an Air Operated Elevator is being openend or closed, the area around the elevator must be clear of personnel. Failure to do so may result in severe injury.**

⚠ **WARNING: An Air Operated Elevator is a very powerful piece of equipment when opening or closing. During use, the elevator should be manipulated only by the handles provided on the front and rear frames.**

⚠ **WARNING: To lift a load safely, the Air Operated Elevator must be latched and locked and the “closed, latched and locked” indicator pin is in place. The operator should check that the indicator pin is in the correct position prior to cemmencing load tranfer to the elevator. The indicator pin is provided on the front frame.**

⚠ **WARNING: Never use a Air Operated Elevator with a defective latch and/or latch lock and/or indicator pin.**

⚠ **WARNING: When an Air Operated Elevator is not in use, the elevator should be stored in the closed position to prevent accidental closing. If the elevator is stored in the open position the safety pin and ”hair pin, cotter” must be engaged. Failure to do so could result in serious injury or death.**

⚠ **WARNING: If the elevator is damaged, has become deformed or doesn’t function properly, take it out of service.**

Unlatching under load

⚠ **WARNING: Unlatching the Air Operated Elevator under load can cause the elevator to open, resulting in the release of the supported pipe, with risk of serious injury or death.**

Safety pin operation

Safety pin engagement for NOV Air Operated Elevators.

Models HYC and TA

Procedure

1. Place elevator in open position.
2. Remove the ”hair pin, cotter” from the trigger locking pin.
3. Place trigger locking pin behind the trigger finger on the trigger body as shown in figure 4 and reinsert the ”hair pin, cotter”.

Models HGG, MGG and GG

Procedure

1. Place elevator in open position.

2. Remove the ”hair pin, cotter” from the trigger finger hinge pin as shown in figure 5.

3. Push the trigger finger hinge pin until it moves through the eye in the trigger body and insert the ”hair pin, cotter” as shown in figure 6.

⚠ **WARNING: When disengaging the safety pin, make sure the elevator is completely cocked open to prevent accidental closing. Failure to do so could result In severe injury.**

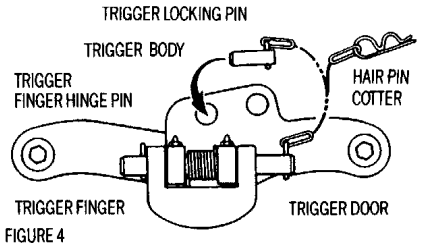


FIGURE 4

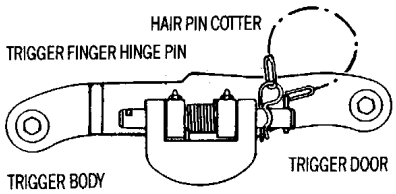


FIGURE 5

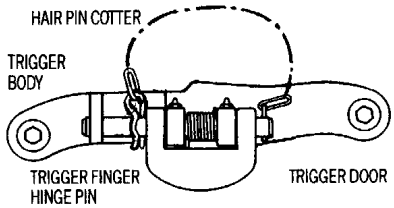


FIGURE 6

Check prior to operation

⚠ *CAUTION: Do not use an elevator if the latch and the latch lock do not function properly. The latch lock Is tested by attempting to pry the latch off the lug on the door. The latch lock should prevent this.*

Procedure

Closing the elevator

1. Check the latch end the latch lock for full engagement when closing around the pipe.
2. The size of the elevator (or slips for slip types) must be properly sized to the pipe.
3. Oversized pipe could cause difficulties in latching or possibly result in the elevator latching partially or not at all.
4. Undersized pipe could cause uneven stress distribution, inadequate load bearlng area, or possibly allow the pipe to slip through the elevator.
5. Inspect the bore (or slips), latch, latch pin and hinge pin regularly for wear to be sure the pipe does not slip down through the elevator under string weight, resulting in dropped pipe or excessive stresses in primairy load bearing parts.

Determining pipe crushing loads (HYC)

⚠ **WARNING: Keep in mind that the actual rating is determined by the pipe. Below formula is based on an ideal situation where the pipe is completely circumferential clamped. In reality, especially for big sizes, the slips do not enclose the pipe completely, hence the risk for crushing the pipe is higher.**

Applicable for casing with wall thickness t > 0.1 R. Critical hook load of pipe at slip contact.
$F = Qyp * A * \sqrt{\frac{1}{1 + \frac{RK}{L} + \left\lceil \frac{RK}{L} \right\rfloor^2}}$ No safety factor to account for dynamic factors is used in this formula
F = Crushing load in lbs.
Qyp = Yield stress of pipe in psi.
A = Sectional area of pipe in inch²
R = Outside radius of pipe in inches.
L = Length of slip contact in inches.
K = Crushing factor (used =) 2.6

Safe Working Area (SWA)

When working with the elevator there are three zones to consider:

1. Red Zone: unsafe at all times
2. Yellow Zone: unsafe but accessible when needed
3. Green Zone: safe

During operation: don't stand under the elevator: this is the Red Zone.

Keep a distance of minimal 1m/3ft from the elevator: within this distance the SWA must be considered as Yellow Zone, outside this radius Green Zone.

Operation

NOTE: Ensure that slips are activated/set by suspending load on the setting ring and are not set on friction only.

Procedure

1. Move the elevator towards the pipe. When in open position, the trigger installed on top of the elevator is activated due to being hit by the pipe entering the elevator, it is designed to close, latch and lock around the tubular.
2. Once closed verify that elevator is latched and locked. The indicator center must have passed to right side of the black arrow.
3. Once verified, move elevator slowly up along the tubular until setting ring hits collar/upset and all slip segments are pushed down by the setting ring and grip the pipe.
4. The center of the indicator pin needs to be in line with arrow-head. When the elevator is latched and locked,. the center of the indicator is not to the left side of the arrow-head. It is either in line or to right, but should not be against the end of slot.

Center indicator pin in line with arrow head.

Assembly and dis-assembly

Safety

WARNING: Use only genuine NOV parts when assembling the elevator

CAUTION: Always wear eye protection In disassembly and assembly operations. Practice safety in all performances and use approved safety methods, materials and tools. Keep hands away from any undesignated areas.

CAUTION: Be aware of the fact that springs are being used. They may cause injury when disassembling the elevator.

NOTE: All images in this chapter are for info only. Please use the official drawings for reference

NOTE: All disassembly should be performed in a dry, dirt-free area.

Field service

Outside of routine maintenance and inspections as outlined in API RP 8B latest revision, servicing of elevators must be limited to changing out of old non-load bearing parts with new genuine NOV parts.

Shop repairs

The elevator must be removed from service and returned to an authorized NOV repair facility when one or more of the following occurs:

- Indications found beyond the acceptable level as outlined in chapter "Non-destructive examination"
- Wear of specified parts Is beyond the acceptable level as outlined in chapter "Wear data"
- Use of non-standardized or non-genuine NOV parts.
- Unauthorized modifications or repairs.

The below listed activities must only be performed at a NOV facility or a NOV authorized repair shop:

- Welding
- Preheating above 150° C (300° F)
- Re-machining
- Replacement of critical load path components

Elevator Disassembly

Prior to disassembly, clean the elevator thoroughly with a steam-cleaner in order to prevent the disassembled parts from getting contaminated with dirt, mud etc..

⚠ **WARNING: To make any repairs to the NOV air operated elevator it must be removed from the links. Follow the procedures below to disassemble an elevator in need to repair. Before starting any maintenance or repair work on trigger assembly the elevator must be in the closed position. Failure to do so could result in severe injury.**

Elevator disassembly guidelines

Remove hinge, latch and latch lock pin retainers by one of the following methods (when applicable):

Splitting the lock bar/latch or hinch pin retainer by drilling through.

Procedure

1. Drill through the lock bar
2. Use a cold chisel to split the separated lock bar

Figure 1: Lock bar removed correctly

3. Do not try to remove the lock bar pin by trying to drive the hinge pin from the underside through the hole

Figure 2: WRONG: Lock bar removed by driving shaft through from underside, causing damage to elevator.

4. Remove the hinge, latch and latch lock pins to separate body, door latch and latch lock.
5. Remove link blocks and / or door latch arms by driving out the pins and unscrewing bolts and nuts.
6. To assemble the elevator reverse the above procedure where applicable

Assembly of the lockbar

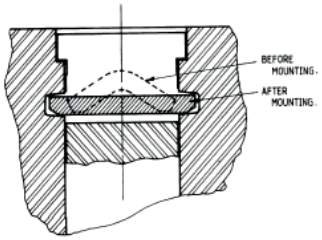
When the lockbar needs replacement, NOV recommends to pre-heat lockbars prior to installation at all times as follows:

Procedure

1. Preheat lockbar with torch, between 760°C – 816 °C / 1400°F - 1500°F (see Glowchart for reference)
2. Install lockbar in groove.
3. Drive lockbar in position by straightening with a chisel.
4. Air cool lockbar.
5. Once lockbar is back to ambient temperature elevator is ready to go back into service.

2000°F	Bright yellow	1093°C
1900°F	Dark yellow	1038°C
1800°F	Orange yellow	982°C
1700°F	Orange	927°C
1600°F	Orange red	871°C
1500°F	Bright red	816°C
1400°F	Red	760°C
1300°F	Medium red	704°C
1200°F	Dull red	649°C

GlowChart



Trigger disassembly

Use figure 8 and matching trigger assembly drawing (See parts list)

Procedure

1. Place elevator in the closed position.
2. Remove the trigger assembly by removing the two cap screws, lock washers and thrust washers on the top of the trigger link pivot pins.
3. Disengage the right hand and the left hand trigger spring by disconnecting spring legs from the groove pins
4. Remove the trigger assembly from the elevator by slipping it off the two link pivot pins
5. Remove set screws on the elevator body and the door near the base of the pivot pins
6. Remove the trigger link pivot pins from the body and the door my screwing them out with a wrench.
7. If damaged, the groove pins can be pulled or drilled out and new pins installed.
8. To remove the trigger finger hinge pin, remove the cotter pin at the opposite end from the chain assembly.
9. Drive the trigger hinge pin out of the spring and trigger finger.
10. Remove the set screw from the trigger link door.
11. To separate the trigger links remove the cotter pin from the center hinge pin and pull the hinge pin from the links
12. To re-assemble the trigger assembly, reverse the above procedure.

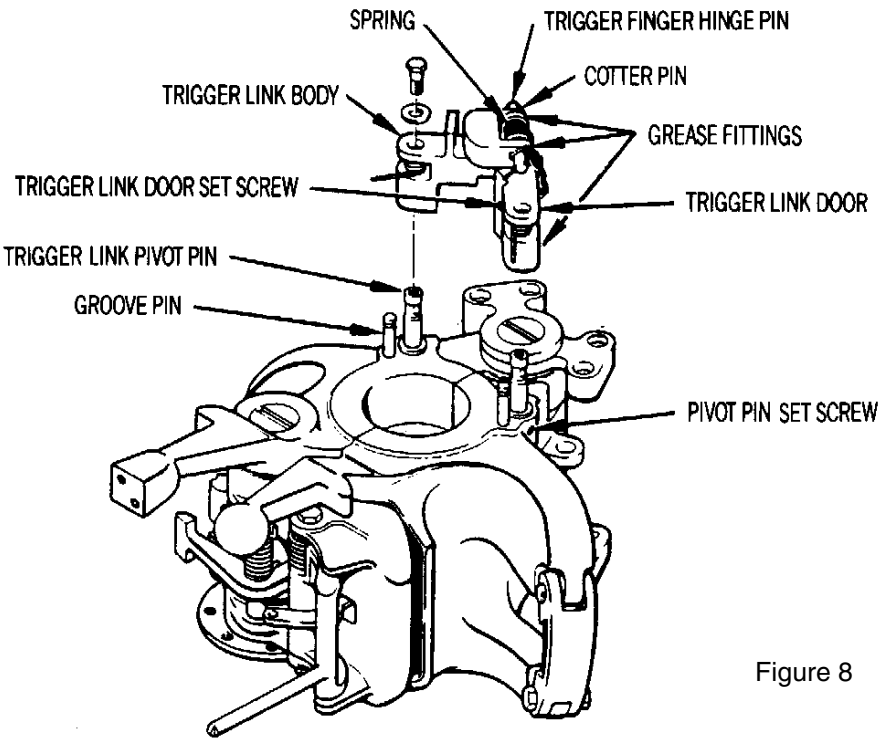


Figure 8

Rear frame disassembly

Use figure 9 and matching rear frame assembly, spring and air cylinder assembly and closing spring assembly drawing (See parts list)

WARNING: Before starting any maintenance or repair work on the rear assembly, the elevator must be in the closed position. Failure to do so could result in severe Injury to personnel

Procedure

1. Place elevator in closed position
2. Support the elevator body and door on wooden blocks in order to remove the front and rear frames
3. Relieve spring tension necessary to hold elevator closed by tightening the spring tension nut **5 full turns**. On each end of the closure spring assembly is a hole exposing a nut and tubular spring housing. The housings, acting as spring retainers, are attached by a long bolt. Turning the nut clockwise will shorten the length of the spring and reduce the tension of the closing spring to allow rear frame disassembly.
4. Remove air hose assembly between the 2 air cylinders.
5. Remove the top hinge plates by removing the lock wire and cap screws.
6. Remove the bottom rear hinge plates in the same manner.
7. Remove the 2 retaining pins nuts and washers to free the rear frame from the elevator door and body.
8. Remove the rear frame.
9. Remove the socket head cap screws and lock washers from the 4 pivot trunnions.

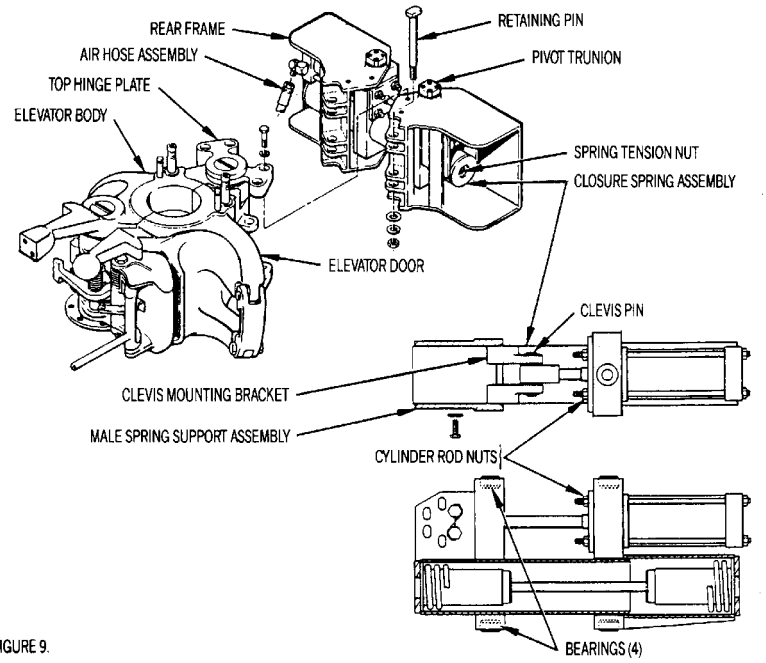


FIGURE 9.

NOTE: Each trunnion may have a set of shims that are to be retained with that trunnion and further designated top and bottom. If frame has been damaged, re-shimming may be required

10. Pull the 4 trunnions from the rear frame.
11. Remove the lock wire, lock washers and cap- screws from the male spring support assembly to free the clevis mounting bracket.
12. Retract the air cylinder assembly enough to expose the cylinder rod clevis pin.
13. Maintaining the cylinder's position, remove the retaining rings the clevis pin and drive the pin out of the cylinder rod clevis. Take care not to damage the end of the pin or bore of the clevis.
14. Remove the nuts on the air cylinder rods extending through the cylinder support assembly and remove the cylinder.
15. Replace the bearings in the cylinder support assembly if needed.

⚠ **WARNING: A special fixture is required to disassemble the closing spring assembly and for that reason it is recommended not to field repair this unit, but to replace the assembly as an entire unit. Attempting field repair of this unit could result in severe injury.**

16. Replace closure spring assembly.
17. After reassembly of all components with fasteners torqued to proper values and lock wired where required, turn spring tension nut counter- clockwise **5 full turns** to restore spring force required to hold elevator closed.

NOTE: Make sure by using a level that air cylinder assembly is properly spaced out. Improper re-assembly could cause piston rod breakage.

Front frame disassembly

Use figure 10 and matching front frame assembly (See parts list).

⚠ **WARNING: Before starting any maintenance or repair work on the front frame assembly, the elevator must be in closed position. If work must be done in the open position, the safety pin must be engaged. Failure to do so could result in severe injury.**

Procedure

1. With the elevator in a closed position, support body and door on wooden blocks in order to remove the front frame.
2. Remove the clevis pin connecting the air cylinder to the elevator door.
3. Remove the 2 cap screws holding the front frame assembly to the elevator door.
4. Remove the 4 cap screws holding the front frame to the bottom of the elevator.
5. Remove the front frame.
6. Remove the hose assembly between the air cylinder and the quick release valve.
7. Remove the clevis pin assembly and the air cylinder assembly.
8. To remove the quick release valve, remove 2 cap screws and lock washers from the front frame

.

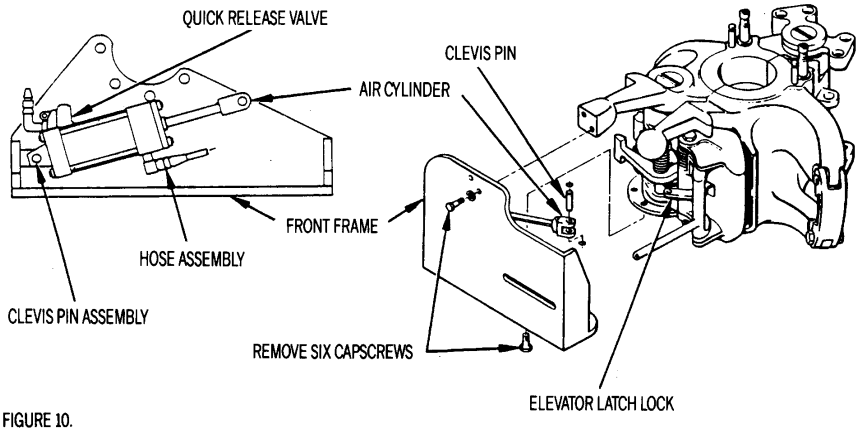


FIGURE 10.

Latch disassembly

Use figure 11 and matching latch assembly (See parts list).

Procedure

1. Remove the latch lock bar by drilling in the center of the lock bar, splitting it with a cold chisel and removing the pieces.

   ⚠ *CAUTION: The latch spring must be wound up and secured to prevent it from coming out of the latch when the latch pin is removed. Failure to do so could result in injury.*

   NOTE: TA air operated elevators: Do not use a latch lock bar to retain the latch pin. Instead the latch pin is retained by a riveted method. Remove the latch pin (and bell crank pin) by grinding of the riveted area.

2. Wind latch spring up and finish removing the latch pin by driving it out from the bottom of the elevator.
3. From the bottom of the latch assembly drive out the spring stop pin if replacement is necessary.
4. Remove the latch-holding bell-crank spring and spacer.
5. Remove the cotter pin and slotted nut to remove the latch lock bolt and latch lock spring.

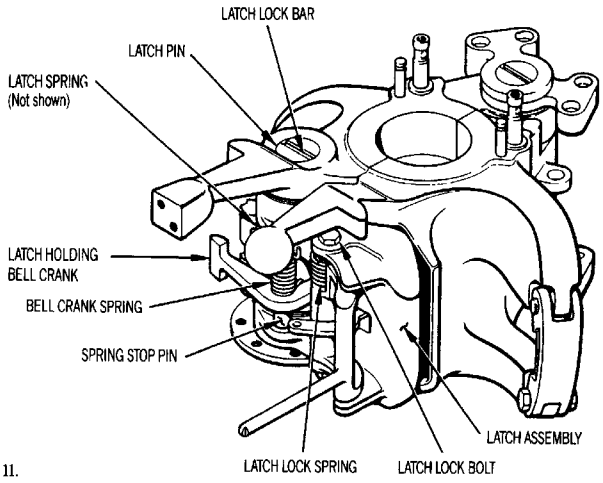


FIGURE 11.

Elevator frame disassembly

Use figure 12 and matching elevator frame (See parts list).

Procedure

1. Remove the hinge pin retainer by drilling in the center of the retainer, splitting it with a cold chisel and removing the pieces.

2. Press or drive out the hinge pin from the bottom of the elevator to separate the door from the body.
3. If replacement is necessary, remove the link blocks by removing the cotter pins and slotted nuts from the upper link block bolts and slide the bolts out, freeing the top of the link block
4. Remove the cotter pins and slotted nuts from the lower link block bolts and slide the bolts out, freeing the lower part of the link block.

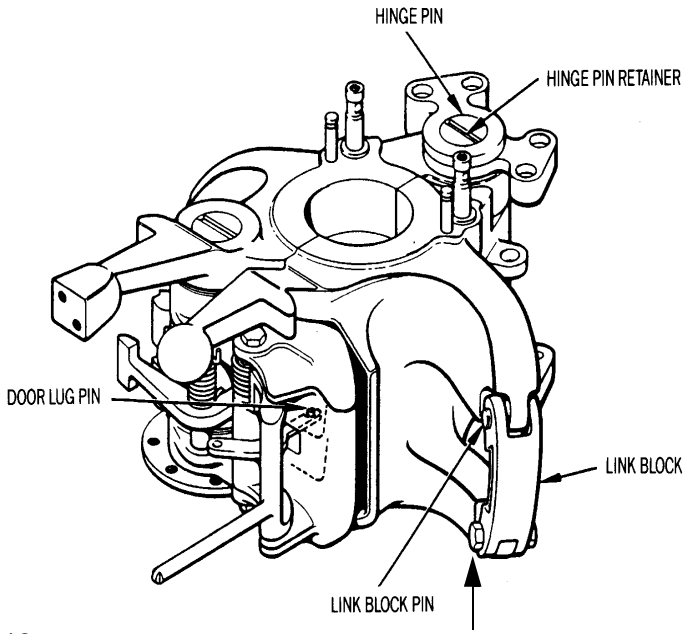


Figure 12 Link block bolt, nut and cotter pin

⚠ *CAUTION: Use only original NOV parts. Re-machining and re-heat treating should be performed only by an authorized NOV authorized repair facility. Improper machining could result in increased stress (decreased load carrying capability) or improper alignment component parts. Either condition could be hazardous to personnel and equipment.*

⚠ *CAUTION: Bodies and doors are specifically matched during the manufacturing process. For this reason, a body or door from one elevator should never be exchanged with a body or door from another elevator.*

TA assembly

Procedure

1. Mount Latch/latchlock assembly together with Latchspring and Latchpin in the Latchpin hole

Grease contact surface lightly

2.

Use pipes to tension the Latchspring and use a plastic hammer to mount the Latchpin

3.

Check the movement of the latch; lock if not: the springtension is not correct and the spring need to be replaced

4.

Put a screwdriver behind the latch and check if the latch lock can be opened; this should not be possible

Assembly G-type elevator

Procedure

1. Place the Latch Spring together with the Springpin.
2. When placing the Latchpin alway use a plastic hammer.

tension the spring before placing the Springpin

3. Place the Latch Lock Spring

Place the Latch Lock Spring over the Lock

4. Place the Lock in the Latch

Place the Lock in the Latch and put Lock Bolt in

5.

Check if the hook does not touch the pin

6. Place nut

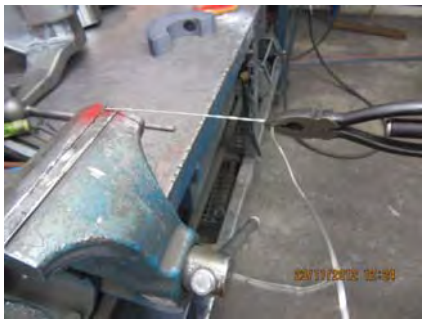
Place nut on Lock Bolt and secure with cotter pin

7. Hang elevator in crane and tip it over. Check if the Latch does not tip over. If yes, the tension on the spring is too low.

8. Place the Latchspring

Placing the Latchspring

9. Lockwire the Wearbushing

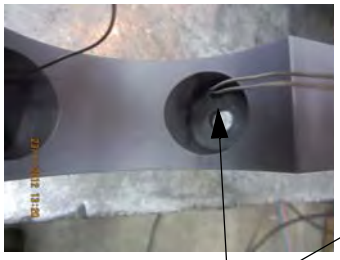


double the lockwire; ensure the wire is not damaged

10.

check length with the wearbushing

11.



pull lockwire through the small holes and tension

12. Place the wearbushing in the elevator

ensure the recess is at the top

13. Mount the wearbushing

14. Lockwire bolts.

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Trouble shooting

NOTE When going throuhg the trouble shooting list, and the problem can not be solved, please contact an authorized NOV repair facility for further information.

Prior to trouble shooting a problematic elevator, check the following according to the following **PCL-rule**:

P	Check the **P**ressure to the hook up manifold is at least 85 psi (585 kPa).
C	Check that all hoses and connectors are properly **C**onnected
L	Check **L**ubrication status of the Air Operated Elevator

Overview possible problems

Problem	Possible cause	Possible solution
Elevator does not close or is difficult to close	Parts bent or damaged.	Check elevator.
	Pipe to big	Use different size elevator
Elevator does not hang level	Length of links not equal	Use same length slings
Elevator does not open	Yielding due to overload	Replace Elevator
	Elevator corroded	Open elevator by force, clean and lubricate. Check elevator for excessive wear.
Bent pins	Elevator is overloaded	Replace Elevator
Elongated holes	Elevator is overloaded	Replace Elevator
	Elevator holes worn	Check amount of wear. If within acceptance criteria use as is, when over acceptance criteria, replace Elevator

Pipe is stuck in a slip type elevator

WARNING: The operator needs to make an assessment of the emergency situation and the posible hazards resulting from the emergency situation.

WARNING: Any of the below listed procedures are potentionally unsafe actions.

Procedure #1

1. Remove the stuck pipe and elevator from the string
2. Hang off the single in a slip in the mouse hole
3. With a tugger line drop a weight (drill collar or so) on the elevator

Procedure #2

1. Remove the stuck pipe and elevator from the string
2. Torchcut the pipe below the elevator in such a way that the pipe is sticking out between 3 and 4 inches below the elevator
3. Now bump the pipe on the floor
4. Send elevator to a repair shop for inspection

Procedure #3

NOTE: This procedure may be detrimental if not fatal for the elevator.

1. Remove the stuck pipe and elevator from the string
2. From the inside diameter of the pipe, vertically torchcut the pipe blasting outwards in the gap between the slips
3. From the inside diameter of the pipe, vertically torchcut the pipe, blasting outwards in the gap between the slips and the elevator
4. Send elevator to a repair shop for inspection

Procedure #4

WARNING: This procedure is extremely dangerous and may lead to injury or fatality if not carried out carefully.

If procedure #3 doesn't work; follow procedure #3 by the following steps:

5. Pick up the weight of the string including the PS and lift the string from the hole.
6. Support the PS to prevent dropping when working underneath the PS. Note the weight of the PS!
7. Put a hinged master bushing in the hole.
8. Engage handslips and secure with a safety clamp.
9. Torchcut the pipe and remove the PS + stump.
10. Send the PS including the stump to a repair shop for repair.

Appendixes

Risk assessment acc. to EN12100:2010

Conclusion Risk Assessment

In general, crew must:

- Wear personal safety protection like safety glasses, hard hat etc.
- Follow instructions as stated in the manual.
- Have knowledge of rig procedures.
- Must have been instructed for safe use of the elevator.
- Always use secondary retention as established and implemented by NOV.
- Do not rely on visual signals “elevator closed and latched” from deckhand etc.

Applicable standards

EN-ISO 4414:2010 Pneumatic fluid power- General rules and safety requirements for systems and their components

EN-1127-1:2011 Explosion atmospheres - Explosion prevention and protection. Part 1: Basic concepts and methodology.

EN-ISO 12100:2010 Safety of machinery - Basic concepts, general principles for design - Risk assessment and risk reduction

EN-13463-1:2009 Non electrical equipment for use in potentially explosive atmospheres. Part 1: Basic method and requirements

EN-13463-5:2011 Non electrical equipment for use in potentially explosive atmospheres. Part 5: Protection by constructional safety ‘c’

ATEX-directive 94/9/EC

Machinery Directive: 2006/42/EC

API ISO 8C

Receipt, storage, transport & decommissioning

NOTE: All exposed, not painted metal surfaces, are coated with a rust preventative at the factory prior to shipment for transport only.

Immediatelly after receipt*

Check the tool immediately after receipt and re-preserve the tool as required (at the latest within 1 month) as per table below:.

Description	Recommended preservation
All unpainted static steel surface and flanges	Rustilo DWX 32
All unpainted dynamic steel surfaces	Rustilo DWX 32
Extended cylinder rods (retract if possible)	Rustilo DWX 32 + Premtape*
Exposed bolts and nuts	Rustilo DWX 32
Hydraulic/pneumaticfittings.	Plugs or caps + Premtape*
Grease fittings supplied with cap.	Cap + Premtape*
All grease points	Lubricate

* In case long time preservation is ordered: follow procedure TSEL-0194.

Inspection and test during storage

- All accessible exposed surfaces should be checked and if needed re-preserved periodically (once per 3 months is recommended) to be sure that no corrosion is taking place.
- Test the tool annually as a minimum as per User's Manual.

Storage general recommendations

- Main unit should be palletized for indoor storage. A cargo container would be appropriate for indoor/ outdoor storage.
- Every attempt should be made to avoid wide variations in temperature and high humidity. The preferred environment would be clean and dry at 60°F (16° C) ambient. If high humidity is unavoidable, 70° F (21° C) is recommended.
- All openings should be covered to prevent water or dust from entering.

Storage after use

When the tool is not being used for a longer period then 3 days the following steps should be carried out:

- Remove the insert carrier assembly.
- Clean tool slip assembly and the insert carrier asembly.
- Grease tool, insert carrier assembly and slip assembly as described in checklist lubrication.
- Place tool in closed position.
- Grease all blank parts.
- Use an extreme pressure, multi-purpose, lithium based grease of No. 1 or No. 2 consistency and multi grade motor oil.
- Grease trigger finger-shafts .

- Clean and cap hydraulic Quick Disconnect Couplings.
- Preserve the tool as per table on the previous page.

Transport

⚠ **WARNING: Only lift the tool at it's dedicated lifting points or ears.**

The best way of transporting the tool is in its original crate. Use oiled paper and seal the box with plastic to prevent leaking when stored outside. Secure the top safely.

Decommissioning

The tool may contain grease, steel, rubbers, plastic, stainless steel, mild steel and several assembled components with undefined consistency or mixtures. The tool can be contaminated with drilling fluids, hydraulic fluids and preservatives. After the tool is decommissioned, it is recommended to disassemble the tool in a place where waste fluids can be contained and properly disposed of.

⚠ **WARNING: Any fluids, mud and grease are potentially unsafe when in contact with the skin. Always wear gloves and safety goggles when disassembling the tool.**

1. Clean the tool with a steam cleaner.
2. It is recommended to disassemble the tool in a place where drainage for waste fluids is possible.
3. Remove all quick-disconnects, hoses, cylinders and manifold block and bleed off hydraulic oil.

⚠ **WARNING: Accumulators (if applicable) may contain high pressure gasses or liquids. Refer to the OEM-documentation for safe removal and disposal.**

4. Accumulator (if applicable): let all the pressure out and remove the valve. Decontaminate if necessary.
5. Remove the parts.
6. Carry off to proper place for final storage or destruction.

Torque values (US)

		Bolts Lubricated with Light Machine Oil			Bolts lubricated with Anti-seize compound		
		Grade 8			Grade 8		
Dia.	**Threads per inch**	**Min. Torque (ft lb)**	**Max. Torque (ft lb)**	**Clamp force (lb)**	**Min. Torque (ft lb)**	**Max. Torque (ft lb)**	**Clamp force (lb)**
Coarse Thread Series, UNC							
1/4”	20	11.4	12.6	2860	8.6	9.5	2860
5/16”	18	24	26	3720	17.8	19.7	3720
3/8”	16	43	47	7000	32	35	7000
7/16”	14	67	74	9550	50	55	9550
1/2”	13	105	116	12750	78	87	12750
9/16”	12	143	158	16100	107	118	16100
5/8”	11	209	231	20350	157	173	20350
3/4”	10	361	399	30100	271	299	30100
7/8”	9	570	630	41600	428	473	41600
1”	8	855	945	54500	641	709	54400
1 1/8”	7	1216	1344	68700	912	1008	68700
1 1/4”	7	1729	1911	87200	1297	1433	87200
1 3/8”	6	2261	2499	104000	1696	1874	104000
1 1/2”	6	3002	3318	126500	2252	2489	126500

Tensile strength=150,000 psi. Proof strength=120,000 psi.

		Bolts Lubricated with Light Machine Oil			Bolts lubricated with Anti-seize compound		
		Grade 8			Grade 8		
Dia.	**Threads per inch**	**Min. Torque (ft lb)**	**Max. Torque (ft lb)**	**Clamp force (lb)**	**Min. Torque (ft lb)**	**Max. Torque (ft lb)**	**Clamp force (lb)**
Fine Thread Series, UNF							
1/4”	28	13.3189	14.7	3280	10	11	3280
5/16”	24	24	26	5220	17.8	19.7	5220
3/8”	24	48	53	7900	36	39	7900
7/16”	20	76	84	10700	57	63	10700
1/2”	20	114	126	14400	86	95	14400
9/16”	18	162	179	18250	121	134	18250
5/8”	18	228	252	23000	171	189	23000
3/4”	16	399	441	33600	299	331	33600
7/8”	14	627	693	45800	470	520	45800
1”	14	950	1050	59700	713	788	59700
1 1/8”	12	1368	1512	77000	1026	1134	77000
1 1/4”	12	1900	2100	96600	1425	1565	96600
1 3/8”	12	2584	2856	118400	1938	2142	118400
1 1/2”	12	3382	3738	142200	2537	2804	142200

Tensile strength=150,000 psi to 1” dia. Proof strength=120,000 psi.

Torque values (metric)

		Bolts Lubricated with Light Machine Oil			Bolts lubricated with Anti-seize compound		
		Grade 8			Grade 8		
Diameter	**Threads per inch**	**Min. Torque (Nm)**	**Max. Torque (Nm)**	**Clamp force (N)**	**Min. Torque (Nm)**	**Max. Torque (Nm)**	**Clamp force (N)**
Coarse Thread Series, UNC							
1/4”	20	15.5	17.14	12870	11.7	12.9	12870
5/16”	18	32.6	35.4	16740	24.2	26.8	16740
3/8”	16	58.5	64	32500	43.5	47.6	31500
7/16”	14	91.1	100.6	42980	68	92.5	42980
1/2”	13	143	158	57380	106	118	57380
9/16”	12	195	215	72450	145.5	160	72450
5/8”	11	284	314	91580	213.5	235	91580
3/4”	10	491	542	135450	368	407	135450
7/8”	9	775	857	187200	582	643	187200
1”	8	1163	1285	245250	872	965	245250
1 1/8”	7	1654	1828	309150	1240	1370	309150
1 1/4”	7	2351	2598	382400	1764	1949	392400
1 3/8”	6	3075	3398	468000	2306	2549	468000
1 1/2”	6	4082	4512	569250	3062	3385	569250

		Bolts Lubricated with Light Machine Oil			Bolts lubricated with Anti-seize compound		
		Grade 8			Grade 8		
Diameter	**Threads per inch**	**Min. Torque (Nm)**	**Max. Torque (Nm)**	**Clamp force (N)**	**Min. Torque (Nm)**	**Max. Torque (Nm)**	**Clamp force (N)**
Fine Thread Series, UNF							
1/4”	28	18.1	20	14760	13.6	15	14760
5/16”	24	32.6	35	23490	24.2	26.8	23490
3/8”	24	65.3	72	35550	49	53	35550
7/16”	20	103	114	48150	77.5	86	48150
1/2”	20	155	171	64800	117	129	64800
9/16”	18	220	239	82130	165	182	82130
5/8”	18	310	343	103500	232	257	103500
3/4”	16	542	600	151200	406	450	151200
7/8”	14	853	943	206100	639	707	206100
1”	14	1292	1428	268650	970	1071	268650
1 1/8”	12	1860	2056	346500	1396	1542	346500
1 1/4”	12	2584	2856	434700	1938	2128	434700
1 3/8”	12	3514	3884	532800	2635	2913	532800
1 1/2”	12	4599	5083	639900	3450	3813	639900

Tensile Strength = 1,034,214KPa to 1” dia. Proof Strength = 827,370 kPa

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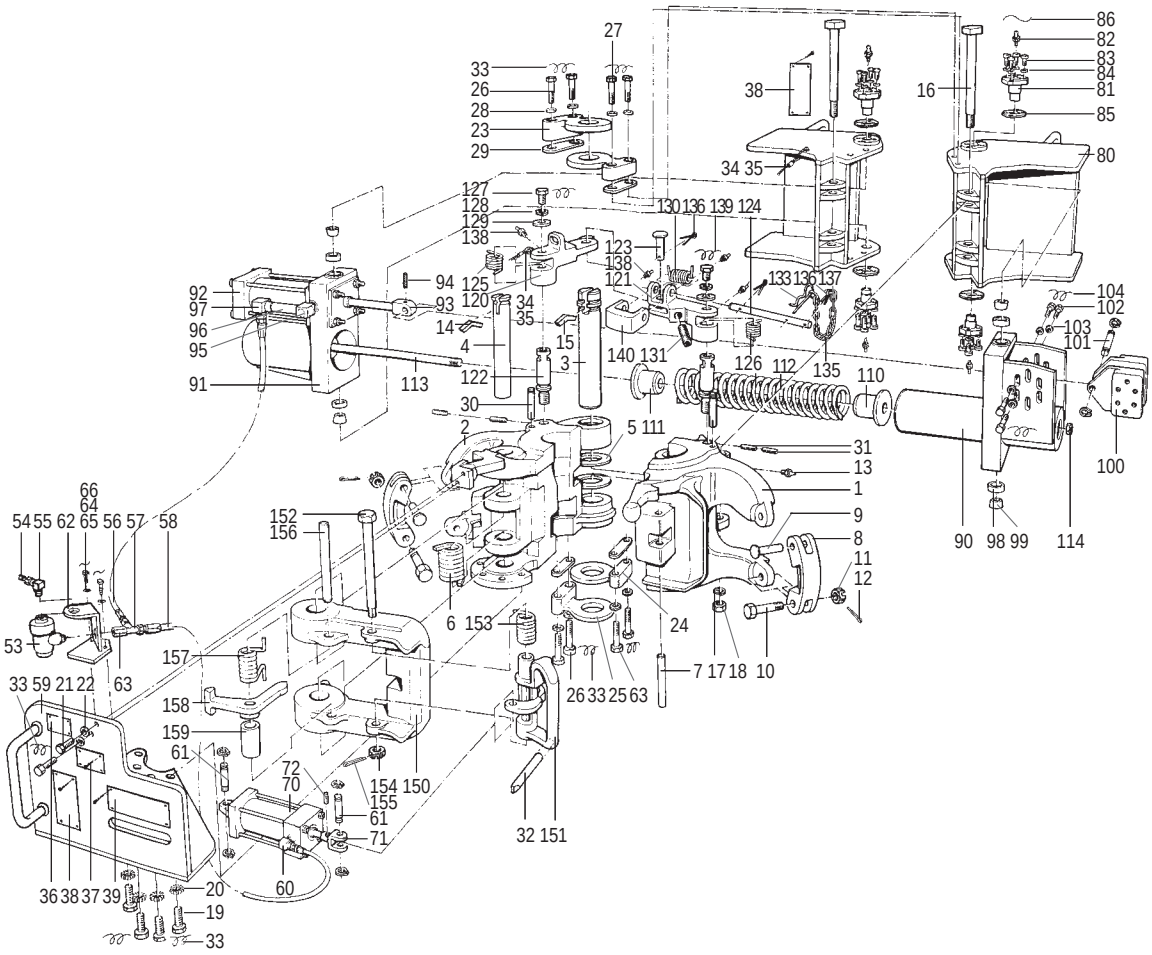
Parts & Spare parts

MGG, GG & HGG elevator



Trigger finger chart

	Final assembly							
	HGG *	HGG *	HGG special	HGG	GG *	GG	MGG *	MGG
Bore code	**200059**	**200061**	**200830**	**70222**	**200024**	**35143**	**200057**	**36056**
119							30805	
120							30805	
121					30769	30769	30805	30769
122				30806	30769	30769	30805	30769
123	30806			30806	30769	30769		30769
124	30806			30806	30769	30769		
509								30769
525								30769
678				30806				
722			30806					
740		30806		30806				
756	30806			30806				
770				30806				
789		30806		30806				
805					30769			

* With wear bushings

Parts list MGG, GG, HGG

Ref. No.	Description	No. req.	MGG & GA 36056-200035	No. req.	GG & GGA 35143-201380	No. req.	HGG 70222
1	Door	1	34905Y1	1	35139Y1W	1	70218Y
2	Body	1	34904Y1	1	35140Y1W	1	70219Y
3	Hinge pin	1	36058	1	35141	1	70217
4	Latch pin	1	34907	1	33999	1	30613
5	Spacer	2	36001	2	36205	1	70354*
6	Latch spring	1	36998	1	18931	1	202180
7	Door lug pin	1	BJ13190	1	BJ13190	1	31216
8	Link block	2	9519	1	9519	1	30492
9	Link block pin	2	8151	2	8151	2	8151
10	Link block bolt	2	8145	2	8145	2	8145
11	Link lock nut	2	8150	2	8150	2	8150
12	Cotter pin	2	51402-12	2	51402-12	2	51402-12
13	Grease fitting	1	53202	1	53202	1	53201
14	Latch pin retainer	1	32892	1	32892	1	36901
15	Hinge pin retainer	1	31074	1	31074	1	30609
16	Retainer pin	2	35145	2	35145	2	35145
17	Plain washer	2	50812-N-C	2	50812-N-C	2	50812-N-C
18	Flexloclock nut	2	51812-C	2	51812-C	2	51812-C
19	Hex head capscrew	4	50010-10-C8D	4	50010-10-C8D	4	50010-10-C8D
20	Lockwasher	4	50910-C	4	50910-C	4	939352-64
21	Hex Head capscrew	2	50008-20-C8D	2	50008-20-C8D	2	50008-14-C8D
22	Lockwasher	2	50908-C	2	50908-C	2	50908-C
23	Hinge plate	1	35377	2	35082	1	BJ70185
24	Hinge plate	2	35378	2	35082-1	2	70186
25	Lower right hinge plate	1	35377-1	--		1	70277
26	Hex head capscrew	4	50008-18-C8D	4	50008-18-C8D	4	939098-64
27	Hex head capscrew	4	50008-22-C8D	4	50008-22-C8D	4	939098-84
28	Shakeproof lockwasher	8	939656-9	8	939656-9	8	939656-9
29	Shim set	AR	35526	AR	35526	AR	35526
30	Groove pin	2	941071-215	2	941071-215	2	941071-215
31	Set screw	4	50704-3-B-C	4	50704-3-B-C	4	50704-3-B-C
32	Indicator pin	1	54410	1	54410	1	54410
33	Lockwire	AR	947879	AR	947879	AR	947879
34	Wire rope	1	979438-318	1	979438-318	1	979438-318
35	Wire clamp	2	979437-3	2	979437-3	2	979437-3
36	Name plate	1	70474-3	1	70474-2	1	70474-6
37	Warning plate	1	200005	1	200005	1	200005
38	Warning plate	2	70215	2	70215	2	70215
39	Warning plate	1	BJ70216	1	BJ70216	1	BJ70216

* Not being used in new elevators

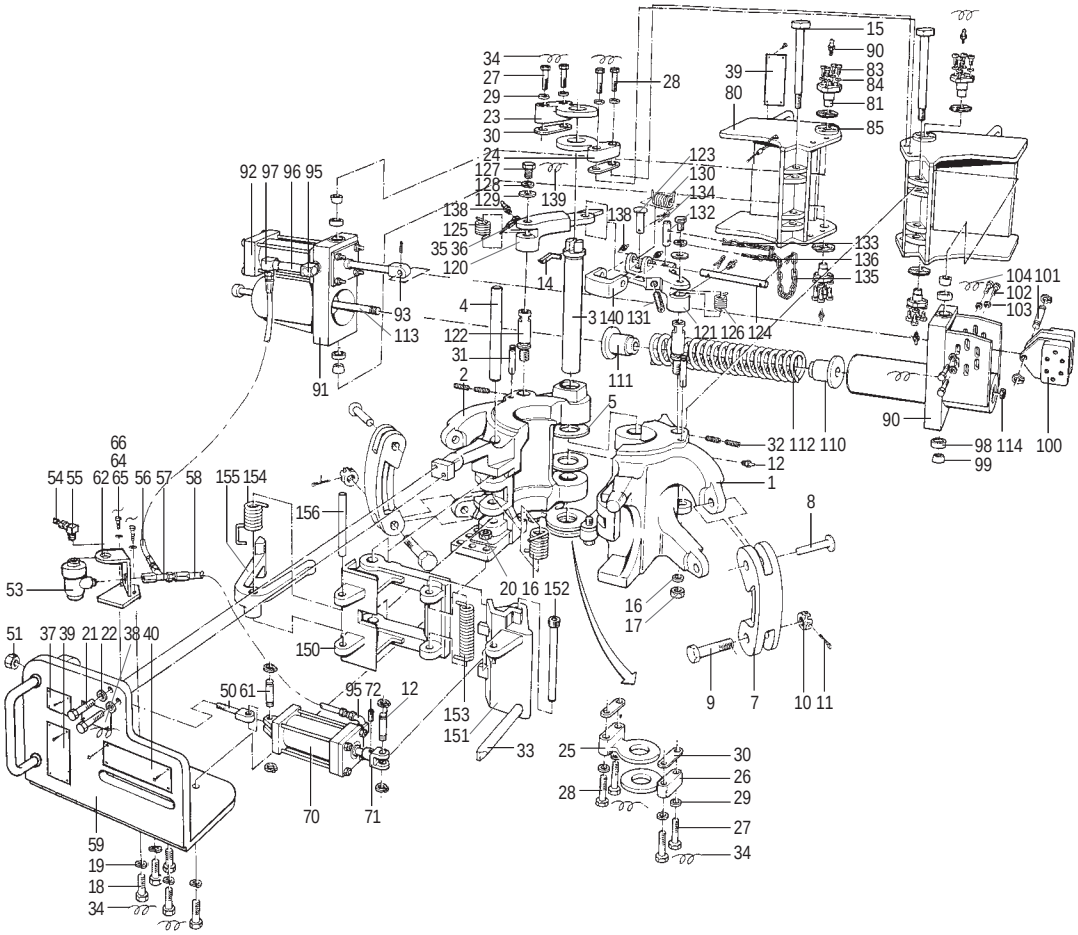
Parts list MGG, GG, HGG continued

Ref. No.	Description	No. req.	MGG & GA 36056-200035	No. req.	GG & GGA 35143-201380	No. req.	HGG 70222
--	Front frame assembly	1	36781	1	36784	1	70189
50	Adjustment pin	1	37087	1	36784	1	37087
51	Hexagon nut	1	50208-C		50208-C	1	50208-C
52	Lockwasher	1	50808-N-C	1	--		
53	Quick release valve	1	979385-1	1	979385-1	1	979385-1
54	Quick disconnect plug	1	942027-6	1	942027-6	1	942027-6
55	90° Male pipe elbow	1	56702-6-4-S	1	56702-6-4-S	1	56702-6-4-S
56	Hose	1	990065-26	1	990065-26	1	990065-26
57	Male run Tee	1	56533-4-6-S	1	56533-4-6-S	1	56533-4-6-S
58	Hose	1	990065-11	1	990065-11	1	990065-11
59	Front frame	1	35372	1	35147	1	70190
60	90° Male elbow	1	56506-6-6-S	1	56506-6-6-S	1	56506-6-6-S
61	Pivot pin assembly	2	939512-2	2	939512-2	2	939512-2
62	Valve support	1	200263	1	200263	1	200263
63	Reducing connector	1	56710-4-4-S	1	56710-4-4-S	1	945112-5
64	Hex head capscrew	2	50005-6-C8D	2	50005-6-C8D	2	50005-6-C8D
65	Lockwasher	2	50905-C	2	50905-C	2	50905-C
66	Lockwire	AR	947879-	AR	947879-	AR	947879-
--	Cylinder assembly	1	35585	1	35585	1	35585
70	Cylinder	1	943456-401	1	943456-401	1	943456-403
71,72	Rod clevis pin assembly	1	200925	1	200925	1	200925
--	Rear frame assembly	1	36873	1	36873	1	70214
80	Rear frame	2	35144-1	1	35144-1	1	70171
81	Trunnion	4	BJ70228	4	BJ70228	4	BJ70228
82	Grease fitting	4	53201	4	53201	4	53201
83	Hex head capscrew	16	50006-16-C8D	16	50006-16-C8D	16	50006-16-C8D
84	Lockwasher	16	50906-C	16	50906-C	16	50906-C
85	Shim set	AR	31650	AR	31650	AR	31650
86	Lockwire	AR	947879-	AR	947879-	AR	947879-
--	Cylinder& spring supp assy	1	35146	1	35146	1	70170
90	Spring support	1	35162	1	35162	1	BJ70178
91	Cylinder support	1	35163	1	35163	1	70175
92	Cylinder	1	943456-601	1	943456-601	1	943456-704
93	Knuckle	1	939516-4	1	939516-4	1	939516-4
94	Set screw	1	50704-3-B-C	1	50704-3-B-C	1	50704-3-B-C
95	90° Street elbow	1	56705-8-4-S	1	56705-8-4-S	1	56705-8-4-S
96	Nipple	1	56723-04-36	1	56723-04-36	1	56723-04-36
97	90° Female elbow	1	56527-6-4-S	1	56527-6-4-S	1	56527-6-4-S
98	Inner race	4	942443-24	4	942443-24	4	942443-24
99	Outer race	4	942443-4	4	942443-4	4	942443-4
100	Pivot pint mounting bracket	2	35164	2	35164	2	35164
101	Pivot pin assembly	1	939512-3	1	939512-3	1	939512-3
102	Hex head capscrew	4	50008-10-C8	4	50008-10-C8	4	50008-12-C8D
103	Spring lockwasher	4	50908-C	4	50908-C	4	50908-C
104	Lockwire	AR	947879-	AR	947879-	AR	947879-

Parts list MGG, GG, HGG continued

Ref.No	Description	No. Req	MGG & GA 36056-200035	No. Req	GG & GGA 35143-201380	No. Req	HGG 70222
--	Closing spring assembly	1	35155	1	35155	1	BJ70179
110	Threaded spring retainer	1	35157	1	35157	1	35157
111	Straigh spring retainer	1	35156	1	35156	1	35156
112	Main closing spring	1	17308	1	17308	1	70278
113	Hex capscrew	1	50010-96-C8	1	50010-96-C8	1	50010-96-C8
114	Flex lock nut	1	51810-C	1	51810-C	1	51810-C
--	Trigger assembly	1	35181	1	35181	1	70247
120	Trigger link body	1	35180	1	35180	1	70243
121	Trlgger link door	1	35086	1	35086	1	70244
122	Link pivot pin	2	35179	2	35179	2	70242
123	Trigger hinge pin	1	30772	1	30772	1	35646
124	Trigger finger hinge pin	1	31654	1	31654	1	31654
125	Right hand trigger finger	1	35175	1	35175	1	35175
126	Left hand trigger finger	1	35178	1	35178	1	35178
127	Hex head capscrew	2	55007-6-C8D	2	55007-6-C8D	2	55007-6-C8D
128	Lockwasher	2	50907-C	2	50907-C	2	50907-C
129	Thrustwasher	2	939360-17	2	939360-17	2	939360-17
130	Trigger finger spring	1	18940	1	18940	1	18940
131	Set screw	1	939575-188	1	939575-188	1	939575-188
132	Locking pin	--	--	1	35719		
133	Hair pin cotter	1	944042-6	1	944042-6	1	944042-6
134	Cotter pin	--	--	1	939672		
135	Chain	1	948042-424	1	948042-424	1	948042-424
136	Cotter pin	3	51403-10	3	51403-10	3	51403-10
137	S-hook	1	948038-19	1	948038-19	--	
138	Grease fitting	4	53201	4	53201	4	53201
139	Lockwire	AR	947879-	AR	947879-	AR	947879-
140	Trigger finger	see chart					
--	Latch assembly	1	36209	1	35142	1	70230
150	Latch	1	34609Y	1	31071Y	1	30460Y
151	Latch lock	1	35148	1	35148	1	BJ70231
152	Latch lock block	1	15101	1	15101	1	31138
153	Latch lock spring	1	13188	1	13188	1	13188
154	Slotted hex nut	1	50512-C	1	8150	1	50512-C
155	Cotter pin	1	51402-12	1	51402-12	1	51402-12
156	Spring stop pin	1	13185	1	13185	1	31215
157	Bell crank spring	1	18929	1	18929	1	18929
158	Bell crank	1	30739	1	30739	1	70225
159	Bell crank	1	35379	1	30766	1	70235

TA-elevatorTrigger finger chart



	Final assembly	
Bore code	**PN 35636Y**	**PN 39343Y**
131	30786	
132	30769	
139		30806
334	30786	
336	30786	
339	30786	
338	30805	
348	30769	
367		30769
370		30806
373	30805	
387	30805	
422	30786	
435	30786	

Parts list TA

Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"	Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"
1	Door	1	32756-2	1	39347	80	Rear frame	2	35144-1	1	35144-1
2	Body	1	32755-2	1	39346	81	Trunnion	4	BJ70228	4	BJ70228
3	Hinge pin	1	36310	1	36310	82	Grease fitting	4	53201	4	53201
4	Latch pin	1	32762	1	32762	83	Hex head capscrew	16	50006-16-18D	16	50006-16-18D
5	Spacer	2	36205	2	36205	84	Lockwasher	16	50906-C	16	50906-C
6	Latch spring	1	36304	1	36304	85	Shim set	AR	31650	AR	31650
7	Link block	2	9519	1	9519	86	Lockwire	AR	947879-	AR	947879-
8	Link block pin	2	8151	2	8151	--	Cylinder spring support	1	36313	1	36313
9	Link block bolt	2	8145	2	8145	assembly					
10	Link lock nut	2	8150	2	8150	90	Spring support	1	35162	1	35162
11	Cotter pin	2	51402	2	51402	91	Cylinder support	1	35163	1	35163
12	Grease fitting	1	53201	1	53201	92	Cylinder	1	943456-603	1	943456-603
13	Latch pin retainer		--	--		93	Knuckle	1	939516-4	1	939516-4
14	Hinge pin retainer	1	32925	1	32925	94	Set screw	1	50704-3-B-C	1	50704-3-B-C
15	Retainer pin	2	35145	2	35145	95	90° Street elbow	1	56705-8-4-S	1	56705-8-4-S
16	Plain washer	2	50812-N-C	2	50812-N-C	96	Nipple	1	56723-04-36	1	56723-04-36
17	Flexlock nut	2	51812-C	2	51812-C	97	90° Female elbow	1	56527-6-4-S	1	56527-6-4-S
18	Hex head capscrew	5	50010-16-C8D	5	50010-16-C8D	98	Inner race	4	942443-24	4	942443-24
19	Spring lockwasher	5	50910-C	5	50910-C	99	Outer race	4	942443-4	4	942443-4
20	Hex nut	5	50210-C	5	50210-C	100	Pivot pin mounting bracket	2	35164-2	2	35164-2
21	Hex head capscrew	2	50006-14-C8D	2	50006-14-C8D	101	Pivot pin assembly	1	939512-3	1	939512-3
22	Spring lockwasher	2	50906-C	2	50906-C	102	Hex head capscrew	4	50008-10-C8D	4	50008-10-C8D
23	Right hinge plate	1	36480	1	36480	103	Spring lockwasher	4	50908-C	4	50908-C
24	Left hinge plate	2	36834	2	36834	104	Lockwire	AR	947879-	AR	947879-
25	Lower right hinge plate	1	36308	1	36308	--	Closing spring assembly	1	3631	1	36311
26	Lower left hinge plate	1	36307	1	36307	110	Threaded spring retainer	1	35157	1	35157

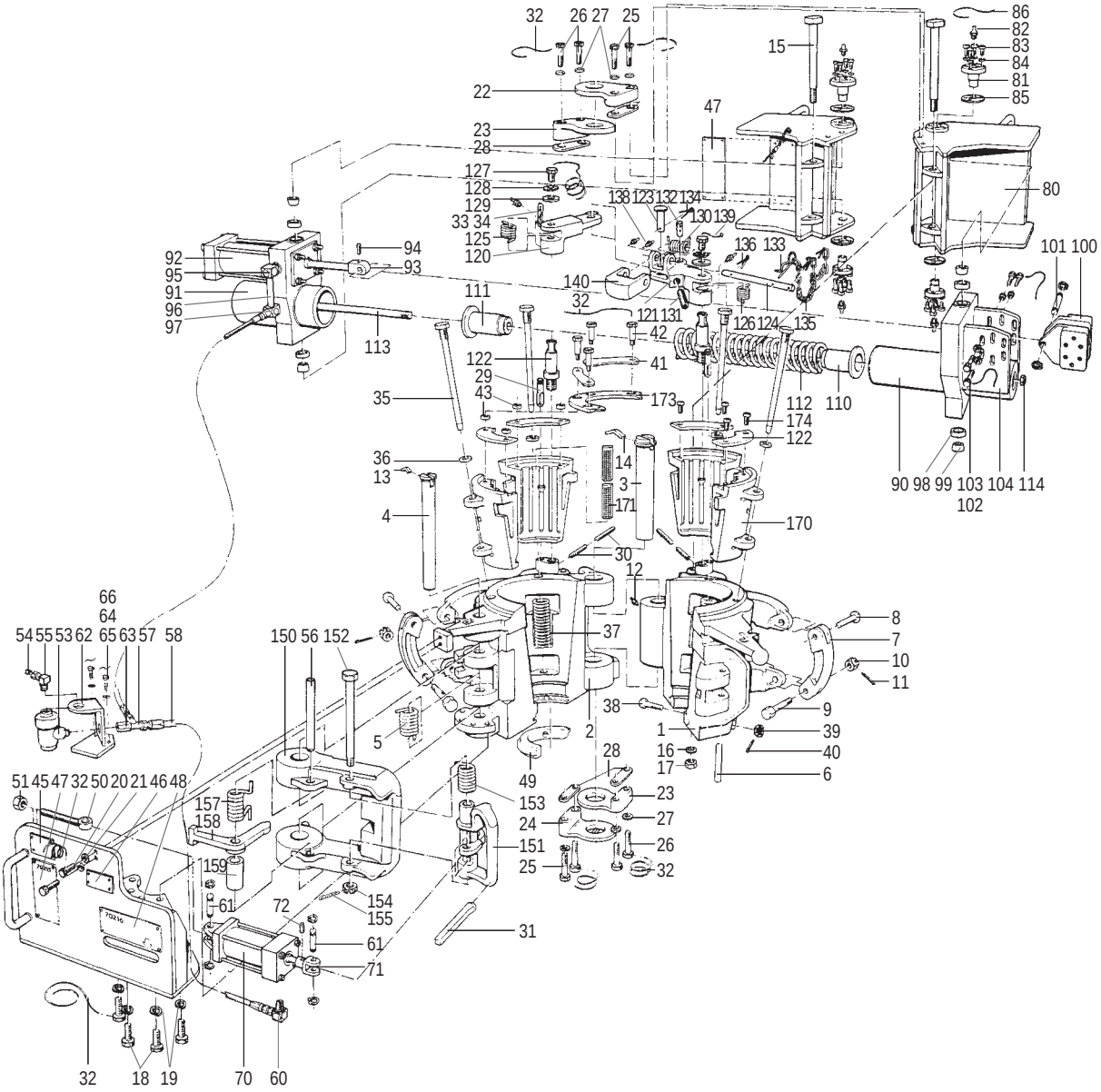
Parts list TA continued

Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"	Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"
27	Hex head capscrew	4	50008-16-C8D	4	50008-16-C8D	111	Straight spring retainer	1	35156	1	35156
28	Hex head capscrew	8	50008-12-C8D	8	50008-12-C8D	112	Main closing spring	1	17308	1	17308
29	Spring lockwasher	8	50908-C	8	50908-C	113	Hex head capscrew	1	50110-108-C	1	50110-108-C
30	Shim set	AR	35526	AR	35526	114	Flex lock nut	1	50310-C	1	50310-C
31	Groove pin	2	941071-215	2	941071-215	--	Trigger assembly	1	35718	1	35718
32	Set screw	4	50704-3-B-C	4	50704-3-B-C	120	Trigger link body	1	36530	1	36530
33	Indicator pin	1	52410	1	52410	121	TrIgger link door	1	36513	1	36513
34	Lockwire	AR	947879	AR	947879	122	Link pivot pin	2	35179	2	35179
35	Wire rope	1	979438-318	1	979438-318	123	Trigger hinge pin	1	35646	1	35646
36	Wire clamp	1	979437-3	1	979437-3	124	Trigger finger hinge pin	1	31654	1	31654
37	Name plate	1	70474-1	1	70474-1	125	Right hand trigger finger	1	35175	1	35175
38	Warning plate	1	200005	1	200005	126	Left hand trigger finger	1	35178	1	35178
39	Warning plate	2	70215	2	70215	127	Hex head capscrew	2	55007-6-C8	2	55007-6-C8
40	Warning plate	1	70216	1	BJ70216	128	Spring lockwasher	2	50907-C	2	50907-C
--	Front frame assembly	1	36783	1	36783	129	Thurstwasher	2	939360-17	2	939360-17
50	Adjustment pin	1	37087	1	37087	130	Trigger finger spring	1	18940	1	18940
51	Hexagon nut	1	939212-5	1	939212-5	131	Set screw	1	939575-188	1	939575-188
52	Lock washer	--	--			132	Locking pin	1	35719	1	35719
53	Quick release valve	1	50208-C	1	50208-C	133	Hair pin cotter	1	944042-6	1	944042-6
54	Quick disconnect plug	1	942027-6	1	942027-6	134	Cotter pin	1	51433-10	1	51433-10
55	90° Male pipe elbow	1	56702-6-4-S	1	56702-6-4-S	135	Chain	1	948042-424	1	948042-424
56	Hose	1	990065-26	1	990065-26	136	Cotter pin	3	51403-10	3	51403-10

Parts list TA continued

Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"	Ref. No	Description	Req. No	4 1/2"-8 5/8"	Req. No	8 1/2"-11 1/4"
57	Male run Tee	1	56533-4-6-S	1	56533-4-6-S	137	S-hook		--		--
58	Hose	1	990065-11	1	990065-11	138	Grease fitting	4	53201	4	53201
59	Front frame	1	35650	1	35650	139	Lockwire	AR	947879-	AR	947879-
60	90° Male elbow	1	56506-6-6-S	1	56506-6-6-S	140	Trigger finger	see	chart		
61	Pivot pin assembly	2	939512-2	2	939512-2	--	Latch assembly	1	36312Y	1	36312Y
62	Valve support	1	200263	1	200263	150	Latch	1	32752Y1	1	32752Y1
63	Reducing connector	1	56710-4-4-S	1	56710-4-4-S	151	Latch lock	1	32757-1	1	32757-1
64	Hex head capscrew	2	50005-6-C8D	2	50005-6-C8D	152	Latch lock pin	1	36207	1	36207
65	Lock washer	2	939252-59	2	939252-59	153	Latch lock spring	1	36305	1	36305
66	Lock wire	AR	947879-	AR	947879-	154	Bell crank spring	1	36306	1	36306
--	Cylinder assembly	1	35647	1	35647	155	Bell crank	1	36309	1	36309
70	Cylinder	1	943456-403	1	943456-403	156	Bell crank pin	1	36303	1	36303
71,72	Rod clevis pin assembly	1	2000925	1	2000925						
--	Rear frame assembly	1	36722	1	36722						

HYC elevator



Trigger finger chart

Size	FInal assembly
2 7/8”	203333
3 1/2” - 6”	70210
6 5/8” - 7 3/4”	70209

HYC-parts

Ref. No	Description	No. Req.	Part. No
1	Door	1	70168
2	Body	2	70205
3	Hinge pin	1	70180
4	Latch pin	1	55312
5	Latch spring	1	70356
6	Door lug pin	1	BJ13190
7	Link block	2	9519
8	Link block pin	2	8151
9	Link block bolt	2	8145
10	Link lock nut	2	8150
11	Cotter pin	2	51402-12
12	Grease fitting	1	53201
13	Latch pin retainer	1	55505
14	Hinge pin retainer	1	55504
15	Retainer pin	2	35145
16	Plain washer	2	50812-N-C
17	Flexlock nut	2	51812-C
18	Hex head capscrew	4	50010-10-C8D
19	Spring lockwasher	4	50910-C
20	Hex head capscrew	2	50008-10-C8D
21	Spring lockwasher	2	50908-C
22	Hinge plate	1	BJ70185
23	Hinge plate	2	70186-1
24	Lower hinge plate	1	70277
25	Hex head capscrew	4	50008-22-C8D
26	Hex head capscrew	4	50008-18-C8D
27	Shakeproof lockwasher	8	939656-9
28	Shim set	AR	35526
29	Groove pin	2	941071-215
30	Set screw	4	50704-3-8-C
31	Indicator pin	1	--
32	Lockwire	AR	947879-
33	Wire rope	1	979438-318
34	Wire clamp	2	979437-3
35	Slip pin as'y	4	50003697-2
36	Spring lockwasher	4	51112-C
37	Slip spring	4	945044-2
38	Guide plate screw	4	55508
39	Guide plate nut	4	50508-C
40	Cotter pin	4	51402-8
41*	Retainer31/2" -7"	2	30216
41*	Retainer75/8"	2	BJ70147
42*	Shoulder screw	4	55501
43*	Rubber bushing	4	55502
44*	Insert retainer screw	4	50108-8-C
45	Name plate	1	70474-5
46	Warning plate	1	200005
47	Warning plate	2	70215
48	Warning plate	1	702176

HYC-parts continued

Ref. No	Description	No. Req.	Part. No
--	Front frame assembly	1	70189
50	Adjustment pin	1	37087
51	Hexagon nut	1	50208-C
52	Lockwasher	--	
53	Quick release valve	1	979385-1
54	Quick disconnect plug	1	942027-6
55	90° Male pipe elbow	1	56702-6-4-S
56	Hose	1	990068-30
57	Male run Tee	1	56533-4-6-S
58	Hose	1	990065-11
59	Front frame	1	70190
60	90° Male elbow	1	56506-6-6-S
61	Pivot pin assembly	2	939512-2
62	Valve support	1	200263
63	Reducing connector	1	56710-4-4-S
64	Hex head capscrew	2	50005-6-C8D
65	Spring lockwasher	2	939252-59
66	Lockwire	AR	947879-
--	Cylinder assembly	1	35647
70	Cylinder	1	943456-403
71,72	Rod clevis pin assy	1	2000925
--	Rear frame assembly	1	70214
80	Rear frame	2	70171
81	Trunnion	4	BJ70228
82	Grease fitting	4	53201
83	Hex head capscrew	16	50006-16-C8D
84	Lockwasher	16	50906-C
85	Shim set	AR	31650
86	Lockwire	AR	947879-
--	Cylinder& spring support assembly	1	70170
90	Spring support	1	BJ70178
91	Cylinder support	1	70175
92	Cylinder	1	943456-703
93	Knuckle	1	939516-4
94	Set screw	1	50704-3-B-C
95	90° Street elbow	1	56705-8-4-S
96	Nipple	1	56723-04-44
97	90° Female elbow	1	56527-6-4-S
98	Inner race	4	942443-24
99	Outer race	4	942443-24
100	Pivot pint mounting bracket	2	35164
101	Pivot pin assembly	1	939512-3
102	Hex head capscrew	4	30008-12-C8D
103	Spring lockwasher	4	50908-C
104	Lockwire	AR	947879-

HYC-parts continued

Ref. No	Description	No. Req.	Part. No
--	Closing spring assy	1	BJ70179
110	Threaded spring retainer	1	35157
111	Straight spring retainer	1	35158
112	Main closing spring	1	17308
113	Hex head capscrew	1	50010-96-C8
114	Flexlocc lock nut	1	51810-C
--	Trigger assembly	1	70229
120	Trigger link body	1	70243
121	Trlgger link door	1	70244
122	Link pivot pin	2	70242
123	Trigger hinge pin	1	31654
124	Trigger finger hinge pin	1	31654
125	Right hand trigger finger	1	70200
126	Left hand trigger finger	1	70201
127	Hex head capscrew	2	939098-4
128	Spring lockwasher	2	50907-C
129	Thurstwasher	2	939360-17
130	Trigger finger spring	1	18940
131	Set screw	1	939575-188
132	Locking pin	1	35719
133	Hair pin cotter	1	944042-6
134	Cotter pin	1	51433-10
135	Chain	1	948042-424
136	Cotter pin	3	51403-10
137	S-hook	--	
138	Grease fitting	4	53201
139	Lockwire	AR	947879-
140	Trigger finger	see chart	
--	Latch assembly	1	70193Y
150	Latch	1	55503Y
151	Latch lock	1	70194
152	Latch lock bolt	1	15101
153	Latch lock spring	1	13188
154	Slotted hex nut	1	50512-C
155	Cotter pin	1	51402-12
156	Spring stop pin	1	13185
157	Bell crank spring	1	18929
158	Bell crank	1	30739
159	Bell crank pin	1	70241

Drawings, bore codes & ratings

Material Safety Data Sheets

Factory applied grease and hydraulic fluid

MSDS grease	Autol TOP 2000
MSDS air tool lubricant	Berulit 75
MSDS preservation	Castrol Rustilo DWX 32
MSDS Premtape	Premtape

Test procedures

Drawing number	Name
TSEL-0022	TA-series test pecification
TSEL-0074	G-series test specification
TSEL-0076	Y-series test specification
TSEL-0230	Air test specification
TSEL-0194	Preservation procedure

Assembly drawings

Drawing number	Name
70166	Assembly HYC air operated elevator 3.1/2” - 7.5/8”
35143	Assembly GG air operated elevator 4” - 5.1/2”
36056	Assembly MGG air operated elevator 3.1/2” - 5.1/2”
70222	Assembly HGG air operated elevator 4” - 6.5/8”
35636	Assembly TA air operated elevator 4.1/2” - 8.5/8”
39343	Assembly TA air operated elevator 8.1/2” - 11.1/4”
200024	Assembly GG air operated elevator with wearbushing
200057	Assembly MGG air operated elevator with wearbushing
200059	Assembly HGG air operated elevator with wearbushing
200061	Assembly HGG air operated elevator with wearbushing

Wear data drawings

Number	Name
WD-000	Wear data general warning
WD-001	Tooljoint/bore wear table 18” bore type elevator
WD-010	Max. wear data for 18” center latch elevators to maintain 100% rating
WD-011	Inspection sheet 18° tapered bore
WD-050	Max. wear data for TA and RA elevators to maintain 100% rating
WD-051	Max. collar wear data for A-type elevators to maintain 100% rating
WD-060	Max. wear data for slip type elevators to maintain 100% rating
WD-080	Max. wear data for MAA and AA elevators to maintain 100% rating

Bore Code drawings

Number	Name
15316-2	Elevator bore chart for casing
15316-3	Elevator bore chart for tubing
15316-5	Elevator bore chart f/drill pipe having 18 shouldered tool joints
15316-6	DC Zip Bores
15316-8	Drill collars with lift plug

CA drawings

Number	Name
CA-201	Critical areas elevator latches
CA-300-M	Critical areas body centre latch “G” type elevator
CA-301-M	Critical areas door center latch “G” type elevator
CA-302-M	Critical areas body “Y” type elevator
CA-303-M	Critical areas door “Y” type elevator
CA-304-M	Critical areas body “A” type elevator
CA-305-M	Critical areas door “A” type elevator
CA-306-M	Critical areas body side door collar types
CA-307-M	Critical areas body side door collar types

Wedge measuring instructions

Number	Name
10773477-PRO	Wedge and bor measuring instruction TMA & TA elevator
10777152-PRO	Wedge and bor measuring instruction G elevator

SAFETY DATA SHEET

1. Identification of the substance/preparation and of the company/undertaking

Product name **Rustilo DWX 32**

SDS # UK-8332, NL-08332, BE-08332

Product Use Rust preventive.

Supplier

Castrol (U.K.) Limited
Wakefield House
Pipers Way
Swindon
Wiltshire, SN3 1RE
United Kingdom

Tel.: +44 (0)1793 512712
Fax.: +44 (0)1793 486083

EMERGENCY TELEPHONE NUMBER +44 (0)1793 512712

2. Composition/information on ingredients

Hydrocarbon solvent, film forming corrosion preventives and additives.

Chemical name	CAS no.	%	EINECS / ELINCS.	Classification
Low boiling point hydrogen treated naphtha (white spirit)	64742-82-1	50 - 100	265-185-4	R10 Xn; R65 R66, 67 N; R51/53
Barium long chain alkaryl sulphonate	93028-28-5	1 - 5	296-719-4	Xn; R20/22
2-(2-Butoxythoxy) ethanol; diethylene glycol-monobutyl ether	112-34-5	1 - 5	203-961-6	Xi; R36

See Section 16 for the full text of the R Phrases declared above

Occupational Exposure Limit(s), if available, are listed in Section 8

3. Hazards identification

This preparation is classified as dangerous according to Directive 1999/45/EC as amended and adapted.

Physical/chemical Hazards Flammable.

Human health hazards Harmful: may cause lung damage if swallowed.
Repeated exposure may cause skin dryness or cracking.
Vapours may cause drowsiness and dizziness.
Residual film: Harmful by inhalation and if swallowed.

Environmental hazards Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Effects and symptoms

Eyes May cause eye irritation.

Skin Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis.

Inhalation Vapors and aerosol can produce mucous membrane, nose and throat irritation.
Vapours may cause drowsiness and dizziness.

Ingestion Ingestion may cause gastrointestinal irritation and diarrhoea.
Aspiration hazard if swallowed -- harmful or fatal if liquid is aspirated into lungs.

4. First-aid measures

Eye Contact In case of contact, immediately flush eyes with a copious amount of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin contact Immediately wash exposed skin with soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if irritation develops.

Inhalation If inhaled, remove to fresh air. Get medical attention if symptoms appear.

Ingestion If swallowed, do NOT induce vomiting. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed- can enter lungs and cause damage. Obtain medical attention.

5. Fire-fighting measures

Extinguishing Media

Suitable	In case of fire, use water fog, foam, dry chemical or CO2 extinguisher or spray. This material is toxic to aquatic organisms. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
Not Suitable	Do not use water jet.
Hazardous decomposition products	These products are carbon oxides (CO, CO2), sulphur oxides (SO2, SO3, etc.). Some metallic oxides.
Unusual fire/explosion Hazards	This material is combustible/flammable and is sensitive to fire, heat, and static discharge.
Special fire-fighting procedures	None identified.
Protection of fire-fighters	Fire fighters should wear self-contained positive pressure breathing apparatus (SCBA) and full turnout gear. Firefighters' protective clothing will provide limited protection. DO NOT FIGHT FIRE WHEN IT REACHES MATERIAL. Withdraw from fire and let it burn. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. First move people out of line-of-sight of the scene and away from windows.
Fire Hazards in Presence of Various Substances	Flammable liquid and vapour. Vapour may cause flash fire. Vapours may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

6. Accidental release measures

Personal Precautions	Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Follow all fire fighting procedures (Section 5). Do not touch or walk through spilled material.
Environmental precautions and cleanup methods	If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Minimize contact of spilled material with soils to prevent runoff to surface waterways. See Section 13 for Waste Disposal Information.
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapour respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

7. Handling and storage

Handling	Aspiration hazard if swallowed- can enter lungs and cause damage. Do not ingest. If ingested do not induce vomiting. Avoid prolonged or repeated contact with skin. Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Avoid contact of spilled material and runoff with soil and surface waterways. Wash thoroughly after handling.
Storage	Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

Ingredient Name	**Occupational Exposure Limits**
Low boiling point hydrogen treated naphtha (white spirit)	**EH40-OES (United Kingdom (UK)).** TWA: 600 mg/m^3
Highly refined mineral oil	**EH40-OES (United Kingdom (UK)).** TWA: 5 mg/m^3 Form: Oil mist, mineral STEL: 10 mg/m^3 Form: Oil mist, mineral

Control Measures	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
Hygiene measures	Wash hands after handling compounds and before eating, smoking, using lavatory, and at the end of day.

Personal protective equipment

Respiratory system	Use with adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment.
Skin and body	Avoid contact with skin. Wear clothing and footwear that cannot be penetrated by chemicals or oil.
Hands	Wear gloves that cannot be penetrated by chemicals or oil.
Eyes	Safety glasses with side shields.

9. Physical and chemical properties

Autoignition temperature	>200 °C
Flash point	40 °C (CLOSED CUP)
Explosion Limits	LOWER: 0.6 % UPPER: 8 %
Colour	Brown.
Odour	Solvent.
Odour threshold	Not available.
Physical state	Liquid.
Boiling point / range	150 °C
Density	<1 g/cm^3
Vapour pressure	2.625 mmHg
Solubility	Insoluble in cold water, hot water.
Viscosity	kinematic at 40°C: <7 cSt

10. Stability and reactivity

Conditions to Avoid	Keep away from sources of ignition.
Incompatibility with Various Substances	Reactive with oxidizing agents.
Hazardous Polymerization	Will not occur.

11. Toxicological information

Chronic toxicity

Carcinogenic effects No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH, the International Agency for Research on Cancer (IARC) or the European Commission (EC).

12. Ecological information

Persistence/degradability	Inherently biodegradable
Mobility	Volatile. Liquid. Insoluble in water.
Bioaccumulative potential	This product may bioaccumulate through food chains in the environment.
Environmental hazards	Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

13. Disposal considerations

Disposal Consideration / Waste information	Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities.
Hazardous Waste	This product is listed as Hazardous by the EU Directive on hazardous waste. Dispose of according to all national and local applicable regulations.

14. Transport information

International transport regulations

Regulatory Information	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID Classification	UN1300	Turpentine substitute mixture	3	III		**Hazard identification number** **30** **CEFIC Tremcard Number:** **30G35** **Hazchem Code** **3Y**

ADNR Classification	UN1300	Turpentine substitute mixture	3	III		-
IMDG Classification	UN1300	Turpentine substitute mixture	3	III		**Emergency Schedules (EmS)** **3-07** **Marine pollutant** **IMDG Class: Marine Pollutant. (Pollutant.)**
IATA Classification	UN1300	Turpentine substitute mixture	3	III		-

15. Regulatory information

Label Requirements

Hazard symbol(s)

Indication of Danger Harmful; Dangerous for the environment.

Risk Phrases

R10- Flammable.
R65- Harmful: may cause lung damage if swallowed.
R66- Repeated exposure may cause skin dryness or cracking.
R67- Vapours may cause drowsiness and dizziness.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases

S23- Do not breathe vapour or spray.
S24/25- Avoid contact with skin and eyes.
S43- In case of fire, use CO2/dry powder/foam - Never use water..
S51- Use only in well-ventilated areas.
S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.
S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Contains Low boiling point hydrogen treated naphtha (white spirit)

EU Regulations Classification and labelling have been performed according to EU directives 1999/45/EC and 67/548/EEC as amended and adapted.

Other Regulations

Inventories

AUSTRALIAN INVENTORY (AICS): Not determined.

CANADA INVENTORY (DSL): Not determined.

CHINA INVENTORY (IECS): Not determined.

EC INVENTORY (EINECS): In compliance.

JAPAN INVENTORY (ENCS): Not determined.

KOREA INVENTORY (ECL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

US INVENTORY (TSCA): Not determined.

16. Other information

Full text of R-phrases appearing in section 2

R10- Flammable.
R20/22- Harmful by inhalation and if swallowed.
R65- Harmful: may cause lung damage if swallowed.
R36- Irritating to eyes.
R66- Repeated exposure may cause skin dryness or cracking.
R67- Vapours may cause drowsiness and dizziness.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

HISTORY

Date of issue 21/02/2003.

Date of previous issue 30/07/2002.

Prepared by Product Stewardship

Notice to Reader

The data and advice given apply when the product is sold for the stated application or applications. The product is not sold as suitable for any other application. Use of the product for applications other than as stated in this sheet may give rise to risks not mentioned in this sheet. You should not use the product other than for the stated application or applications without seeking advice from us.

If you have purchased the product for supply to a third party for use at work, it is your duty to take all necessary steps to secure that any person handling or using the product is provided with the information in this sheet.

If you are an employer, it is your duty to tell your employees and others who may be affected of any hazards described in this sheet and of any precautions which should be taken.

Further copies of this Safety Data Sheet may be obtained from Castrol.

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SAFETY DATA SHEET

according to 1907/2006/EC, Article 31

Premtape

Revision 1

Revision date 2013-10-14

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name	Premtape

1.2. Relevant identified uses of the substance or mixture and uses advised against

Product Use	[SU3] Industrial uses: Uses of substances as such or in preparations at industrial sites; [SU19] Building and construction work; [PC1] Adhesives, sealants; ----- [SU21] Consumer uses: Private households (= general public = consumers); [PC1] Adhesives, sealants; ----- [SU22] Professional uses: Public domain (administration, education, entertainment, services, craftsmen); [SU19] Building and construction work; [PC1] Adhesives, sealants;

1.3. Details of the supplier of the safety data sheet

Company	Premier Coatings Ltd
Address	Headcorn Road, Smarden, Ashford, Kent TN27 8PJ
Web	www.premiercoatings.com
Telephone	+ 44 (0) 1233 770 663
Fax	+44 (0) 1233 770 633
Email	enquires@premiercoatings.com
Email address of the competent person	help@premiercoatings.com

1.4. Emergency telephone number

Emergency telephone number	+ 44 (0) 1233 770 663 9.00 am - 5.00 pm Mon - Fri

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Main hazards	No Significant Hazard

2.2. Label elements

	Not required.

2.3. Other hazards

Other hazards	Not determined.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

	This product does not contain any substances classified as hazardous to health.

SECTION 4: First aid measures

Premtape

Revision 1
Revision date 2013-10-14

4.1. Description of first aid measures

Inhalation	If you feel unwell, seek medical advice (show the label where possible).
Eye contact	Avoid contact with eyes.
Skin contact	Avoid contact with skin. Wash with soap and water.
Ingestion	If you feel unwell, seek medical advice (show the label where possible).

4.2. Most important symptoms and effects, both acute and delayed

Inhalation	Solid. Potential Suffocation.
Eye contact	May cause irritation to eyes.
Skin contact	May cause irritation to skin.
Ingestion	If you feel unwell, seek medical advice (show the label where possible).

4.3. Indication of any immediate medical attention and special treatment needed

Inhalation	Seek medical attention.
Eye contact	Rinse immediately with plenty of water.
Skin contact	Wash off immediately with plenty of soap and water.
Ingestion	If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

SECTION 5: Firefighting measures

5.1. Extinguishing media

	Carbon dioxide (CO2). Dry chemical. Foam. Do NOT use water jet.

5.2. Special hazards arising from the substance or mixture

	Burning produces obnoxious and irritating fumes.

5.3. Advice for firefighters

	Wear suitable respiratory equipment when necessary.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

	Wear suitable gloves.

6.2. Environmental precautions

	Not normally required.

6.3. Methods and material for containment and cleaning up

	Collect spillage.

6.4. Reference to other sections

	See section 8, 13 for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

	Wear suitable gloves. Adopt best Manual Handling considerations when handling, carrying and dispensing.

7.2. Conditions for safe storage, including any incompatibilities

	Avoid sparks, flames, heat and sources of ignition.

7.3. Specific end use(s)

	See section 1.2 for further information.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

	Not normally required.

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8.2. Exposure controls

	
Eye / face protection	Not normally required.
Skin protection - Handprotection	Wear suitable gloves.
Respiratory protection	Not normally required.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State	Solid
Colour	Brown
Odour	Characteristic
pH	Not determined
Melting point	Not determined
Freezing Point	Not determined
Boiling point	Not determined
Flash point	Not relevant
Evaporation rate	Not relevant
Flammability limits	No data available
Vapour Flammability	No data available
Vapour pressure	Not relevant
Vapour density	Not relevant
Relative density	Not relevant
Fat Solubility	Not determined
Partition coefficient	Not determined
Autoignition temperature	Not determined
Viscosity	Not relevant
Explosive	Not relevant
Oxidising	Not relevant
Solubility	Insoluble in water

9.2. Other information

Conductivity	Not determined
Surface tension	Not relevant
Gas group	Not relevant
Benzene Content	Not determined
Lead content	Not determined
VOC (Volatile organic compounds)	Not determined

SECTION 10: Stability and reactivity

10.1. Reactivity

	Stable under normal conditions.

10.2. Chemical stability

	Stable under normal conditions.

10.3. Possibility of hazardous reactions

	No Significant Hazard.

10.4. Conditions to avoid

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Revision 1
Revision date 2013-10-14

10.4. Conditions to avoid

Heat, sparks and open flames.

10.5. Incompatible materials

Keep away from food, drink and animal feedingstuffs.

10.6. Hazardous decomposition products

Will not decompose if stored and used as recommended.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

No data is available on this product.

11.1.4. Toxicological Information

No data available

SECTION 12: Ecological information

12.1. Toxicity

No data available

12.2. Persistence and degradability

No data is available on this product.

12.3. Bioaccumulative potential

No data is available on this product.

12.4. Mobility in soil

No data is available on this product.

12.5. Results of PBT and vPvB assessment

No data is available on this product.

12.6. Other adverse effects

No data is available on this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Do not empty into drains; dispose of this material and its container in a safe way.

General information

EWC.
08 WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS.
08 04 10 waste adhesives and sealants other than those mentioned in 08 04 09.

Disposal methods

Contact a licensed waste disposal company.

Disposal of packaging

Contact a licensed waste disposal company.

SECTION 14: Transport information

ADR/RID

The product is not classified as dangerous for carriage.

IMDG

The product is not classified as dangerous for carriage.

IATA

The product is not classified as dangerous for carriage.

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Revision 1
Revision date 2013-10-14

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

	COMMISSION REGULATION (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

15.2. Chemical safety assessment

	Not relevant.

Labelling

Risk phrases	No Significant Hazard.

SECTION 16: Other information

Other information

	The information supplied in this Safety Data Sheet is designed only as guidance for the safe use, storage and handling of the product. This information is correct to the best of our knowledge and belief at the date of publication however no guarantee is made to its accuracy. This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process.
Revision	This document differs from the previous version in the following areas:. 11 - 11.1. Information on toxicological effects.

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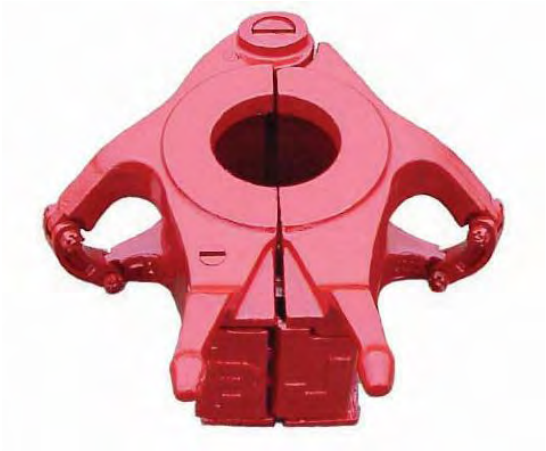
NATIONAL OILWELL VARCO

TEST SPECIFICATION
TA - Series



Configuration : _____

Part Description : _____

Part Number : _____

Serial Number : ***NL*** _____

Shop Order : _____

Final inspection "Operator": _____***Name,*** _____***Signature***

Final inspection "Quality Inspector": _____***Name,*** _____***Signature***

Final inspection "Picker": _____***Name,*** _____***Signature***

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	Corne Stuyts	Name	Kees van de Sande
Date:	18 juni 1997	Date	3 SEP 2013
Drawing type:	Word document.	ECR	00011197

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **D**	Document No.: **TSEL-0022**	Description: **TA - series Test specification**	Sheet: **1 of 9**

1. TSEL guidelines

1.1. ***TSEL stands for Test Specification Etten-Leur.***

1.2. ***The TSEL describes essential measurements and checks that need to be performed during and after assembly. These measurements and checks need to be logged at the appropriate paragraphs. Additional each step needs to be signed by the "Operator" and/or by the "Quality Inspector".***

1.3. ***The "Operator" is the person that does run the initial check/measurement. He/she needs to sign the respective step with his/her identification stamp in the box behind the respective paragraph.***

1.4. ***The "Quality Inspector" is the person that verifies certain key checks/measurements performed by the "Operator". He/she is also responsible for the final acceptance of the TSEL and needs to sign the check/measurement with his/her identification stamp in the box behind the respective paragraph.***

1.5. ***The "Picker" is the person that verifies the visual aspects of the finished product after the last router step completion from the painter.***

1.6. ***Some checks/measurements may require the "Operator" and the "Quality Inspector" to be present simultaneously. Where applicable***

1.7. ***The TSEL contains all relevant part information like part number, serial, number heat no etc. The TSEL is send to Document Control by the cell "Quality Inspector" after closing the shop order. Document control scans the TSEL and files into our Document Management System PdmLink.***

1.8. ***In case Data Books are required with a specific part/assembly the TSEL will be added into the Data Book for customer reference.***

1.9. ***Deviations in the TSEL must be clearly marked and corrected or; a written waiver explanation MUST be given behind the deviation or on the remark sheet in the back of the TSEL. Waiver approvals always need to be signed of by the "Quality Inspector" or "Engineering".***

DO NOT CHANGE THIS PAGE UNLESS PERMISSION FROM ENGINEERING SUPERVISOR OR TECHNICAL DIRECTOR

2. FINAL INSPECTIONS AND DATABOOK INFORMATION

Reference serial number:_____

2.1. ***Part numbering and traceability information***

Part	*Part number*	*(*1)Heat-code/ Serial number*	*(*2) 1e 907*	*(*3) 2e 907*	*(*4) 910*	*Foundry/ Vendor*	*Oven Charge number(s) when applicable*
Body							
Door							
Latch							
H-pin							***NA***
L-pin							***NA***

(*1)Heatno's to be filled in by picker: _____***Name,*** _____***Signature***

(*2)Heatno's checked by: _____***Name,*** _____***Signature***

(*3) Heatno's checked by: _____***Name,*** _____***Signature***

(*4) Heatno's checked by: _____***Name,*** _____***Signature***

3. General inspection

		Initials required; Operator	Quality Inspector
3.1.	*Check there are no sharp corners or edges on parts.*		
3.2.	*Check there are no welding spatters.*		
3.3.	*Check that the assembly has been load tested*		
3.4.	*Check that the assembly has been MPI tested*		
3.5.	*Check paint layer thickness according to specification. Measure and note down 3 positions randomly taken from the painted surfaces:*		
	Measurement 1; _____		
	Measurement 2; _____		
	*Measurement 3:*_____		
	(Minimum thickness required is 120 um, measurement taken by painter)		
3.6.	*Check all blank surfaces have preservation applied (picker).*		
3.7.	*Check painted surfaces for no chipping and a gloss finish (picker).*		
3.8.	*Check all greasing points are greased*		
3.9.	*Check all sliding surfaces have grease applied prior or after assembly.*		
3.10.	*Check secondary retention rules have been applied as mentioned on the assembly drawing and secondary retention guide.*		

4. Before load test (For all Elevators)

	Initials required; Operator	Quality Inspector
4.1. ***Check marking on presence, legibility and verify with shop order;***		
4.1.1. ***Part number:*** _____		
4.1.2. ***Serial number:*** _____		
4.1.3. ***Bore code:*** _____		
4.1.4. ***Rating:*** _____		
4.2. ***Check if the latch/lug contact is between 60% - 70% if the lug isn't machined or between 75% - 80% if the lug is machined.***		
4.3. ***Check if the latch is minimum 3/16" free from the door (fig 1) Note down the measured dimension:*** _____		
4.4. ***Check that the clearance between latch and door lug is 1/8" minimum (top and bottom)***		
4.5. ***Check if the lock is between 1/16" - 5/32" clear from the door lock surface (fig 1) Note down the measured dimension:*** _____		
4.6. ***Check if latch lock can rotate freely and if it is within the door guide's (top and bottom)***		
4.7. ***Check if distance between the body and door is within 1/32"- 1/16" Note down the measured dimension:*** _____		
4.8. ***Check that the distance between latch and door lug is minimum 3/16" (elevator closed and latch in maximum opened position) Note down the measured dimension***: _____		
4.9. ***Check lock engage minimum 3/8" x 3/8" behind the lock surface from the door. (For 32754, 39342, 200000 it should be 7/16" x 7/16") (See fig 1 and 2)***		

4.10. ***Check if the clearance between the bottom side from the latch lock and the door guide is minimum 1/16" when the door is wedged up.***

4.11. ***When the latch is pried from behind, the latch lock must prevent the latch from being opened.***

4.12. ***Check that correct latch and latch lock spring are fitted and if the latch/latch lock can rotate freely and opens and closes very smoothly***

4.13. ***Pipe opening:***
If the bore is 2 7/8" or smaller the pipe opening should be at least 1 3/8" more than the actual bore.

Note down the measurements; _____

If the bore is between 2.7/8" and 5.1/2" the pipe opening should be 1.1/2." more than the actual bore.

Note down the measurements: _____

If the bore is equal or bigger then 5.1/2" the pipe opening should be 2" more than the actual bore.

Note down the measurements: _____

At Part no 32383 the pipe opening only has to be 1" bigger than the actual bore.

Note down the measurements: _____

4.14. ***Check for reducing chamber in body under hinge and latch pin.***

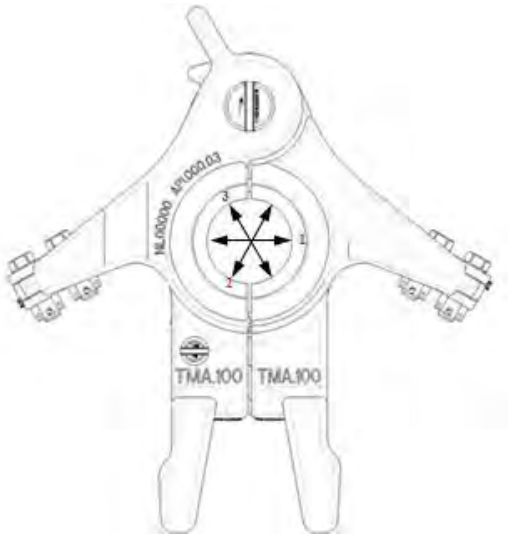
4.15. ***Check if link blocks can rotate freely to a minimum horizontal position.***

4.16. ***Open and close the elevator 5 times slowly and 5 times quickly check that the elevator works without hesitation or hampering.***

5. After load test (For all Elevators)

		Initials required; Operator	Quality Inspector
5.1.	*Check if elevator is load tested and MPI'd.*		
5.2.	*Check there are no sharp corners, edges or weld spatter that can cause injury.*		
5.3.	*Check there's no corrosion on pins, springs and machined areas.*		
5.4.	*Check if latch and hinge pin are retained on the bottom side.*		
5.5.	*Check when latch is fully open that both springs ends are correctly engaged and that the springs don't stick out.*		
5.6.	*Check if hinge pin lock bar is engaged both sides for at least 3/16" (fig 3)*		
5.7.	*Check if latch and latch lock pin on the top side are retained.*		
5.8.	*Check if link blocks, bolts, nuts (on front side of elevator) and cotter pins are present.*		
5.9.	*Check that grease nipples on door hinge boss are present and greased.*		
5.10.	*Check if grease on latch/lug contact area, latch/latch-lock sliding area and one bore is present.*		
5.11.	*Check if al stamping has been applied according to drawing and router.*		
5.12.	*Check if info and read manual nameplate is present.*		
5.13.	*Open and close the elevator 5 times slowly and 5 times quickly check that the elevator works without hesitation or hampering.*		

5.14. ***Wedge elevator according to Wedge and measurement instruction TMA - TA elevator. Measure the top and bottom bore and note down the dimensions as shown on picture***



Top bore 1 _____ ***Bottom bore 1*** _____

Top bore 2 _____ ***Bottom bore 2*** _____

Top bore 3 _____ ***Bottom bore 3*** _____

6 REMARKS

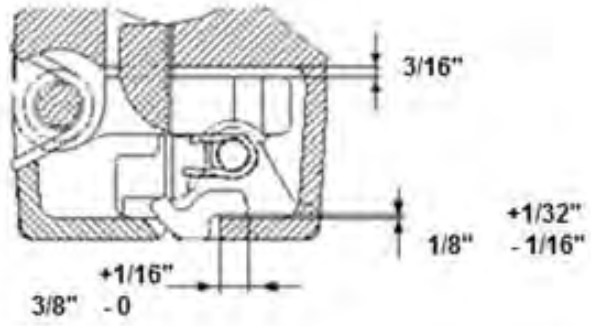
_____

_____

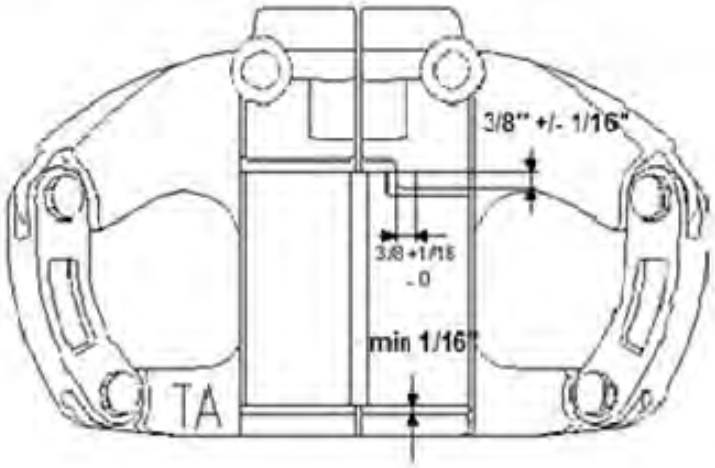
_____

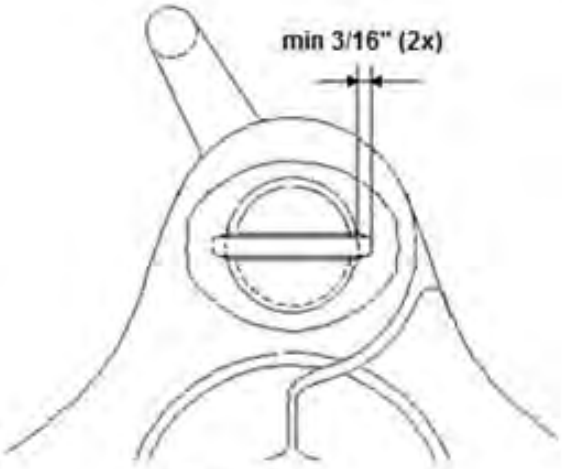
_____

figuur1



figuur 2





figuur 3

Varco BJ B.V.
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4879 AP Etten-Leur
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Fax: +31-76-5046000

Revision:	Document No.:	Description:	Sheet:
D	TSEL-0022	TA - series Test specification	9 of 9

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NATIONAL OILWELL VARCO

TEST SPECIFICATION
G - Series

Configuration : _____

Part Description : _____

Part Number : _____

Serial Number : ***NL*** _____

Shop Order : _____

Final inspection "Operator": _____***Name,*** _____***Signature***

Final inspection "Quality Inspector": _____***Name,*** _____***Signature***

Final inspection "Picker": _____***Name,*** _____***Signatur***

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	K Phillips	Name	Kees van de Sande
Date:	08-21-2000	Date	03-09-2011
Drawing type:	Word document.	ECR	00011200

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **D**	Document No.: **TSEL-0074**	Description: **G - series Test specification**	Sheet: **1 of 10**

1 TSEL guidelines

1.1. ***TSEL stands for Test Specification Etten-Leur.***

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1.3. ***The "Operator" is the person that does run the initial check/measurement. He/she needs to sign the respective step with his/her identification stamp in the box behind the respective paragraph.***

1.4. ***The "Quality Inspector" is the person that verifies certain key checks/measurements performed by the "Operator". He/she is also responsible for the final acceptance of the TSEL and needs to sign the check/measurement with his/her identification stamp in the box behind the respective paragraph.***

1.5. ***The "Picker" is the person that verifies the visual aspects of the finished product after the last router step completion from the painter.***

1.6. ***Some checks/measurements may require the "Operator" and the "Quality Inspector" to be present simultaneously. Where applicable***

1.7. ***The TSEL contains all relevant part information like part number, serial, number heat no etc. The TSEL is send to Document Control by the cell "Quality Inspector" after closing the shop order. Document control scans the TSEL and files into our Document Management System PdmLink.***

1.8. ***In case Data Books are required with a specific part/assembly the TSEL will be added into the Data Book for customer reference.***

1.9. ***Deviations in the TSEL must be clearly marked and corrected or; a written waiver explanation MUST be given behind the deviation or on the remark sheet in the back of the TSEL. Waiver approvals always need to be signed of by the "Quality Inspector" or "Engineering".***

DO NOT CHANGE THIS PAGE UNLESS PERMISSION FROM ENGINEERING SUPERVISOR OR TECHNICAL DIRECTOR

2. FINAL INSPECTIONS AND DATABOOK INFORMATION

Reference serial number:_____

2.1. ***Part numbering and traceability information***

Part	*Part number*	*(*1)Heat-code/ Serial number*	*(*2) 1e 907*	*(*3) 2e 907*	*(*4) 910*	*Foundry/ Vendor*	*Oven Charge number(s) when applicable*
Body							
Door							
Latch							
H-pin							***NA***
L-pin							***NA***

(*1)Heatno's to be filled in by picker: _____***Name,*** _____***Signature***

(*2)Heatno's checked by: _____***Name,*** _____***Signature***

(*3) Heatno's checked by: _____***Name,*** _____***Signature***

(*4) Heatno's checked by: _____***Name,*** _____***Signature***

3. General inspection

		Initials required; Operator	Quality Inspector
3.1.	*Check there are no sharp corners or edges on parts.*		
3.2.	*Check there are no welding spatters.*		
3.3.	*Check that the assembly has been load tested*		
3.4.	*Check that the assembly has been MPI tested*		
3.5.	*Check paint layer thickness according to specification. Measure and note down 3 positions randomly taken from the painted surfaces:*		
	Measurement 1; _____		
	Measurement 2; _____		
	*Measurement 3:*_____		
	(Minimum thickness required is 120 um, measurement taken by painter)		
3.6.	*Check all blank surfaces have preservation applied (picker).*		
3.7.	*Check painted surfaces for no chipping and a gloss finish (picker).*		
3.8.	*Check all greasing points are greased*		
3.9.	*Check all sliding surfaces have grease applied prior or after assembly.*		
3.10.	*Check secondary retention rules have been applied as mentioned on the assembly drawing and secondary retention guide.*		

4. Before load test (For all Elevators)

	Initials required; Operator	Quality Inspector
4.1. ***Check marking on presence, legibility and verify with shop order;***		
4.1.1. ***Part number:*** _____		
4.1.2. ***Serial number:*** _____		
4.1.3. ***Bore code:*** _____		
4.1.4. ***Rating:*** _____		
4.2. ***Check that correct latch and latch lock spring are fitted.***		
4.3. ***Check for clearance of min 1/4" between latch and door lug, elevator closed and latch in the maximum opened position.***		
4.4. ***Check that clearance between body and door is within 1/32" – 1/16" (see fig 2).*** ***Note down the measured dimension:*** _____		
4.5. ***Visually check that the latch is seated as in figure 1***		
4.6. ***Check if the latch lock prevents the latch from being opened when the latch is pried from behind in closed position***		
4.7. ***Check that clearance between latch and door is 1/8" minimum, (elevator wedged, see fig 1a)*** ***Note down the measured dimension:*** _____		
4.8. ***Check that clearance between latch and door lug is 1/8" minimum (elevator wedged, top and bottom of door lug, see fig 3)*** ***Note down the measured dimension:*** _____		
4.9. ***Check that latch and lug faces make contact and are parallel to each other (elevator wedged, see figure 4)***		
4.10. ***Check that latch is not forced outwards when elevator is wedged.***		

4.11. ***Check that the lock hook has clearance all around the door lug pin. (Elevator wedged, See fig 1)***

4.12. ***Check that the lock hook has a minimum clearance of 1/8", top and bottom in the lug door cavity.***

4.13. ***Check that the latch lock can rotate freely.***

4.14. ***Check that the latch lock handle is protected sufficiently by the guard lugs.***

4.15. ***Hang the elevator in the open position (tilted forward) and check that the latch doesn't move forward and when pulled open returns abruptly to its stop (not applicable air op)***

4.16. ***Check whether pipe opening is as per table. Body and door hinge boss must not interfere with each other.***

HGG 8.5/8"(min) Note down measurements; _____

GG 7.1/2"(min) Note down measurements; _____

MGG 7.1/2"(min) Note down measurements; _____

RGG 5.1/2"(min) Note down measurements; _____

RGA 6.1/2"(min) Note down measurements; _____

GA 7.1/2"(min) Note down measurements; _____

MG 7"(min) Note down measurements; _____

4.17. ***Check for reducing chamber in body under hinge pin. (Not applicable air op or for MG)***

4.18. ***Check for reducing chamber in body under latch pin.***

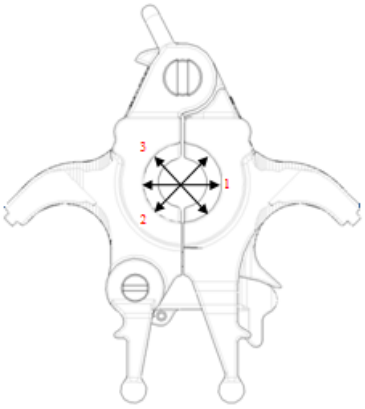
4.19. ***Check if link blocks can rotate freely to a minimum horizontal position.***

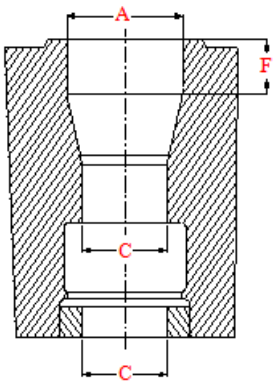
4.20. ***Check that door lug pin is welded both ends***

5. After load test (For all Elevators)

		Initials required; Operator	Quality Inspector
5.1.	*Check if elevator is load tested and MPI'd*		
5.2.	*Check there are no sharp corners, edges or weld spatter that can cause injury.*		
5.3.	*Check there's no corrosion on pins, springs and machined areas*		
5.4.	*Check if hinge pin and latch pin lock bar are engaged both sides for at least 3/16" (not for MG)*		
5.5.	*Check if hinge pin is riveted over on both sides and that the latch pin is retained with a dowel pin (only for MG)*		
5.6.	*Check for nut and cotter pin on latch lock bolt.*		
5.7.	*Check if link blocks, bolts, nuts (on front side of elevator) and cotter pins are present.*		
5.8.	*Check when latch is fully open that both springs ends are correctly engaged.*		
5.9.	*Check for presence of tack weld on latch spring stop. (Lock pin from MG should be riveted over on 2 sides)*		
5.10.	*Check that grease nipple on door hinge boss is present.*		
5.11.	*Check if grease on latch/lug contact area, latch/latch-lock sliding area and one bore are present.*		
5.12.	*If wear bushings are fitted, check that retaining bolts are installed and that they are lock wired. Also check that the bore diameter is correct and that they do not obstruct the elevator from closing*		
5.13.	*Open and close the elevator 5 times slowly and 5 times quickly check that the elevator works without hesitation or hampering.*		

5.14. ***Wedge elevator according to Wedge and measurement instruction G elevator. Measure the bore and note down the dimensions as shown on picture***





Top bore(A) 1 _____ ***Bottom bore(C) 1*** _____

Top bore (A) 2 _____ ***Bottom bore(C) 2*** _____

Top bore (A) 3 _____ ***Bottom bore(C) 3*** _____

F – Maat _____

6 REMARKS

_____

_____

_____

_____

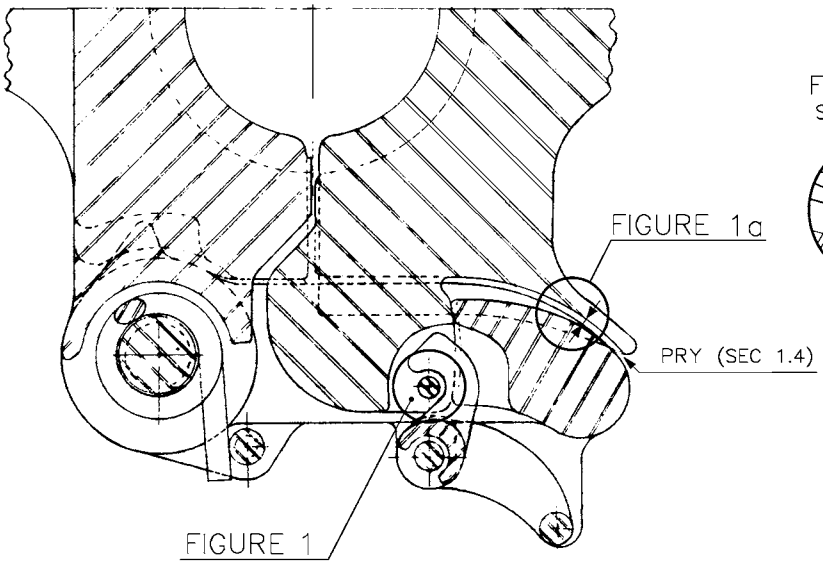


FIGURE 1a
SCALE 2:1

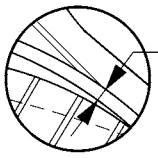
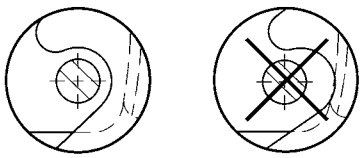


FIGURE 1
SCALE 2:1



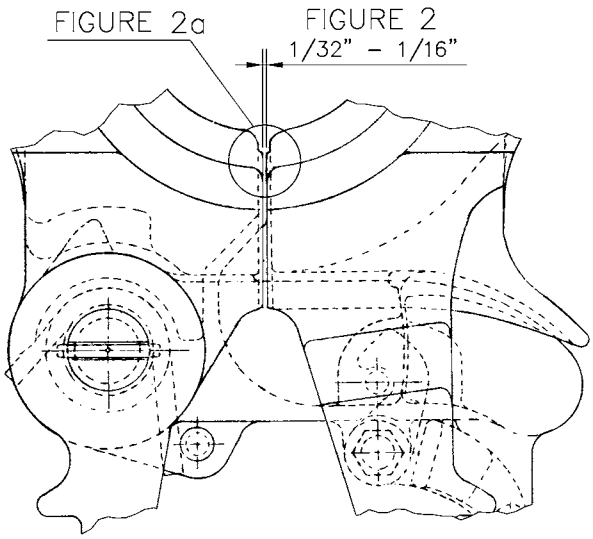
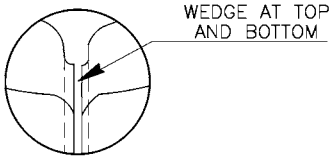


FIGURE 2a
SCALE 2:1



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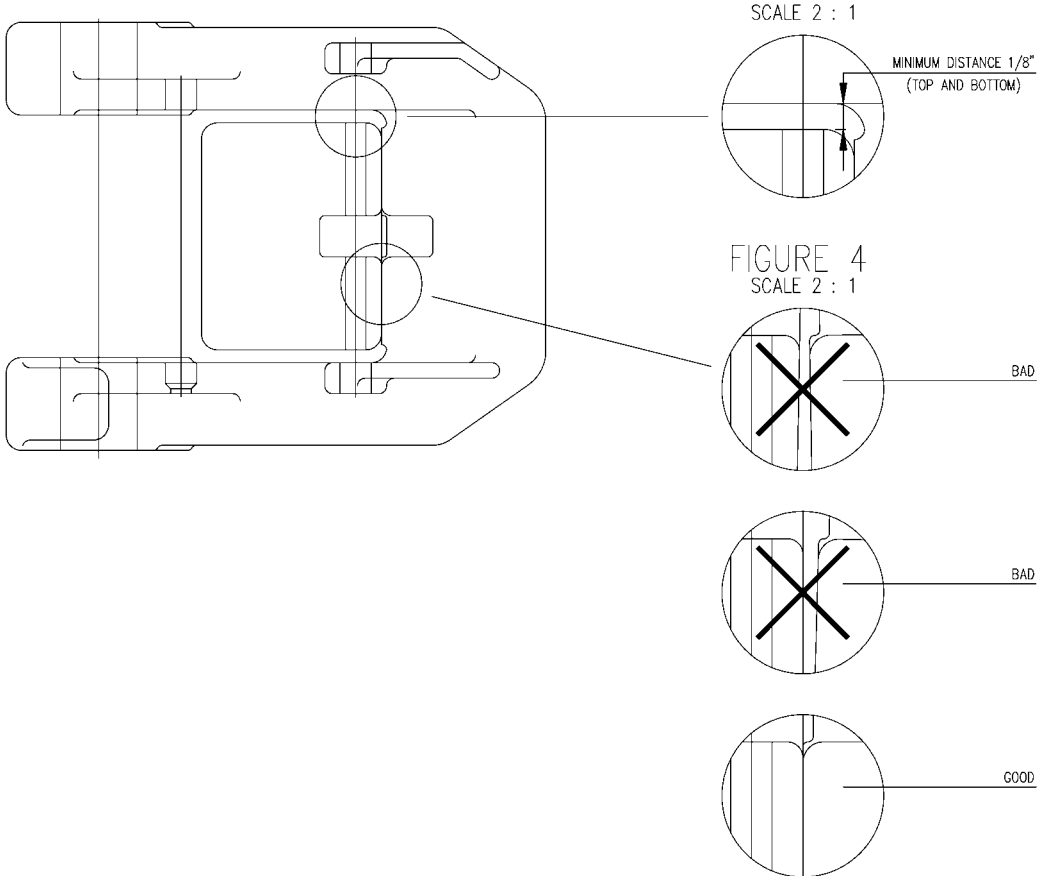
Revision:	Document No.:	Description:	Sheet:
D	**TSEL-0074**	**G - series Test specification**	**9 of 10**



Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **D**	Document No.: **TSEL-0074**	Description: **G - series Test specification**	Sheet: **10 of 10**

NATIONAL OILWELL VARCO

TEST SPECIFICATION
Y - Series

Configuration : _____

Part Description : _____

Part Number : _____

Serial Number : ***NL*** _____

Shop Order : _____

Final inspection "Operator": _____***Name,*** _____***Signature***

Final inspection "Quality Inspector": _____***Name,*** _____***Signature***

Final inspection "Picker": _____***Name,*** _____***Signatur***

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	K.Philips	Name	Cees v.d. Sande
Date:	03-23-'02	Date	22-09-2011
Drawing type:	Word document.	ECN	702501

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **C**	Document No.: **TSEL-0076**	Description: **Y - series Test specification**	Sheet: **1 of 10**

1 TSEL guidelines

1.1. ***TSEL stands for Test Specification Etten-Leur.***

1.2. ***The TSEL describes essential measurements and checks that need to be performed during and after assembly. These measurements and checks need to be logged at the appropriate paragraphs. Additional each step needs to be signed by the "Operator" and/or by the "Quality Inspector".***

1.3. ***The "Operator" is the person that does run the initial check/measurement. He/she needs to sign the respective step with his/her identification stamp in the box behind the respective paragraph.***

1.4. ***The "Quality Inspector" is the person that verifies certain key checks/measurements performed by the "Operator". He/she is also responsible for the final acceptance of the TSEL and needs to sign the check/measurement with his/her identification stamp in the box behind the respective paragraph.***

1.5. ***The "Picker" is the person that verifies the visual aspects of the finished product after the last router step completion from the painter.***

1.6. ***Some checks/measurements may require the "Operator" and the "Quality Inspector" to be present simultaneously. Where applicable***

1.7. ***The TSEL contains all relevant part information like part number, serial, number heat no etc. The TSEL is send to Document Control by the cell "Quality Inspector" after closing the shop order. Document control scans the TSEL and files into our Document Management System PdmLink.***

1.8. ***In case Data Books are required with a specific part/assembly the TSEL will be added into the Data Book for customer reference.***

1.9. ***Deviations in the TSEL must be clearly marked and corrected or; a written waiver explanation MUST be given behind the deviation or on the remark sheet in the back of the TSEL. Waiver approvals always need to be signed of by the "Quality Inspector" or "Engineering".***

DO NOT CHANGE THIS PAGE UNLESS PERMISSION FROM ENGINEERING SUPERVISOR OR TECHNICAL DIRECTOR

2. FINAL INSPECTIONS AND DATABOOK INFORMATION

Reference serial number:_____

2.1. *Part numbering and traceability information*

Description	*Part number*	*Heat-code/ Serial number*	*Foundry/ Vendor*	*Oven Charge number(s) when applicable*
Body				
Door				
Latch				
Hinge pin				*NA*
Latch pin				*NA*

3. General inspection

		Initials required; Operator	Quality Inspector
3.1.	***Check there are no sharp corners or edges on parts.***		
3.2.	***Check there are no welding spatters.***		
3.3.	***Check that the assembly has been load tested.***		
3.4.	***Check that the assembly has been MPI tested.***		
3.5.	***Check paint layer thickness according to specification. Measure and note down 3 positions randomly taken from the painted surfaces:***		
	Measurement 1; _____		
	Measurement 2; _____		
	Measurement 3:_____		
	(Minimum thickness required is 120 um, measurement taken by painter)		
3.6.	***Check all blank surfaces have preservation applied (picker).***		
3.7.	***Check painted surfaces for no chipping and a gloss finish (picker).***		
3.8.	***Check all greasing points are greased***		
3.9.	***Check all sliding surfaces have grease applied prior or after assembly.***		
3.10.	***Check secondary retention rules have been applied as mentioned on the assembly drawing and secondary retention guide.***		

4. Before load test

	Initials required; Operator	Quality Inspector
4.1. ***Check marking on presence, legibility and verify with shop order;***		
4.1.1. ***Part number:*** _____		
4.1.2. ***Serial number:*** _____		
4.1.3. ***Bore code:*** _____		
4.1.4. ***Rating:*** _____		
4.2. ***Check that correct latch and latch lock spring are fitted.***		
4.3. ***Check for clearance of min 1/4" between latch and door lug, elevator closed and latch in the maximum opened position.***		
4.4. ***Check that clearance between body and door is within 1/32" – 1/16", elevator closed and latch contacting the door lug.*** ***Note down the measured dimension:*** _____		
4.5. ***Check that latch cam turns easily (YT-YC elevators only)***		
4.6. ***Check for sufficient room for hand behind lock for opening latch.***		
4.7. ***Check if the latch lock prevents the latch from being opened when the latch is pried from behind in closed position.***		
4.8. ***Check that clearance between latch and door is 1/8" minimum, (elevator wedged, see fig 3) (for HYT clearance has to be 1/4")*** ***Note down the measured dimension:*** _____		
4.9. ***Check that clearance between latch and door lug is 1/8" minimum (elevator wedged, top and bottom of door lug, see fig 5)*** ***Note down the measured dimension:*** _____		

4.10. ***Check that latch and lug faces make 75-80% contact and are parallel to each other (elevator wedged)***

4.11. ***Check that latch is not forced outwards when elevator is wedged.***

4.12. ***Check that the lock hook has clearance all around the door lug pin. (Elevator wedged, See fig 3) (HYT not applicable)***

4.13. ***Check that the lock hook has a minimum clearance of 1/8", top and bottom in the lug door cavity. (HYT not applicable, see Fig 5)***

4.14. ***Check for overlap of latch lock behind door is in accordance with drawing (HYT only, Fig 4)***

4.15. ***Check that the latch lock can rotate freely and is correctly assembled.***

4.16. ***Check that the latch lock handle is protected sufficiently by the guard lugs. (Fig 3)***

4.17. ***Hang the elevator in the open position (tilted forward) and check that the latch doesn't move forward and when pulled open returns abruptly to its stop (not applicable air op)***

4.18. ***Check whether pipe opening is as per table. Body and door hinge boss must not interfere with each other.***

HYC 9"(min)	***Note down measurements;***	_____
HYT 5"(min)	***Note down measurements;***	_____
YT 5"(min)	***Note down measurements;***	_____
YC 9"(min)	***Note down measurements;***	_____
MYT 4 7/8"(min)	***Note down measurements;***	_____
LYT 4 1/16"(min)	***Note down measurements;***	_____
MYC 9"(min)	***Note down measurements;***	_____

4.19. ***Check for reducing chamber in body under hinge pin. (HYC manual, MYC, HYT & YT)***

4.20.	*Check for reducing chamber in body under latch pin.*		
4.21.	*Check that door lug pin is correctly retained.*		
4.22.	*Check if link blocks can rotate freely to a minimum horizontal position.*		
4.23.	*Check that slip set can move up and down freely.*		
4.24.	*Check that elevator can move along pipe without hesitation when slips are in free position.*		
4.25.	*Check slip inserts make full contact with pipe with slips set.*		
4.26.	*Check that offset on slip back makes correct (line)contact with elevator taper.*		
4.27.	*Check that slip segments do not interfere with each other when set.*		
4.28.	*Check that guide lug on top (MYT) is ground in accordance with drawing.*		
4.29.	*Open and close the elevator 5 times slowly and 5 times quickly check that the elevator works without hesitation or hampering.*		

5. After load test

		Initials required; Operator	Quality Inspector
5.1.	*Check if elevator is load tested and MPI'd*		
5.2.	*Check there are no sharp corners, edges or weld spatter that can cause injury.*		
5.3.	*Check there's no corrosion on pins, springs and machined areas.*		
5.4.	*Check if hinge pin and latch pin are correctly retained. (Fig 1 and 2)*		
5.5.	*Check that latch lock pin is correctly retained.*		

5.6.	***Check that door lug pin is correctly retained (not applicable HYT elevator)***		
5.7.	***Check that elevator has 4 slip bolts and 4 slip springs fitted.***		
5.8.	***Check that elevator has 4 lock washers under slip bolts. (HYC, MYC & YC)***		
5.9.	***Check for cotter pins in slip bolts (LYT only)***		
5.10.	***Check for bottom guide plate screws, nuts and cotter pins (4X). (HYC, MYC & YC)***		
5.11.	***Check if guide plate at top of elevator is correctly mounted on the elevator and if bolts are correctly lock wired.***		
5.12.	***Check if link blocks, bolts, nuts (on front side of elevator) and cotter pins are present.***		
5.13.	***Check when latch is fully open that both springs ends are correctly engaged.***		
5.14.	***Check for presence of tack weld on latch spring stop. (HYC & MYC)***		
5.15.	***Check that all grease nipples are present and greased.***		
5.16.	***Check if grease on latch/lug contact area, latch/latch-lock sliding area and one bore are present.***		
5.17.	***Open and close the elevator 5 times slowly and 5 times quickly check that the elevator works without hesitation or hampering.***		
5.18.	***Check that the bore taper dimension is according to the drawing.***		

6. REMARKS

_____

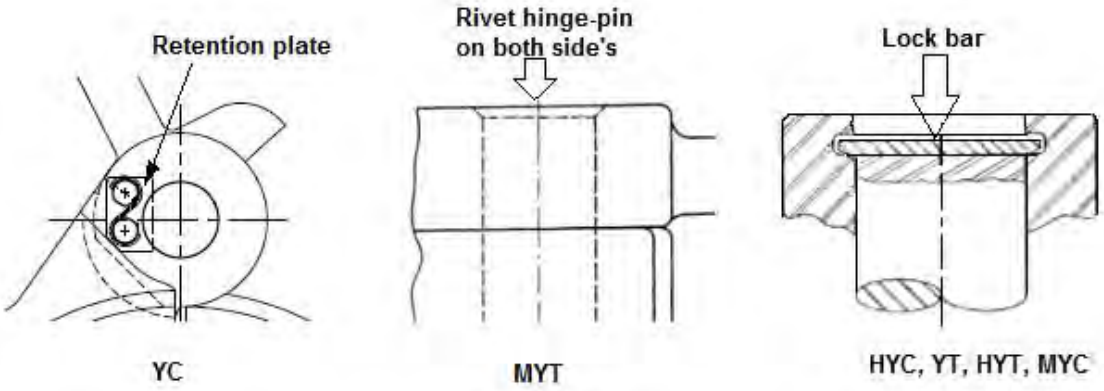
_____

_____

_____

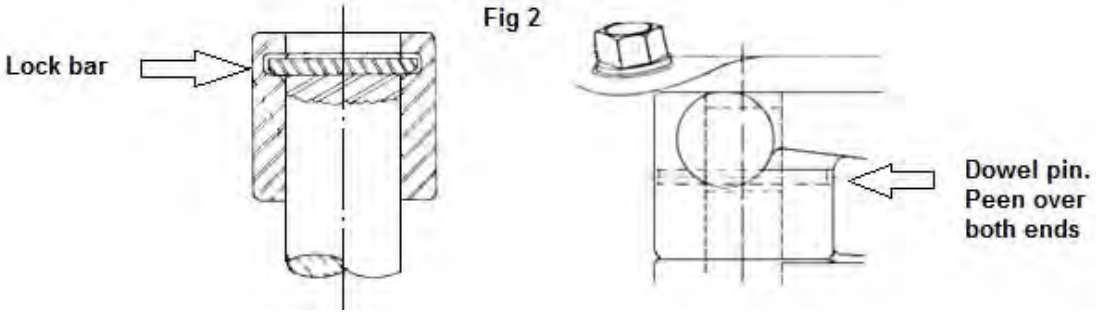
HINGE PIN

Fig 1



LATCH PIN

Fig 2



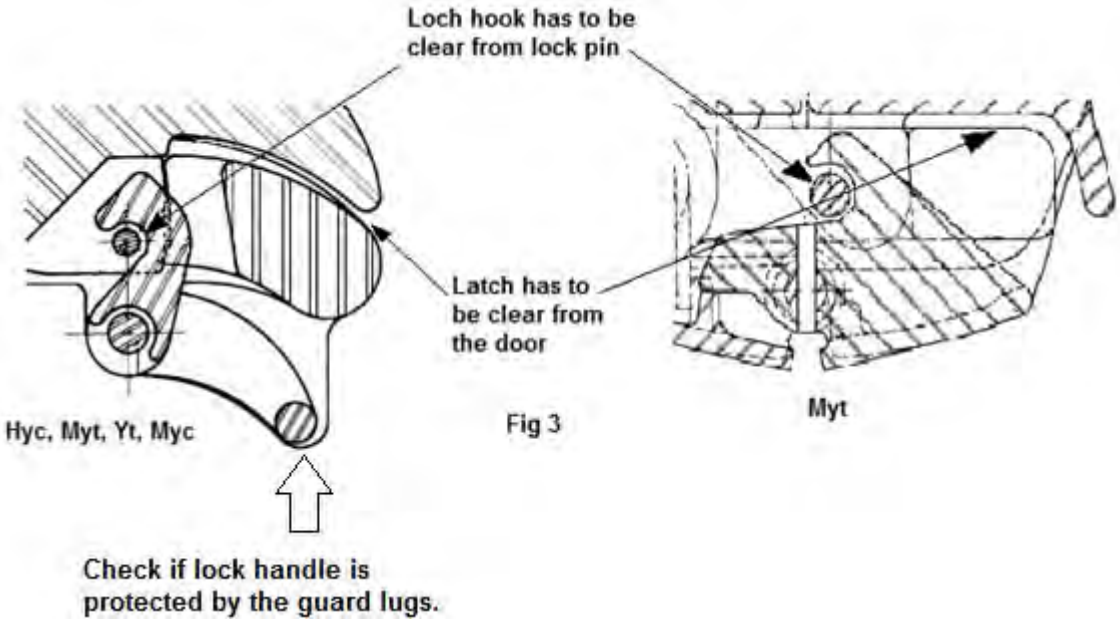


Fig 3

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **C**	Document No.: **TSEL-0076**	Description: **Y - series Test specification**	Sheet: **9 of 10**

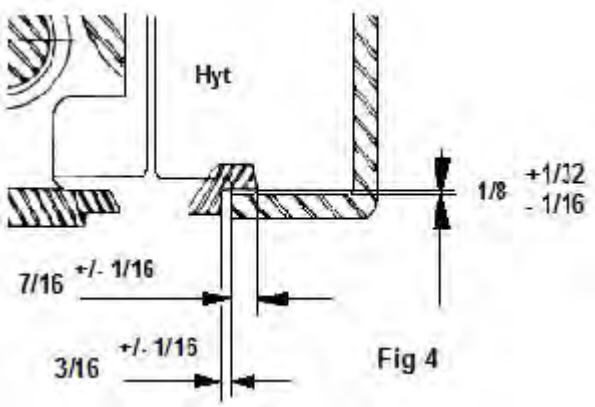


Fig 4

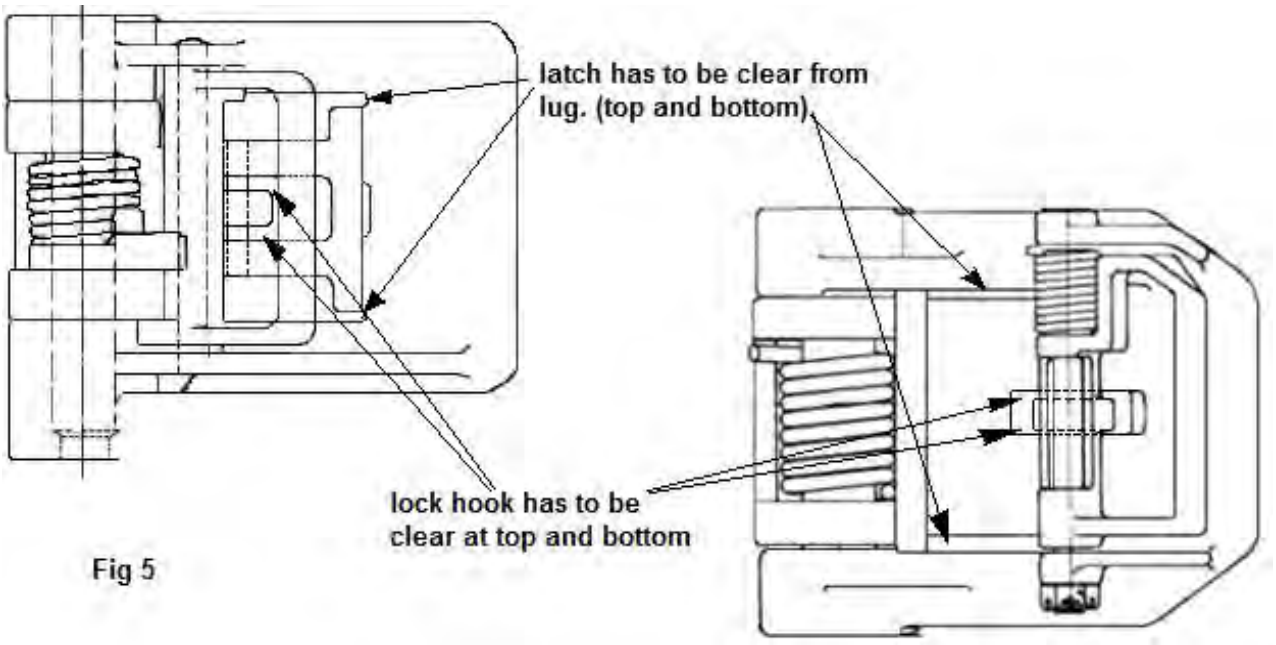


Fig 5

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Revision:	Document No.:	Description:	Sheet:
C	TSEL-0076	Y - series Test specification	10 of 10

NATIONAL OILWELL VARCO

1. ***Additional test steps on TSEL 0022, 0074, 0076 to be followed for air operated elevators. Attach this section when building an air operated elevator. All rules which are mentioned in the guidelines from the TSEL of the manual elevators are also applicable for this air section.***

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	K.v.d. Sande	Name	K.v.d. Sande
Date:	22-sep-11	Date	2-sep-13
Drawing type:	Word document.	ECR	00011228

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **A**	Document No.: **TSEL-0230**	Description: **Air Test specification** **(only to be used with TSEL from manual elevator)**	Sheet: **1 of 3**

2. After load test (only applicable for air operated)

		Initials required; Operator	Quality Inspector
2.1.	*Check that the name plate is correctly marked and that the warning plate's (4x) on front frame and (1x) on rear frame are fitted.*		
2.2.	*Check that the indicator pin protrudes (min) 1" from front frame.*		
2.3.	*Check that the latch cylinder pivot clevis nut is welded to front frame.*		
2.4.	*Check that the bell crank is free in retaining lug. (Top and bottom)*		
2.5.	*Check that trigger assembly is connected to rear frame with safety cable.*		
2.6.	*Check that trigger springs are engaged correctly with groove pins.*		
2.7.	*Check that the balance straps are fitted on rear frames.*		
2.8.	*Open en close the elevator 10 times with air pressure.*		
2.9.	*Check that the latch is opening and closing correctly.*		
2.10.	*Check that the latch lock is function correctly.*		
2.11.	*Check that the hinge-plates (4x) are free from the elevator body and each other. (check in open and closed position)*		
2.12.	*Check if the indicator pin is free from the front frame. (Check in open and closed position)*		
2.13.	*Check that the trigger finger is parallel with the top of the elevator bore and free from trigger link body.*		
2.14.	*Check that the trigger locking mechanism is working correctly.*		

2.15.	***Check that vertical play in trunnion bearings securing the rear cylinder assembly does not exceed 1/32".***		
2.16.	***Check that rear spring supports do not interfere with each other when elevator opens.***		
2.17.	***Check that pneumatic hoses and elbows are not interfering with moving parts.***		
2.18.	***Check that all bolts are tight and lock wired.***		
2.19.	***Check that all grease fittings are present and greased.***		
2.20.	***Check that all retaining rings, cotter pins and set screws are present.***		
2.21.	***Check that hinge pin retainer bar is present on bottom hinge plate.***		
2.22.	***Disconnect air supply in open position. Check for air leaks from quick relief valve, air cylinders and hoses. Elevator must remain fully open under air pressure.***		
2.23.	***Check for correct function of quick relief valve.***		
2.24.	***Check overall for air leaks and condition of hoses.***		
2.25.	***Open and close the elevator 5 times. Check that the elevator works without hesitation or hampering.***		

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This document can be used for any VarcoBJ B.V. tool except the RST rotary support tables. Refer to TSEL-0191 for the RST preservation procedure.

Long Term Preservation Procedure.

TOOL DESCRIPTION:_____

SERIAL NUMBER:_____

SHOP ORDER:_____

WITNESS by: _____

_____

WITNESS DATE + SIGNATURE: _____

_____

REMARKS: _____

_____

REFERENCE	REFERENCE DESCRIPTION

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4870 AA Etten-Leur
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DOCUMENT NUMBER	REV
TSEL-0194	**E**

NATIONAL OILWELL VARCO

REVISION HISTORY

Rev	Date (dd.mm.yyyy)	Reason for issue
E	29-01-2014	See change description
D	25.06.2013	Update
C	21.01.2010	Update
B	14.04.2009	Update
A	13.01.2009	Update
-	15.11.2008	First issue

CHANGE DESCRIPTION

Revision	Change description
-	n/a
A	Name/Title changed
B	Presevation changed, Tool data Info block added
C	For what tools applicable added
D	Revision numbers corrected
E	P-002 (paint spec) removed from document.
E	Short term preservation removed

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose

The purpose of this procedure is to provide information involving **long term preservation** of the product .
All the outlined procedures in this document shall be governing for the entire period from manufacturing until installation.

1.2 Definition

- **Shop-Preservation**: Preservation in the manufacturer's plant during final assembly and before transport.
- **Re-preservation**: Any preservation carried out AFTER **Shop-Preservation**.
- **De-preservation**: Removal of any preservative materials.
- **Preservation record:** The Preservation log + the log of any Re-preservation carried out.
- **Preservation label:** The label attached to the PRODUCT to be filled in when preservation activities are carried out.
- Preservation period: The period AFTER shipping the PRODUCT from manufacturer's plant.
- **Long term storage**: Long term storage preservation, only when ordered from NOV, will guarantee the correct preservation for a period of 12 months.

1.3 Procedure

- This document must be kept with the PRODUCT at final assembly.
- The Preservation record shall be filled in by assembly-crew.
- Prior to shipment from manufacturer's plant, a copy of this document must be attached to the PRODUCT, ensuring availability at receipt of the PRODUCT.
- The original document shall be filed in the DATA book at manufacturers Document Control Dept.
- Prior to shipment from manufacturer's plant, a Preservation label shall be attached to the PRODUCT. The label reflects the most recent preservation work carried out.

PURCHASERS RESPONSIBILITY:

- After shipment, any preservation action must be logged in the preservation-log.

1.4 Safety

- Handling of the PRODUCT involves lifting operations. Only certified lifting gear shall be used. To avoid any injury of personnel and damage to the PRODUCT, the lifting procedure must be followed.
- Forklift handling may be used when the PRODUCT is in it's wooden crate.
- Personnel familiar with PRODUCT-handling procedures are the only personnel that shall be allowed to enter the lifting operation area.

- Shop-Preservation, re-preservation and de-preservation may involve usage of solvents that may be harmful. Personnel performing this type of work should be wearing personnel protection equipment.

2 SHOP-PRESERVATION & RE-PRESERVATION

2.1 Shop-Preservation during manufacturing.

- The preservation-records will be signed off by the assembly crew, indicating that the checks are carried out. The PRODUCT leaves the factory in undamaged and new condition.
- It is recommended the consignee organisation checks the PRODUCT after reception.

2.2 Long term storage procedure

- Check PRODUCT immediately after receipt.
- Carry out interval checks according to preservation.
- If found required, re-preservation shall be carried out. Use the check records in this document.

2.3 Re-Preservation procedure

Carry out according to the preservation-records. Any anomaly shall be rectified.

- The hydraulic piping system on the PRODUCT is sealed off by the manufacturer. All fittings shall remain plugged or capped to avoid ingress of material that may contaminate the piping and the fluid in the system.
- Non metallic plugs shall not be used. All hydraulic components are flushed with clean hydraulic oil prior to storage and transport.
- All non-terminated cable ends shall be fitted with shrinking shroud.
- IN CASE DENSO-TAPE PROTECTION ORDERED BY CUSTOMER: All fittings, as well as any extended rod ends are covered with Denso tape to avoid corrosion. They shall be checked for damage of the Denso tape. The Denso tape must not be allowed to dry. If the Denso tape oil/grease vaporizes the result is corrosion underneath the tape. Replace the Denso tape or add oil/grease to the tape.

3 INSTALLATION

3.1 Welding

- The PRODUCT must be protected from spatter of welding and grinding with suitable protective sheets.
- Any black steel spatter on stainless steel material shall be removed with suitable method to avoid pitting corrosion and to re-establish Pre surface quality.

3.2 Installation period

- The procedures as outlined in this document shall continue during installation and after installation onboard until taken into operation.

4 RECOMMENDED PRESERVATIVES (OR EQUIVALENT):

1. Castrol Rustilo DWX 32: For medium to long term protective for use in severe conditions where a high degree of protection is required: Leaves a **soft** greasy protective film (to be used on dynamic surfaces e.g. cylinder rods & static surfaces e.g. blank steel surfaces)
2. Dow Corning Molykote® 1000 Paste: Anti-seize compound for application on bolts and nuts (to be used when bolts/nuts have to be released on a regular basis, e.g. hatches).
3. Denso Ltd, Densotape: Flexible anti corrosion tape (to be used for application on hydraulic fittings, e.g. sockets)
4. Autol Top 2000 grease: Lubricant for general purpose, OLF-complient (to be used mandatory for all bowls and slips lubrication applications).
5. Paint repairs according to P-001.
6. Castrol Hyspin AWH-M 32: Hydraulic fluid (to be used for the hydraulic system, see also user's manual for details).
7. Plugs / caps: Plastic/steel plugs/caps (to be used for plugging/capping open fittings/QD's)
8. Castrol Spheerol EP2: General multi purpose grease
9. Eoniromonpastax: Anti-galvanic corrosion paste (to be used on stainless steel threads).

5 PRESERVATION SPECIFICATION RECORDS

Record page 1 of 2 | **Long term shop-preservation** | **Customer's responsibility**

Activity No.:	Intervals (Months)	Description	**Method**	**Signed by shop engineer**	Date/Sign Re-Preserved (1)	Date/Sign Re-Preserved (2)	Date/Sign Re-Preserved (3)
1	4	All unpainted static steel surface and flanges.	Rustilo DWX 32				
2	4	All unpainted dynamic steel surfaces.	Rustilo DWX 32				
3	4	Extended cylinder rods	Rustilo DWX 32 + Denso Tape				
4	4	Bolts and nuts (head)	Rustilo DWX 32				
5	4	Bolts and nuts (threads; removable): e.g. Hatches, retainers, adjustment rods etc	Molykote® 1000				
6	4	Hydraulic/pneumatic/grease fittings (open-end).	Plugs / caps + Denso tape				
7	4	Hydraulic/pneumatic/grease fittings (non open-end).	Denso tape				
8	4	Stainless steel threads e.g fittings	Eoniromon-pastax				
9	n/a*	Bolts and nuts (threads; non removable)	Castrol Spheerol EP2		n/a*	n/a*	n/a*
10	n/a*	Bearings	Castrol Spheerol EP2		n/a*	n/a*	n/a*
11	n/a*	Hydraulic system; pre-filled and drained	Hyspin AWH-M 32		n/a*	n/a*	n/a*

* No further inspection required
Comments:

Shop-Preservation Performed by:
Date/Sign:

6 PRESERVATION CHECKS RECORDS

Record page 2 of 2			Long term shop-preservation		Customer's responsibility		
Activity No.:	Intervals (Months)	Description	**Method**	**Signed by shop engineer**	Date/Sign check (1)	Date/Sign check (2)	Date/Sign check (3)
12	4	Inspect internals for moisture (must be dry)	Visual				
13	n/a*	J-boxes seals present and correctly fitted	Visual		n/a*	n/a*	n/a*
14	n/a*	J-boxes checked for proper closing	Visual		n/a*	n/a*	n/a*
15	n/a*	All non-terminated cable ends fitted with shrinking shroud.	Visual		n/a*	n/a*	n/a*
16	n/a*	All spare cable entrances plugged	Visual		n/a*	n/a*	n/a*

* No further inspection required
Comments:

Shop-Preservation Performed by: Date/Sign: _____		

7 DE-PRESERVATION

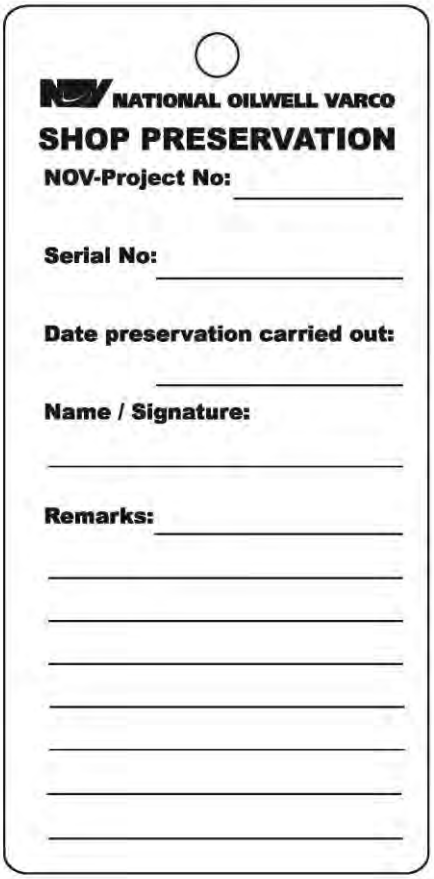
De-preservation must be done after installation and prior to commissioning. The commissioning activities comprise checking, functional activities and operational activities.

The following activities shall be performed to achieve de-preservation:

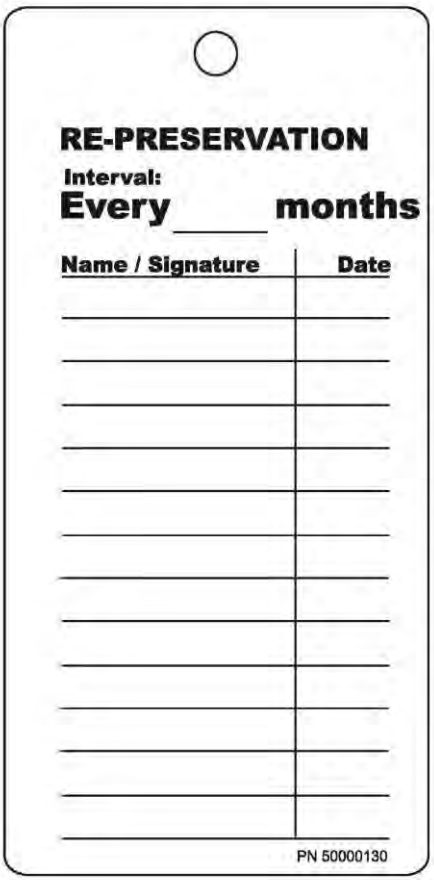
- Remove all protection structure and protective cloths.
- Extended cylinder rods to be washed with dissolving agent to remove preservation.
- Remove preservative from all unpainted steel surfaces and flanges.
- Remove (if applicable) Denso-tape of all parts necessary.
- Remove plugs or caps for all open-end fittings, which shall be available during operation.

8 PRESERVATION LABEL

REAR OF LABEL



FRONT OF LABEL



NATIONAL OILWELL VARCO

WEDGE AND BORE MEASURING INSTRUCTION "TMA & TA" ELEVATORS

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	Fouad Lakhssim	Name	Fouad Lakhssim
Date:	05-09-2012	Date	20-06-2013
Drawing type:	Word document.	ECN	00011668

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Tel: +31-76-5083000
Fax: +31-76-5046000

Revision:	Document No.:	Description:	Sheet:
01	**10773477-PRO**	**Wedge and bore measuring instruction "TMA & TA" elevator**	**1 of 4**

NATIONAL OILWELL VARCO

Tooling Requirements:

- 3x wedge with angle 5°
- Hammer DIN1041 500GR
- Calibrated measuring tool.

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **01**	Document No.: **10773477-PRO**	Description: **Wedge and bore measuring instruction "TMA & TA" elevator**	Sheet: **2 of 4**

1. Hang, fully closed, elevator by its ears in a crane.

2. Wedge elevator at the hinge boss and check top surface of “body” and “door”. Machined top surfaces must be levelled.

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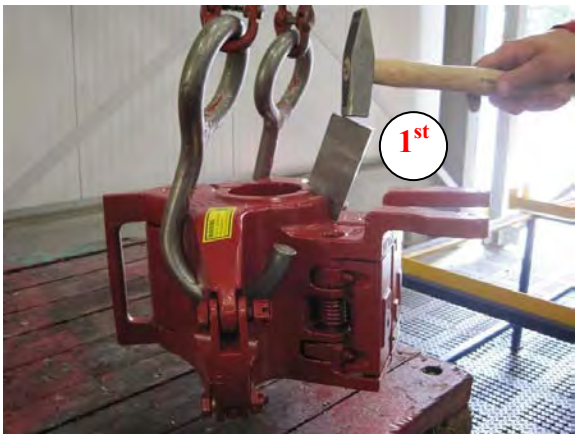
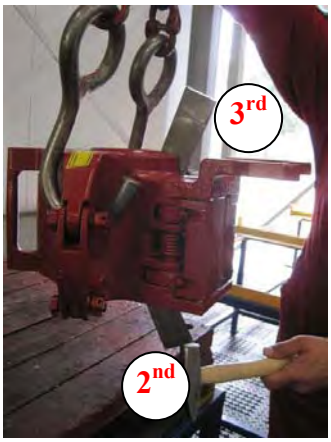
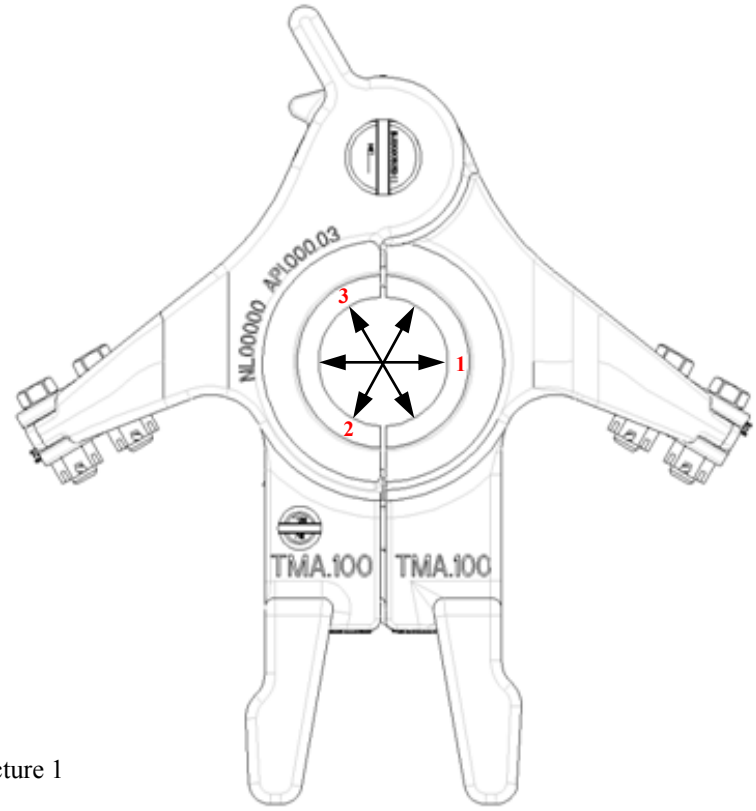
Revision:	Document No.:	Description:	Sheet:
01	10773477-PRO	Wedge and bore measuring instruction “TMA & TA” elevator	3 of 4

3. Insert a wedge first into the gap between “body” and “door” at the top till it is just stuck. Then insert another wedge into the gap between “body” and “door” at the bottom till it is firm stuck.
   Subsequently wedge the 1st again till it is fixed in place.





4. Use calibrated measuring tool to measure top en bottom bore as shown in picture 1.



Picture 1

Varco BJ B.V.
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Revision:	Document No.:	Description:	Sheet:
01	**10773477-PRO**	**Wedge and bore measuring instruction “TMA & TA” elevator**	**4 of 4**

NATIONAL OILWELL VARCO

WEDGE AND BORE MEASURING INSTRUCTION "G" ELEVATOR

ORIGINAL DOCUMENT		LATEST REVISION	
Name:	Fouad Lakhssim	Name	Fouad Lakhssim
Date:	13-Jun-2012	Date	25-Jun-2013
Drawing type:	Word document.	ECN	00011668

Varco BJ B.V.
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Revision:	Document No.:	Description:	Sheet:
01	**10777152-PRO**	**Wedge and bore measuring instruction "G" elevator**	**1 of 4**

NATIONAL OILWELL VARCO

Tooling Requirements:

- 3x wedge with angle 5°
- Hammer DIN1041 500GR
- Calibrated measuring tool.

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **01**	Document No.: **10777152-PRO**	Description: **Wedge and bore measuring instruction "G" elevator**	Sheet: **2 of 4**

1. Hang, fully closed, elevator by its ears in a crane.

2. Wedge elevator at the hinge boss and check top surface of “body” and “door”. Machined top surfaces must be levelled.

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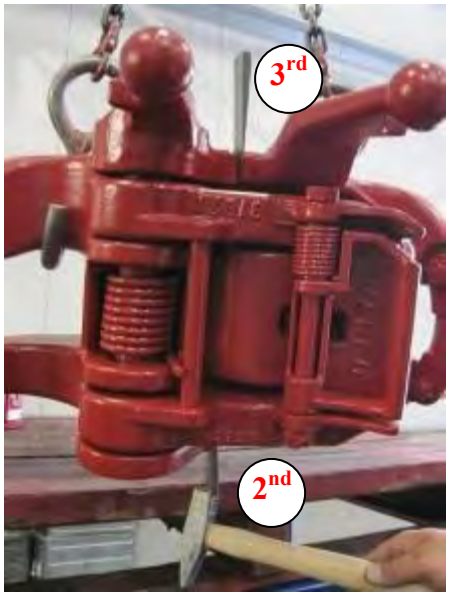
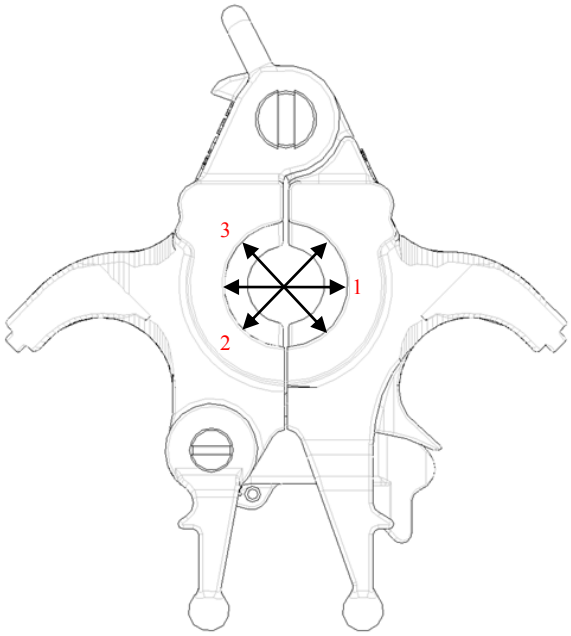
Revision:	Document No.:	Description:	Sheet:
01	**10777152-PRO**	**Wedge and bore measuring instruction “G” elevator**	**3 of 4**

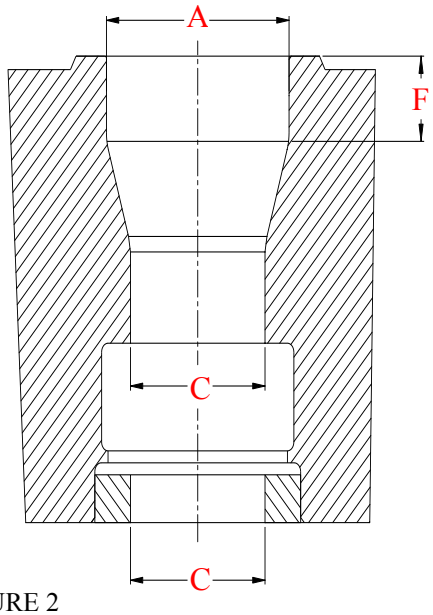
3. Insert a wedge first into the gap between “body” and “door” at the top till it is just stuck. Then insert another wedge into the gap between “body” and “door” at the bottom till it is firm stuck.
   Subsequently wedge the 1st again till it is fixed in place.



4. Use calibrated measuring tool to measure top en bottom bore as shown in picture 1 & 2.



PICTURE 1

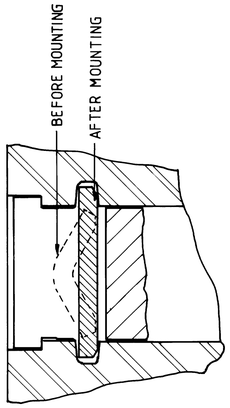


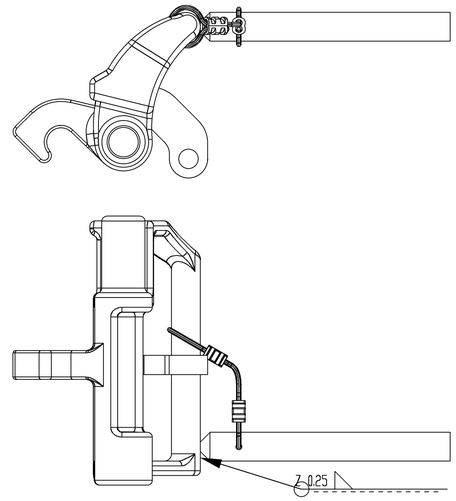
PICTURE 2

Varco BJ B.V. Nijverheidsweg 45 4879 AP Etten-Leur The Netherlands Tel: +31-76-5083000 Fax: +31-76-5046000	Revision: **01**	Document No.: **10777152-PRO**	Description: **Wedge and bore measuring instruction “G” elevator**	Sheet: **4 of 4**

MASK CYLINDER ROD BEFORE PAINTING. NO PAINT MAY BE APPLIED TO CYLINDER ROD

TYPICAL INSTALATION FOR LOCK BAR OF HINGE PIN & LATCH PIN





WHEN ASSMBLED WELD INDICATOR PIN AS SHOWN

TOP EAR 5 52 62

BOTTOM EAR 6 7 8

STAMP HERE:
SERIAL NUMBER,
PART NUMBER,
AND APPLICABLE
P.S.L. AND S.R.NUMBERS

PEEN CASTING OVER PIN

NOTE: IF NECESSARY TILL UP WITH SHIMS

ITEM 47 MUST BE FREE FROM CASTING (TYP) ± 1/16

NOTE: MOUNT 4 HINGE PLATES WITH CURVE FACING TRONT FRAME

NOTE:
DO NOT PAINT
HOSES, FITTINGS
AND QUICK DISCONNECT.

WELDLOCK

TOP HOLE FOR HGG

BOTTOM HOLE FOR HYC

NOTE: MOUNT WARNING PLATES AFTER RED PAINTING

NOTES:
1. USE WELDING INSTRUCTION WINQ-001.

TYPE	ORACLE PARTNUMBER	LEGACY PARTNUMBER
PSL1+SR2	10148056-009	BJ70166Y-SR4
PSL1	10148056-008	BJ70166Y
PSL2	10148056-012	BJ70166Z

ORACLE PART NUMBER	SEE TABLE			
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY		
MATERIAL	—			
SURF. FINISH/ PAINT SPEC	—	COLOR	—	
WEIGHT	— LBS/	— KG		
CREATED BY	R. v. Dooren	REV.		
CREATED ON	13-Aug-14			
REVISED BY	Mike Doerden			
REVISED ON	23-Jul-14	ASM	V	
TC-ECR	00026349			

UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250 µ/
TORCH CUT SURFACES 1000 µ/
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: ASSEMBLY "HYC" AIR OP. ELEV. FRAME 3.1/2"-7.5/8"

SIZE D | DRAWING NO. 70166 | SHEET 1 OF 2

ITEM		SIZE.	2 7/8"	3 1/2"	3 1/2"	4"	4 1/2"	4 1/2"	5"	5 1/2"	5 3/4"	6"	6 5/8"	7"	6 5/8"	7"	7 5/8"	7 5/8"	7 3/4"	SIZE.
	MAKE FROM SLIP SIZE.		FROM 3 1/2"	FROM 3 1/2"	FROM 4 1/2"	FROM 4 1/2"	FROM 4 1/2"	FROM 5 1/2"	FROM 5 1/2"	FROM 5 1/2"	FROM 7"	FROM 7"	FROM 7"	FROM 7"	FROM 7 5/8"	FROM 7 5/8"	FROM 7 5/8"	FROM 7 5/8"	FROM 7 5/8"	MAKE FROM SLIP SIZE.
	SLIP ASSEMBLY.		201355	201353	55509	55510	55511	55513-1	55512	55513	55515-2	55515-1	55514	55515	70009-2	70009-1	70009	70009-3	70009-4	SLIP ASSEMBLY.
–	SLIPS. (4 REQ'D)		201352	201352	55303	55303	55303	55304	55304	55304	55305	55305	55305	55305	55305-1	55305-1	55305-1	55305-1	55305-1	SLIPS. (4 REQ'D)
–	INSERTS.		201356	16441	24779	24781	16408	24785	24783	16407	29254	24785	24748	16407	25474-1	26750-1	70010	70010	32477-1	INSERTS.
–	INSERTS REQ'D.		24	24	24	24	24	36	36	36	48	48	48	48	48	48	48	48	48	INSERTS REQ'D.
–	SLIP SETTING RING.		201357	55516	55516	55517	55518	55518	55519	55520	200392	55520-1M	55521	55522	200217	200440	70012	200218	201546	SLIP SETTING RING.
–	INSERT RETAINER. (4 REQ'D)		201354	201354	30214	30214	30214	30214	30221	30224	30227	30227	30227	30230	70011	70011	70011	70011	70011	INSERT RETAINER. (4 REQ'D)
–	GUIDE PLATE. (2 REQ'D)		201358	26827-1	26827-1	26827	24071-4	24071-4	24071	24071-1	24071-7	24071-5	24071-3	24071-2	24071-3	24071-2	24071-6	24071-8	24071-8	GUIDE PLATE. (2 REQ'D)
–	CHECKING DIMENSION "A"		3.075	3.700	3.735	4.235	4.735	4.735	5.235	5.735	5.985	6.235	6.860	7.235	6.860	7.235	7.860	7.860	7.985	CHECKING DIMENSION "A"
26	SETTING RING RETAINER.		30216	30216	30216	30216	30216	30216	30216	30216	30216	30216	30216	30216	70147	70147	70147	200219	70147	SETTING RING RETAINER.
19	TRIGGER FINGER.		203333	70210	70210	70210	70210	70210	70210	70210	70210	70210	70209	70209	70209	70209	70209	70209	70209	TRIGGER FINGER.
28	GUIDE PLATE SCREW. (4 RE'Q)		55508	55508	55508	55508	55508	55508	55508	55508	55508	55508	55508	55508	55508	55508	55508-1	55508-1	55508-1	GUIDE PLATE SCREW. (4 RE'Q)

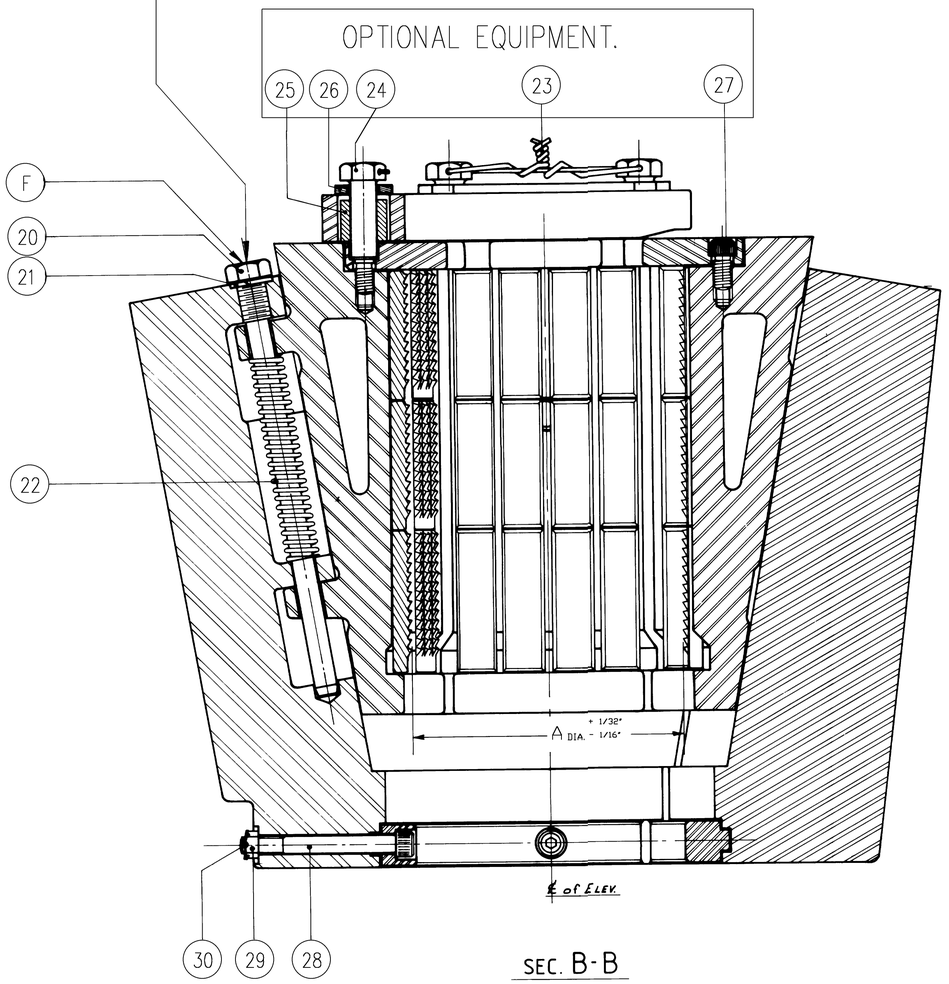
ITEM	QTY	DWG SIZE	PART NUMBER	DESCRIPTION
63	1		70380	WARNING PLATE, MOVING PARTS. FRONT

NOTES :

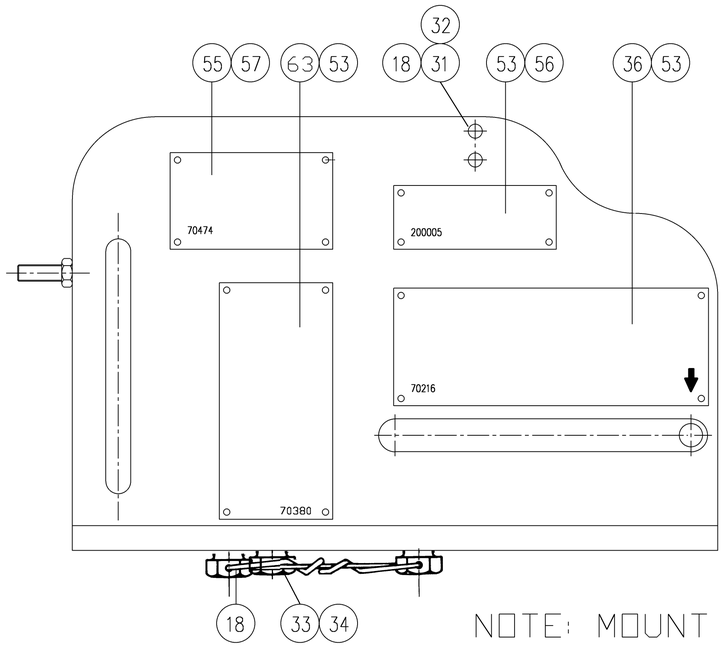
A LOCATE DOOR LUG PIN HOLE BY USING FIXTURE.
B LATCH LOCK (P/N 13152) SHOULD CLEAR DOOR LUG PIN (P/N 13190) WHEN OPENING & CLOSING LATCH.
C LATCH LOCK HOOK SHOULD PREVENT LATCH FROM OPENING WITHOUT OPERATING LATCH LOCK.
D GRIND STOP ON BODY SO THAT LATCH WILL CLEAR DOOR LUG WHEN OPENING 1/4" MIN. CLEARENCE.
E WEDGE DOOR OPEN AGAINST LATCH WHEN BORING.
F TORQUE TO 75 IN-LBS. MAX.
G GRIND DOOR STOP SO THAT OPENING BETWEEN LATCH AND DOOR WILL BE LARGER THAN 9"
(SEE SHEET 1 OF 2).

ASSEMBLY & INSPECTION NOTE :

SLIP LUGS MUST NOT DRAG IN CORED POCKETS OF BODY & DOOR FOR THEIR ENTIRE TRAVEL AND HOLES IN SLIP LUGS MUST CLEAR SLIP PINS WHEN EACH SLIP SEGMENT IS FIRMLY SEATED ON 10° TAPER OF BODY & DOOR.
SLIP SEGMENT MUST NOT JAM TOGETHER ON THEIR VERTICAL FACES IN THE BODY & DOOR WHEN AT THEIR LOWEST POSITION.
SLIP HOLES IN BODY & DOOR MUST BE IN LINE TO PREVENT BENDING OF SLIP PINS.



SEC. B-B



NOTE: MOUNT WARNING PLATES AFTER RED PAINTING.

ITEM	QTY	DWG SIZE	PART NUMBER	DESCRIPTION
1	1	D	70168	DOOR.
2	1	B	70180	HINGE PIN.
3	1	B	55312	LATCH PIN.
4	2	B	9519	LINK BLOCK.
5	2	–	939099-97	HEX.HD.CAP SCREW DRILLED SHANK.
6	2	A	8145	LINK BLOCK BOLT.
7	3	–	50512-C	NUT, HEX-SLOTTED.
8	3	–	51402-12	COTTER PIN.
9	1	D	70229	CLOSING TRIGGER ASSEMBLY.
10	1	D	70214	REAR FRAME ASSEMBLY.
11	1	D	70205-W	BODY WELD'T.
12	1	D	70193	LATCH ASSEMBLY.
13	1	A	55505	LOCK BAR LATCH PIN.
14	1	A	55504	LOCK BAR HINGE PIN.
15	1	A	13190	DOOR LUG PIN.
16	1	D	70189	FRONT FRAME ASSEMBLY.
17	3	–	53201	GREASE FITTING.
18	8	–	947879-14	LOCK WIRE.
19	–	–	SEE TABLE	TRIGGER FINGER.
20	4	B	24076	SLIP BOLT.
21	4	–	51112-C	LOCK WASHER.
22	4	–	945044-2	SLIP SPRING.
23	2	–	947879-15	LOCK WIRE.
24	4	A	55501	SHOULDER SCREW SLIP SET.RING.
25	4	A	55502	RUBBER BUSHING SLIP SET.RING.
26	2	–	SEE TABLE	RETAINER SLIP SET.RING.
27	4	–	50108-8-C	CAP-SOCKET HEAD SCREW.
28	4	A	SEE TABLE	GUIDE PLATE SCREW.
29	4	–	50508-C	NUT, HEX-SLOTTED.
30	4	–	51402-8	COTTER PIN.
31	2	–	50008-10-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
32	2	–	50908-C	WASHER, LOCK-REGULAR.
33	4	–	50010-10-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
34	4	–	50910-C	WASHER, LOCK-REGULAR.
35	1	B	70215	WARNING PLATE, MOVING PARTS. REAR.
36	1	B	70216	WARNING PLATE, OVERHEAD LOAD.
37	–	–	–	–
38	2	B	35145	PIN RETAINER.
39	2	–	50812-N-C	WASHER, FLAT.
40	2	–	51812-C	FLEXLOC, LOCKNUTS.
41	1	B	70356	LATCH SPRING.
42	8	A	35526	SHIM.
43	4	–	50704-3-B-C	SET-SOCKET HEAD SCREW.
44	2	–	941071-215	GROOVE PIN.
45	1	A	55507	RETAINER BAR SEE DWG.70205-W
46	1	C	70185	HINGE PLATE.
47	2	C	70186	HINGE PLATE.
48	1	B	203334	HINGE PLATE LOWER.
49	6	–	50008-18-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
50	2	–	50008-22-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
51	8	–	939656-9	LOCKWASHER.
52	2	–	50514-C	NUT, HEX-SLOTTED.
53	16	–	55301-10-8	DRIVE SCREW, DOUND HEAD.
54	–	–	–	–
55	4	–	55301-6-5	DRIVE SCREW, ROUND HEAD.
56	1	B	200005	WARNING INSTRUCTION PLATE.
57	1	B	70474-5	NAMEPLATE.
58	1	–	947879-3	LOCKWIRE.
⚠V	2	–	979438-318	WIRE 7x7 STAINLESS STEEL.
⚠V	4	–	979437-3	WIRE CLAMP.
61	2	–	201048	BALANCING STRAP.
62	2	–	51402-16	COTTER PIN.
63	1	–	990068-30	HOSE, ASSY

⚠V ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	–		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	– LBS/	– KG	
CREATED BY	R. v. Dooren	REV.	V
CREATED ON	13-Aug-14		
REVISED BY	Mike Doerden		
REVISED ON	23-Jul-14	ASM	
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± 5 DEGREE
BREAK SHARP CORNERS.010-.005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 SIDES

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

NATIONAL OILWELL VARCO

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: ASSEMBLY "HYC" AIR OP. ELEV. 3.1/2"-7.5/8"
SIZE: D
DRAWING NO.: 70166
SHEET 2 OF 2

PAGE	ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
4	51	4	–	53301-6-5	DRIVE SCREW ROUND HEAD.
4	52	4	–	939643-11	SHAKE PROOF LOCKWASHER.
4	53	1	–	947879-14	LOCKWIRE.
4	54	1	–	947879-5	LOCKWIRE.
–	55	–	–	–	–
–	56	–	–	–	–
3	57	4	–	50704-3-B-C	SET SCREW.
3	58	2	–	941071-215	GROOVE PIN.
2	59	1	–	REF.	TRIGGER FINGER (SEE CHART)
4	60	8	–	35526	SHIM.
4	61	1	–	70474-2	NAMEPLATE.
4	62	1	–	200005	WARNING INSTRUCTION PLATE.
2,4	63	16	–	53301-10-8	DRIVE SCREW, ROUND HEAD.
4	64	1	–	70216	WARNING PLATE OVERHEAD LOAD.
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–

PAGE	ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
2,3	26	2	–	35145	PIN, RETAINING.
2,3	27	2	–	50812-N-C	WASHER, FLAT.
2,3	28	2	–	51812-C	FLEXLOC, LOCKNUTS.
2	29	1	–	36784	FRONT FRAME SUBASSEMBLY.
3,4	30	2	–	36993	PIN, RETAINER. (REF)
–	31	–	–	–	–
4	32	10	–	939656-9	LOCKWASHER.
4	33	4	–	50008-10-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
4	34	4	–	50008-16-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
4	35	4	–	50010-10-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
4	36	2	–	50008-8-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
–	37	–	–	–	–
–	38	–	–	–	–
–	39	–	–	–	–
4	40	1	–	35082	HINGE PLATE, RIGHT.
4	41	2	–	35082-1	HINGE PLATE, LEFT.
4	42	1	–	35082-2	LOWER HINGE PLATE, RIGHT.
–	43	–	–	–	–
–	44	–	–	–	–
4	45	1	–	70380	WARNING PLATE, MOVING PARTS. FRONT.
2	46	1	–	70215	WARNING PLATE, MOVING PARTS. REAR.
–	47	–	–	–	–
2	48	2	–	947879-3	LOCKWIRE.
AH 2	49	2	–	979438-318	WIRE 7x7 STAINLESS STEEL.
AH 4	50	4	–	979437-3	WIRE CLAMP.

PAGE	ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
2	1	1	–	35139-1W	DOOR – ELEVATOR.
2	2	1	–	35140-1W	BODY – ELEVATOR.
2	3	1	–	35141	HINGE PIN.
2	4	1	–	33999	LATCH PIN.
–	5	–	–	–	–
AH 2,4	6	1	–	10161741	LATCH ASS'Y – AIR OPERATED.
2	7	1	–	18931	SPRING, LATCH.
4	8	1	–	13190	PIN, DOOR LUG.
3	9	2	–	9519	BLOCK, LINK.
3	10	2	–	939099-97	HEX.HD.CAP SCREW DRILLED SHANK.
3	11	2	–	8145	LINK BLOCK BOLT.
3	12	2	–	50512-C	NUT, HEX-SLOTTED.
3	13	2	–	51402-12	COTTER PIN.
2	14	1	–	35181	ASS'Y – TRIGGER.
2	15	1	–	53202	FITTING, LUBE.
2	16	1	–	36873	REAR FRAME ASSEMBLY.
3	17	2	–	50514-C	NUT, HEX-SLOTTED.
3	18	2	–	51402-16	COTTER PIN.
2	19	1	–	32892	LOCK BAR, LATCH PIN.
2	20	1	–	31074	LOCK BAR, HINGE PIN.
–	21	–	–	–	–
–	22	–	–	–	–
–	23	–	–	–	–
–	24	–	–	–	–
2	25	4	–	947879-8	LOCK WIRE.

NOTES:

1. DISTANCE FROM TOP FACE OF ELEVATOR TO TO BOTTOM SEAT OF LINK ARMS MUST NOT VARY MORE THAN 0.063", GRIND LINK ARMS IF NECESSARY TO MAINTAIN.
2. BEND STRAIGHT TO ENGAGE IN BORE POCKETS AND SLOT IN THE: –HINGE PIN (REF. ITEMS 3 & 20)
   –LATCH PIN (REF. ITEMS 4 & 19)
3. FINISH.
   A. PROTECT ALL MOVING SHAFTS WITH GREASE, PROTECT ALL HOSES & FITTINGS.
   B. PAINT RED.
   C. APPLY NAMEPLATES & "NOV", AS INDICATED ON SHEETS 2 & 4 RESPECTIVELY AFTER PAINTING.
4. MARK THE SERIALNUMBER AFTER BORING IN 0.125" MIN. HEIGHT CHARACTERS.
5. AFTER MACHINING GRIND CORNERS (8) R0.188".
6. USE WELDING INSTRUCTION WINQ-001.

AH	LEGACY PARTNUMBER	ORACLE PARTNUMBER	BORECODE
	35143Y121	10139758-003	SEE DWG. 15316-5
	35143Z121	10139758-019	SEE DWG. 15316-5
	35143Y122	10139758-006	SEE DWG. 15316-5
	35143Z122	10139758-020	SEE DWG. 15316-5
	35143Y123	10139758-009	SEE DWG. 15316-5
	35143Y124	10139758-012	SEE DWG. 15316-5

AH	ORACLE PART NUMBER	SEE TABLE	
	LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY
	MATERIAL	–	
	SURF. FINISH/ PAINT SPEC	– COLOR –	
	WEIGHT	– LBS/ – KG	

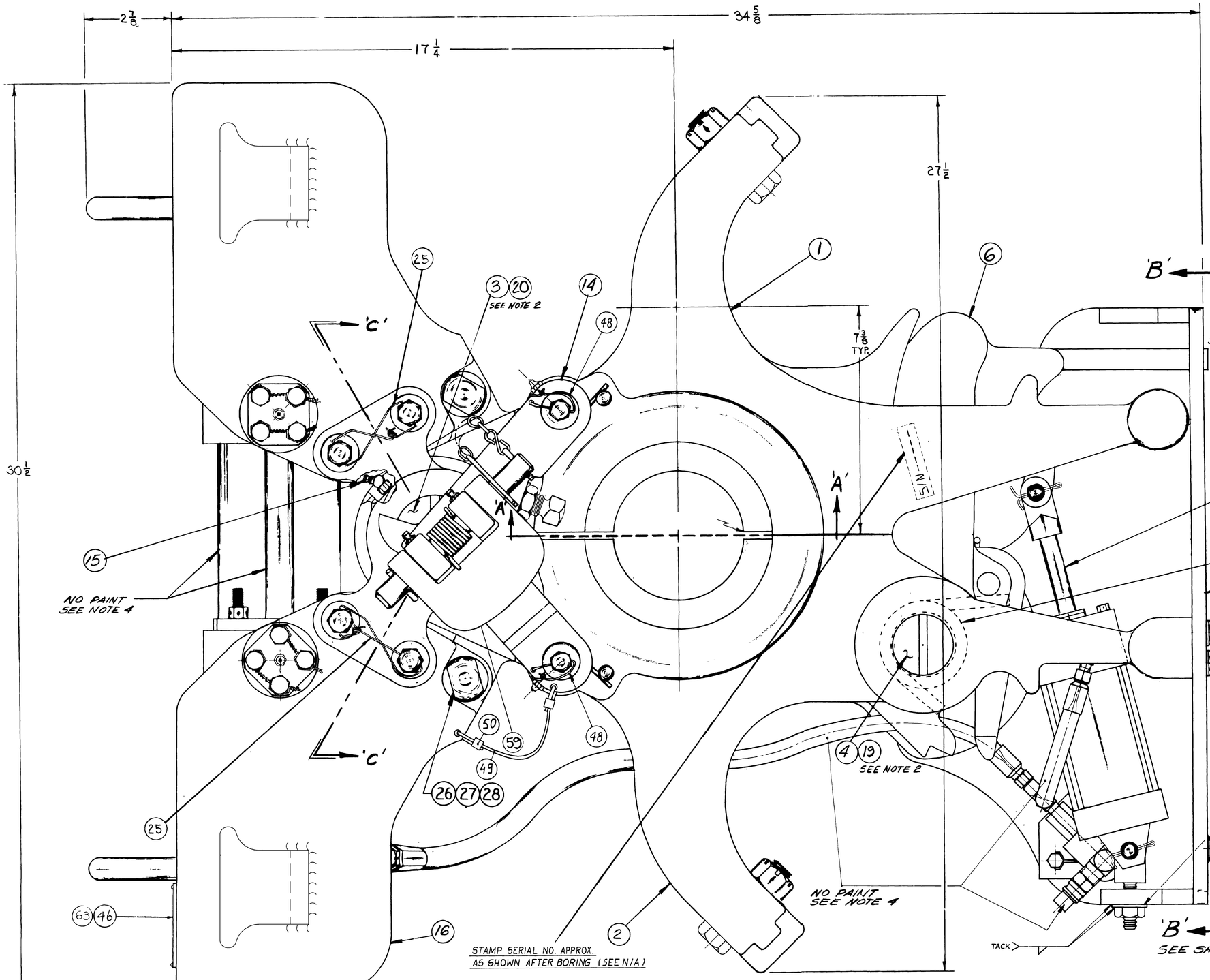
UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

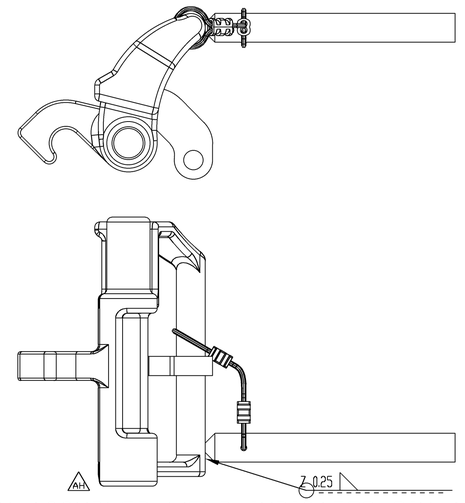
NATIONAL OILWELL VARCO

CREATED BY	C. Dekkers	REV.	AH
CREATED ON	12-AUG-2014		
REVISED BY	Mike Doerden		
REVISED ON	20-AUG-2014	ASM	
TC-ECR	00026349		

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED
SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: ASSEMBLY AIR OP. ELEVATOR 4" - 5.1/2"
SIZE: D
DRAWING NO.: 35143
SHEET 1 OF 4





WHEN ASSMBLED WELD INDICATOR PIN AS SHOWN USE WELD INSTRUCTION WINQ-001

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/		— KG

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± 5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

CREATED BY	C. Dekkers	REV.	
CREATED ON	12-AUG-2014		
REVISED BY	Mike Doerden		
REVISED ON	20-AUG-2014	ASM	AH
TC-ECR	00026349		

DO NOT SCALE DOCUMENT

THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1

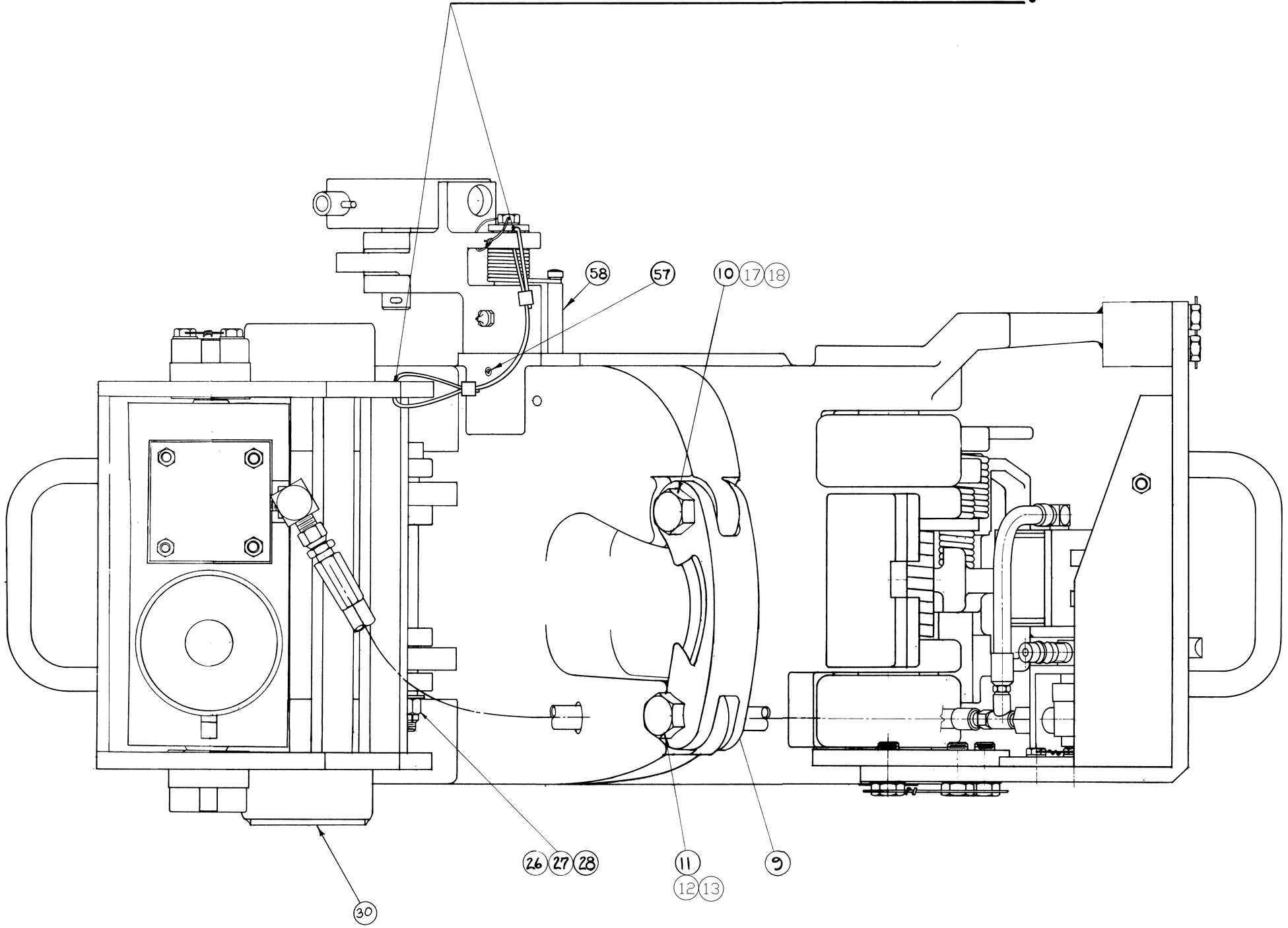
UNITS INCH (MM)

PROJ.

TITLE: ASSEMBLY AIR OP. ELEVATOR 4" - 5.1/2"

SIZE D | DRAWING NO. 35143 | SHEET 2 OF 4

ASSURE SHARP EDGES ARE WELL BROKEN ON BOTH SIDES!



AH	ORACLE PART NUMBER	SEE TABLE			
	LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY		
	MATERIAL	—			
	SURF. FINISH/ PAINT SPEC	—	COLOR	—	
	WEIGHT	— LBS/		— KG	
	CREATED BY	C. Dekkers		REV.	
	CREATED ON	12-AUG-2014			
	REVISED BY	Mike Doerden			
	REVISED ON	20-AUG-2014	ASM	AH	
	TC-ECR	00026349			

UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250 √
TORCH CUT SURFACES 1000 √
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

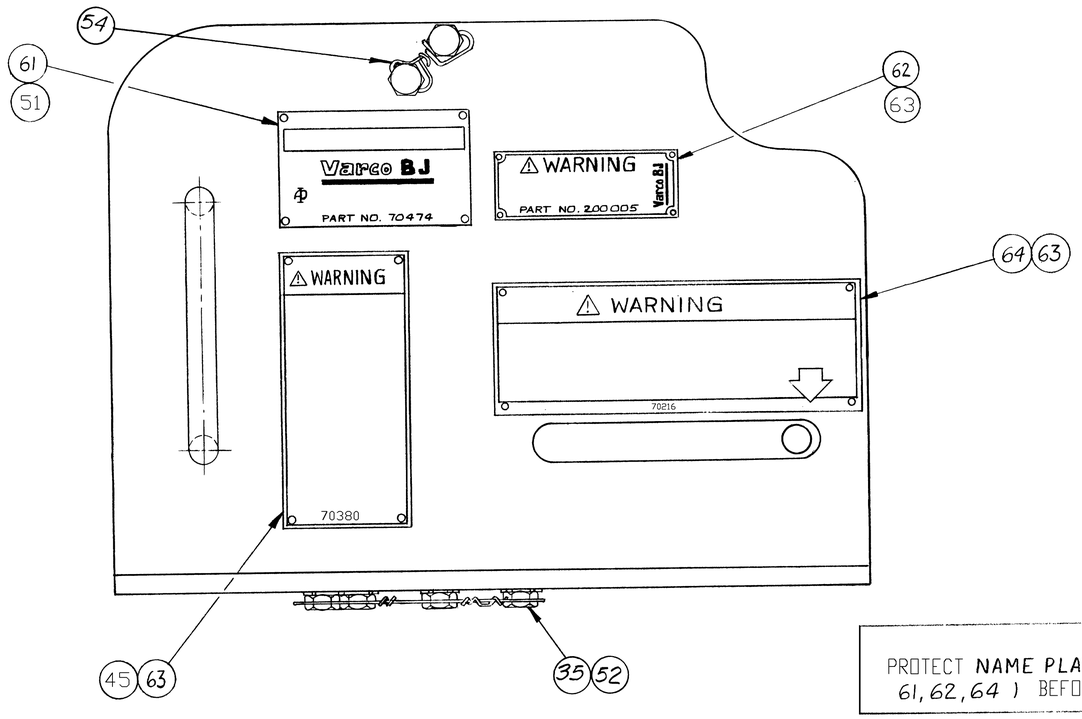
DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

NATIONAL OILWELL VARCO

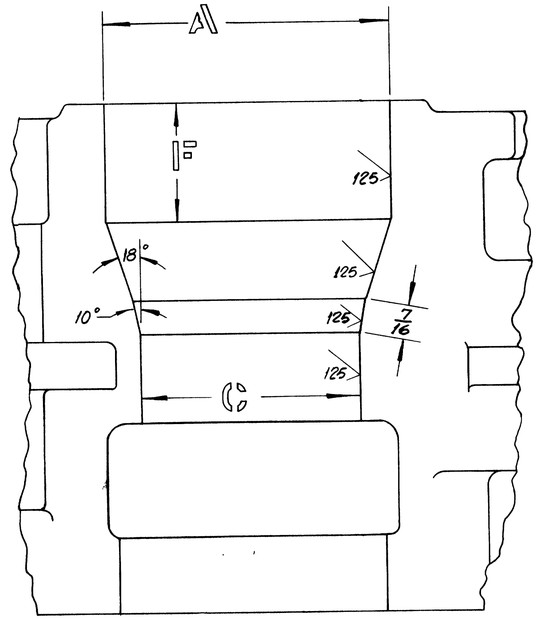
TITLE: ASSEMBLY AIR OP. ELEVATOR 4" - 5.1/2"

SIZE: D | DRAWING NO.: 35143 | SHEET 3 OF 4

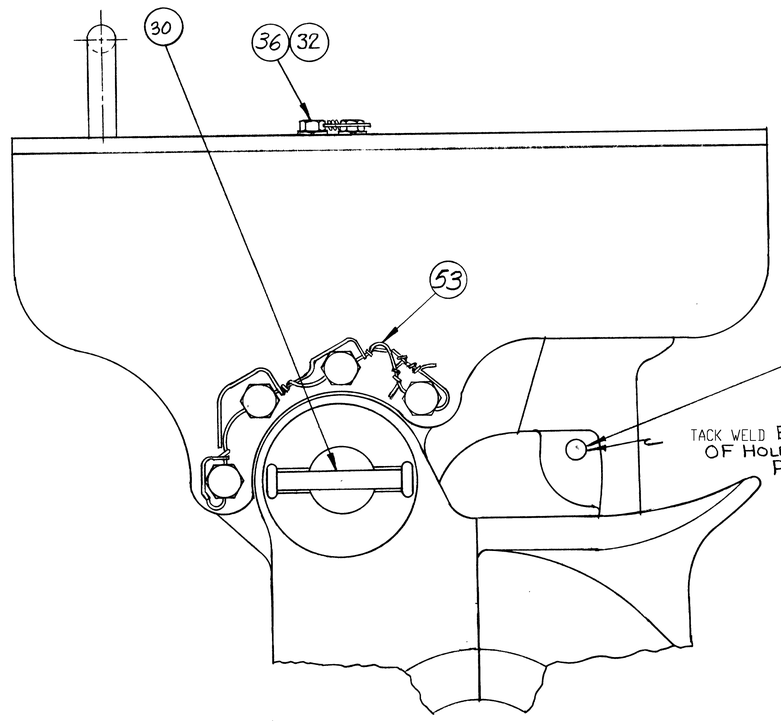


VIEW 'B'-'B'

PROTECT NAME PLATES (ITEMS 45,46, 61,62,64) BEFORE PAINTING.

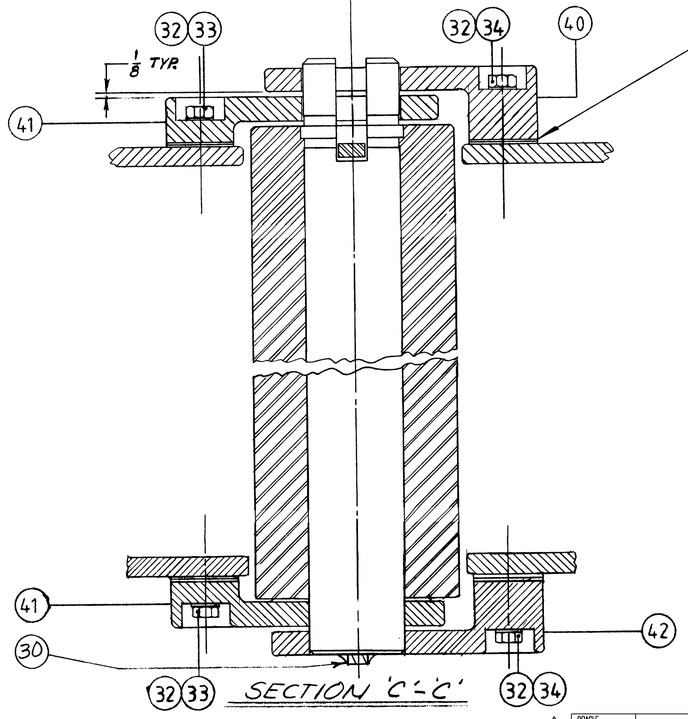


VIEW 'A'-'A'



—NOTE:—
LATCH ASS'Y ITEM "6" NOT SHOWN FOR CLARITY.

TACK WELD BOTH ENDS OF HOLE TO RETAIN PIN.



SHIM AS REQ'D. TO MAINTAIN INDICATED SPACING.

SECTION 'C'-'C'

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	
CREATED BY	C. Dekkers	REV.	
CREATED ON	12-AUG-2014		
REVISED BY	Mike Doerden		
REVISED ON	20-AUG-2014	ASM	AH
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250 V
TORCH CUT SURFACES 1000 V
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

NATIONAL OILWELL VARCO

TITLE	ASSEMBLY AIR OP. ELEVATOR 4" - 5.1/2"	SIZE D	DRAWING NO. 35143
			SHEET 4 OF 4

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
51	1	–	35181	TRIGGER ASSEMBLY.
52	1	–	36873	REAR FRAME ASSEMBLY.
53	1	–	36781	FRONT FRAME SUBASSEMBLY.
54	–	–	–	–
55	2	–	50514–C	NUT, HEX–SLOTTED.
56	2	–	51402–16	COTTER PIN.
57	–	–	–	–
58	–	–	–	–
59	–	–	–	–
60	–	–	–	–
61	–	–	–	–
62	–	–	–	–
63	–	–	–	–
64	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
26	2	–	50008–10–C8D	HEX.HD.CAP SCREW DRILLED HEAD.
27	2	–	50908–C	SPRING LOCKWASHER.
28	–	–	–	–
29	8	–	939656–9	LOCKWASHER
30	4	–	50008–10–C8D	HEX.HD.CAP SCREW DRILLED HEAD.
31	4	–	50008–14–C8D	HEX.HD.CAP SCREW DRILLED HEAD.
32	1	–	35377	HINGE PLATE, RIGHT.
33	2	–	35378	HINGE PLATE, LEFT.
34	1	–	35377–1	LOWER HINGE PLATE, RIGHT.
35	4	–	947879–14	LOCKWIRE.
36	4	–	50704–3–B–C	SOCKET HEAD SET SCREW.
37	2	–	941071–215	GROOVE PIN.
38	2	–	947879–5	LOCKWIRE.
39	1	–	70215	WARNING PLATE, MOVING PARTS. REAR.
40	1	–	70216	WARNING PLATE, OVERHEAD LOAD.
41	1	–	200005	WARNING INSTRUCTION PLATE.
42	1	–	70474–3	NAMEPLATE.
43	16	–	53301–10–8	DRIVE SCREW, ROUND HEAD.
44	4	–	53301–6–5	DRIVE SCREW, ROUND HEAD.
45	1	–	70380	WARNING PLATE, MOVING PARTS. FRONT.
46	–	–	–	–
47	8	–	35526	SHIM.
48	–	–	–	–
49	–	–	–	–
50	1	–	36209	LATCH ASSEMBLY.

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	1	–	34905–10C	DOOR – ELEVATOR.
2	1	–	34904–10C	BODY – ELEVATOR.
3	1	–	36058	HINGE PIN.
4	1	–	34907	LATCH PIN.
5	–	–	–	–
6	1	–	36998	LATCH SPRING.
7	1	–	13190	DOOR LUG PIN.
8	2	–	9519	LINK BLOCK.
9	2	–	939099–97	HEX.HD.CAP SCREW DRILLED SHANK.
10	1	–	8145	LINK BLOCK BOLT.
11	2	–	50512–C	NUT, HEX–SLOTTED.
12	2	–	51402–12	COTTER PIN.
13	1	–	53201	FITTING, LUBE.
14	1	–	32892	LOCK BAR, LATCH PIN.
15	1	–	31074	LOCK BAR, HINGE PIN.
16	2	–	35145	PIN, RETAINING.
17	2	–	50812–N–C	WASHER, FLAT.
18	2	–	51812–C	FLEXLOC, LOCKNUTS.
19	1	–	947879–8	LOCK WIRE.
20	1	–	70196	INDICATOR PIN.
21	2	–	947879–3	LOCK WIRE
22	1	–	979438–318	WIRE 7x7 STAINLESS STEEL.
23	4	–	979437–3	WIRE CLAMP.
24	4	–	50008–10–C8D	HEX.HD.CAP SCREW DRILLED HEAD.
25	4	–	939643–11	LOCKWASHER.

NOTES:

1.DISTANCE FROM TOP FACE OF ELEVATOR TO BOTTOM SEAT OF LINK ARMS MUST NOT VARY MORE THAN $\frac{1}{16}$", GRIND LINK ARMS IF NECESSARY TO MAINTAIN.

2.BEND STRAIGHT TO ENGAGE IN BORE POCKETS AND SLOT IN THE: –HINGE PIN (REF. ITEMS 3 & 15)
–LATCH PIN (REF. ITEMS 4 & 14)

3.BORE PER INSTRUCTIONS ON BORE CHART 15316–5.

4.FINISH.
A.PROTECT ALL MOVING SHAFTS WITH GREASE PROTECT ALL HOSES & FITTINGS.
B.PAINT RED.
C.APPLY NAMEPLATES & "NOV", AS INDICATED ON SHEETS 4 & 2 RESPECTIVELY AFTER PAINTING.

5.MARK THE SERIALNUMBER AFTER BORING IN $\frac{1}{8}$" MIN. HEIGHT CHARACTERS.

6.AFTER MACHINING GRIND CORNERS (8) R$\frac{3}{16}$".

7.SECURE NUT TO FRAME AFTER CYLINDERSTROKE HAS BEEN ADJUSTED.

8.USE WELDING INSTRUCTION WINQ–001.

LEGACY PARTNUMBER	ORACLE PARTNUMBER	BORECODE
36056Y119	10139835–001	SEE DWG. 15316–5
36056Y120	10139835–008	SEE DWG. 15316–5
36056Y121	10139835–003	SEE DWG. 15316–5
36056Y122	10139835–004	SEE DWG. 15316–5
36056Y123	10139835–025	SEE DWG. 15316–5
36056Y124	10139835–026	SEE DWG. 15316–5
36056Z120	10139835–029	SEE DWG. 15316–5
36056Z121	10139835–030	SEE DWG. 15316–5

ORACLE PART NUMBER	SEE TABLE
LEGACY PART NUMBER	SEE TABLE (REFERENCE ONLY)
MATERIAL	–
SURF. FINISH/ PAINT SPEC	–
COLOR	–
WEIGHT	– LBS/ – KG
CREATED BY	[illegible]
CREATED ON	12-08-07
REVISED BY	[illegible]
REVISED ON	29-July-14
TC-ECR	[illegible]
	ASM
REV.	H

UNLESS OTHERWISE SPECIFIED [illegible]

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SCALE 1 : 1

UNITS INCH (MM)

PROJ.

NATIONAL OILWELL VARCO

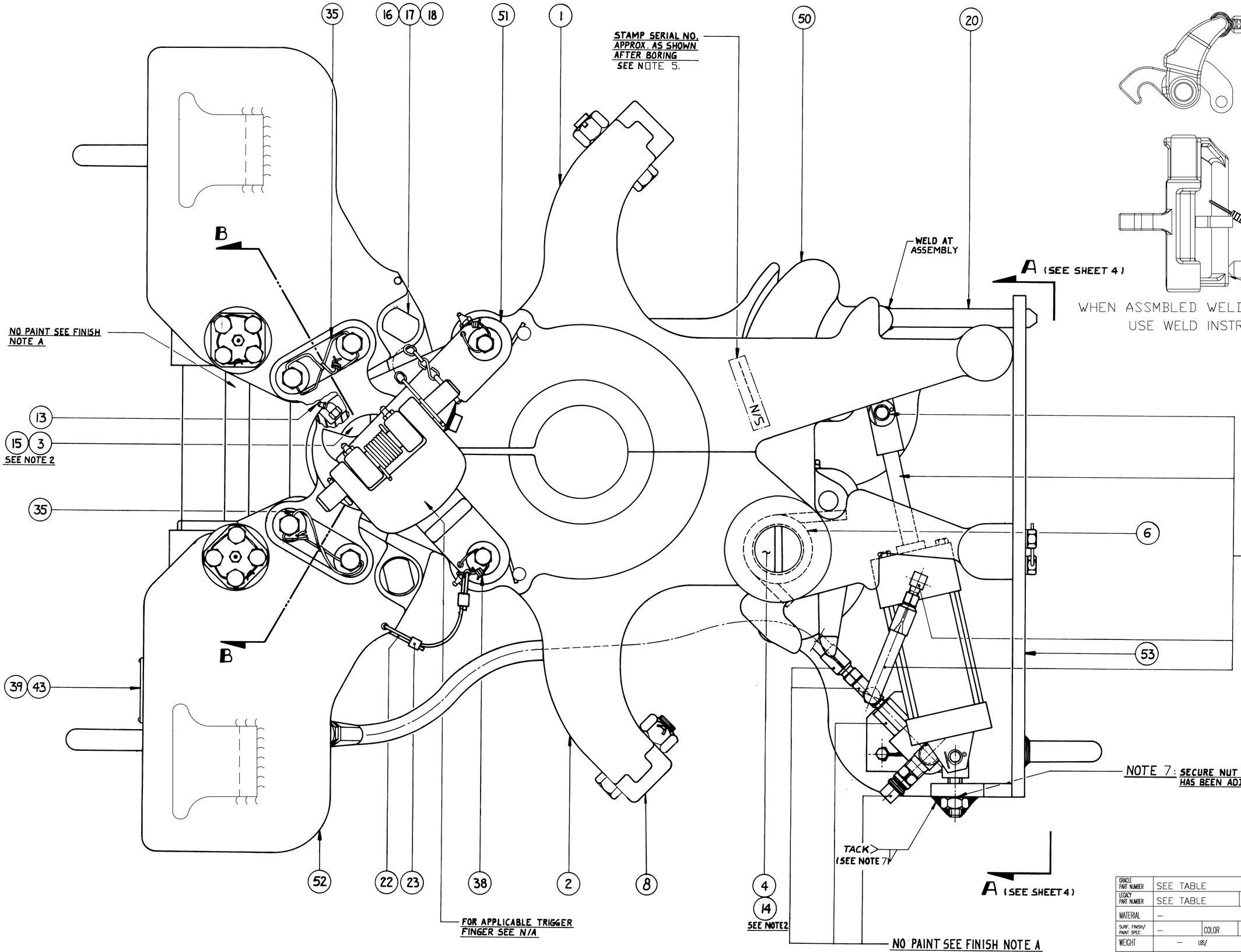
[redacted]

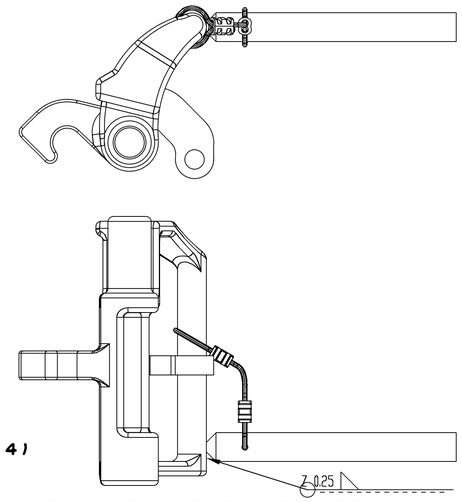
TITLE ASSEMBLY AIR OP. ELEV. 3.1/2"–5.1/2"

SIZE D

DRAWING NO. 36056

SHEET 1 OF 4





WHEN ASSMBLED WELD INDICATOR PIN AS SHOWN
USE WELD INSTRUCTION WINQ-001

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	
CREATED BY	C. Dekkers	REV.	H
CREATED ON	12-09-97		
REVISED BY	Mike Doerden		
REVISED ON	29-July-14	ASM	
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 125
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

DO NOT SCALE DOCUMENT
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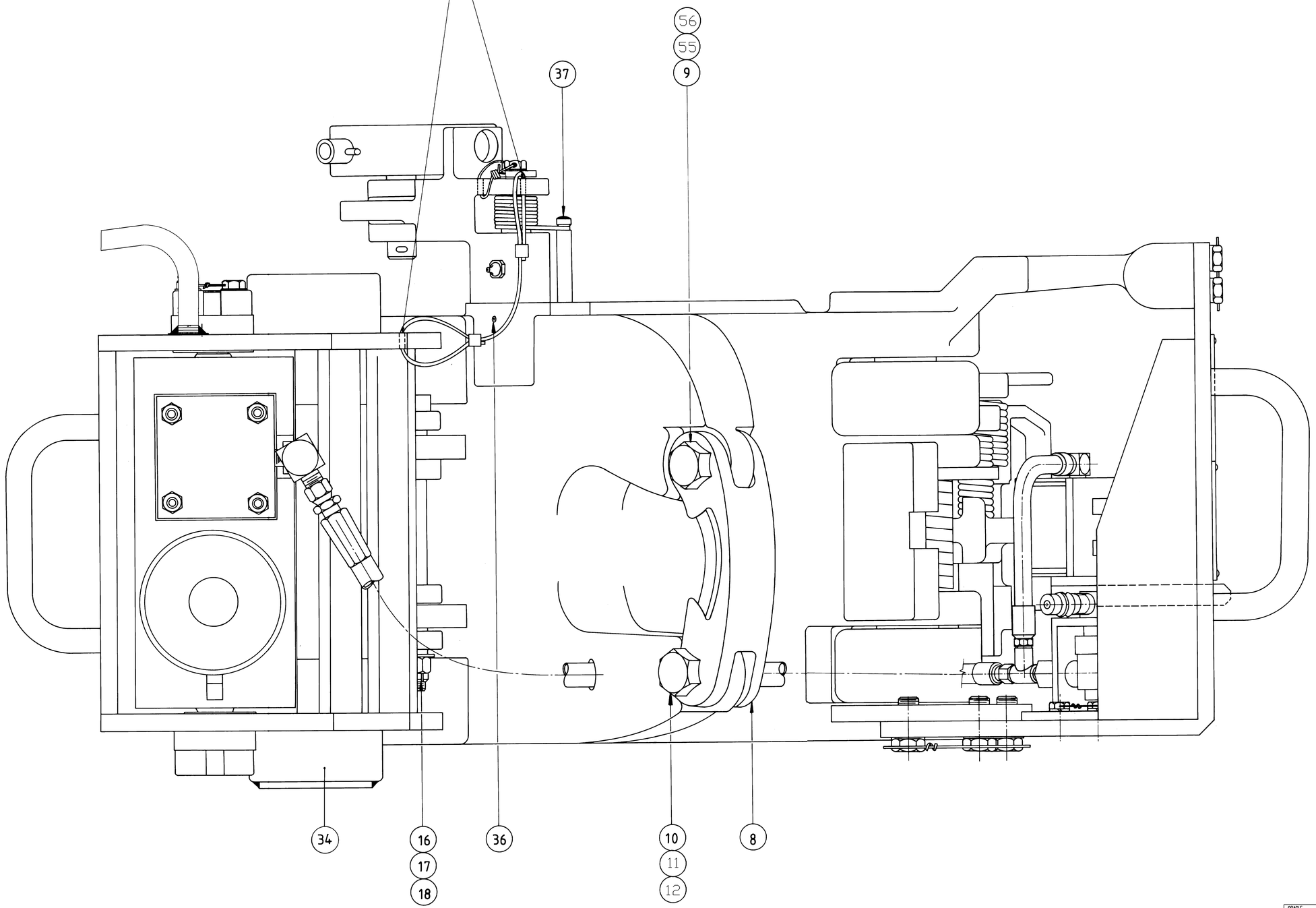
SCALE 1 : 1
UNITS INCH (MM)
PROJ.

NATIONAL OILWELL VARCO

TITLE: ASSEMBLY AIR OP. ELEV. 3.1/2"-5.1/2"

SIZE D | DRAWING NO. 36056 | SHEET 2 OF 4

ASSURE SHARP EDGES ARE WELL BROKEN ON BOTH SIDES!



ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	–		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	– LBS/	– KG	
CREATED BY	C. Dekkers	REV.	H
CREATED ON	12-09-97		
REVISED BY	Mike Doerden		
REVISED ON	29-July-14	ASM	
TC-ECR	00014738		

UNLESS OTHERWISE SPECIFIED
TOLERANCES PER ANSI Y 14.5
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

DO NOT SCALE DOCUMENT
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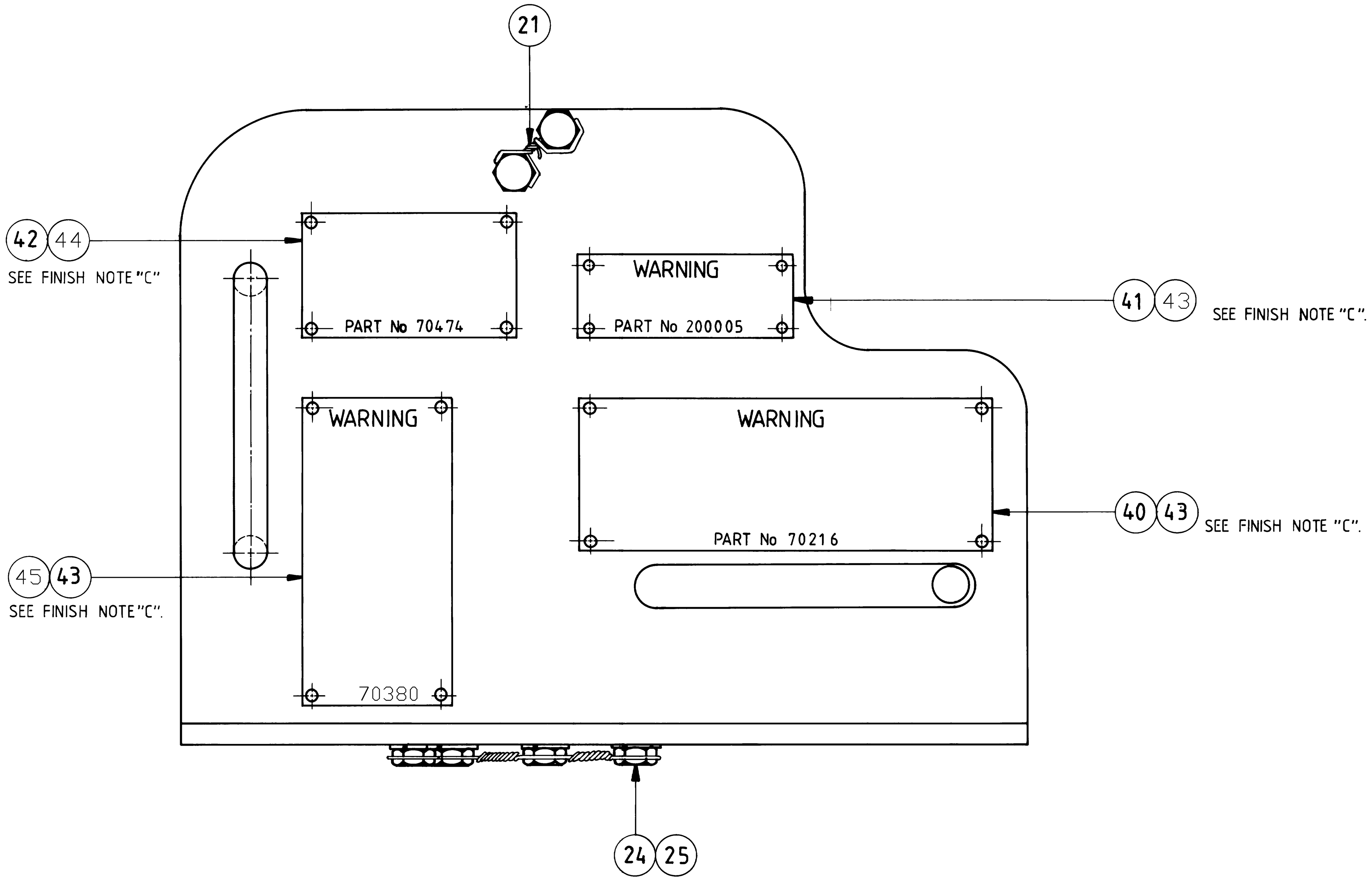
SCALE 1 : 1
UNITS INCH (MM)
PROJ.

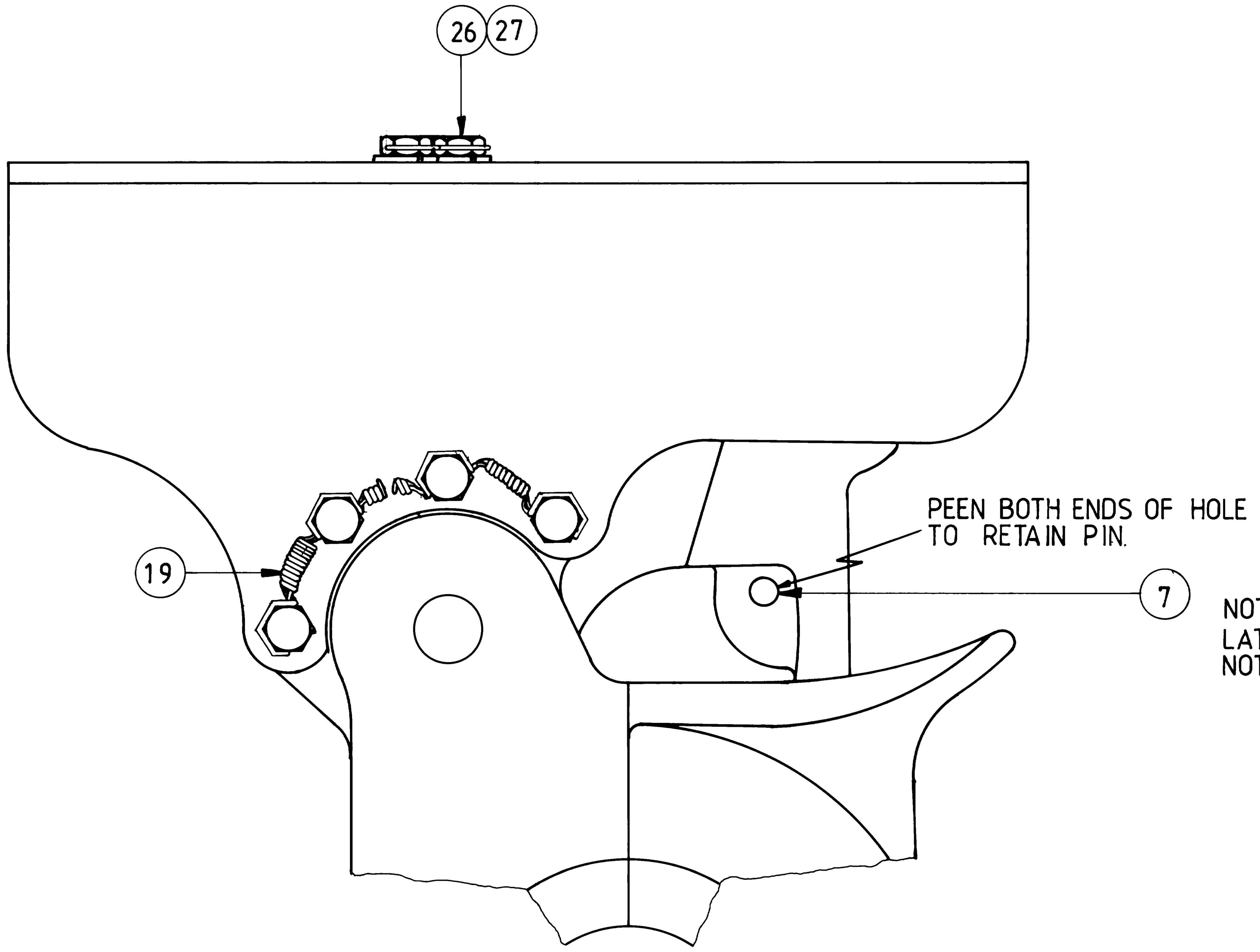
NATIONAL OILWELL VARCO

TITLE: ASSEMBLY AIR OP. ELEV. 3.1/2"-5.1/2"

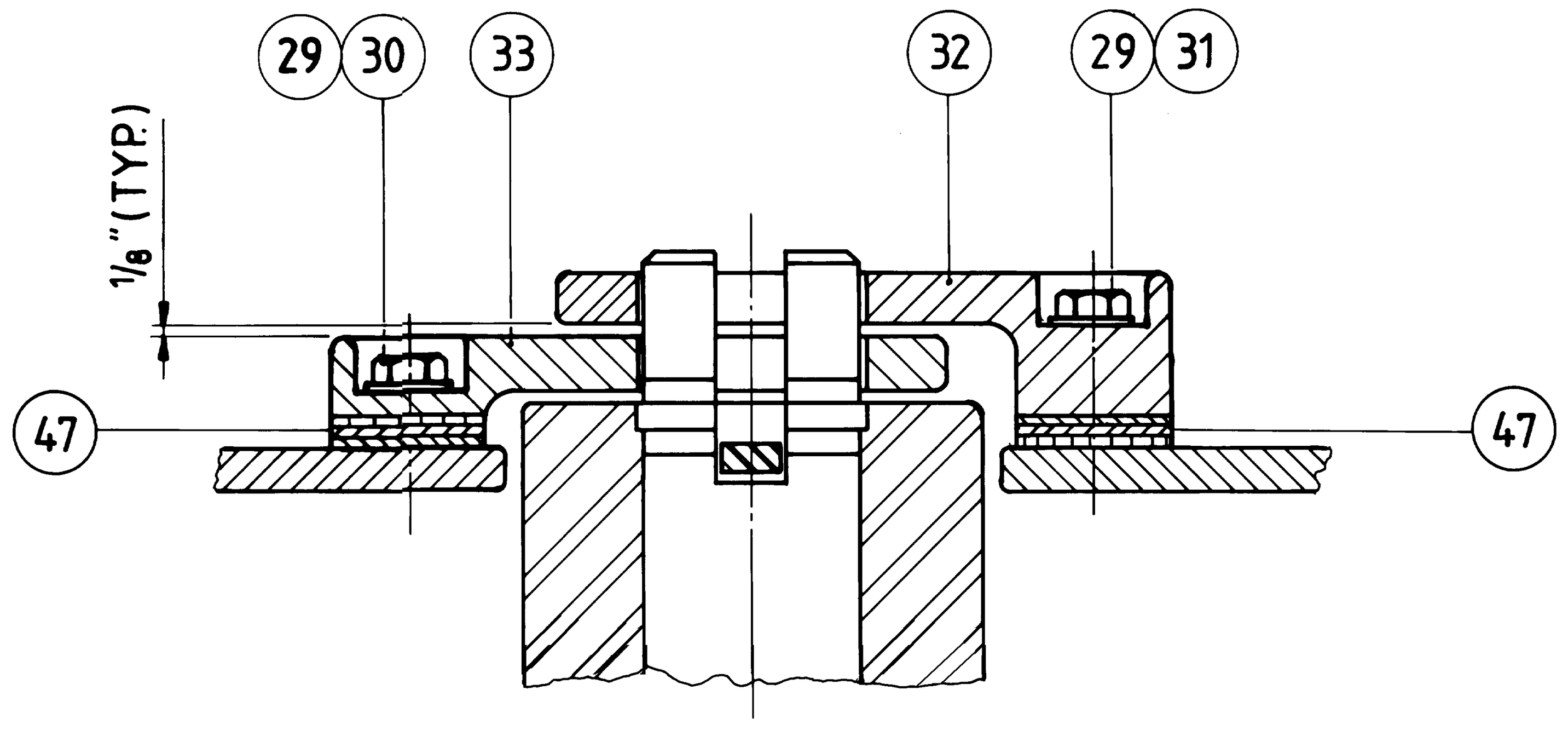
SIZE D | DRAWING NO. 36056 | SHEET 3 OF 4



VIEW A-A



NOTE:
LATCH ASS'Y ITEM "6" NOT SHOWN FOR CLARITY.



SECTION B-B

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010±.005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

CREATED BY	C. Dekkers
CREATED ON	12-09-97
REVISED BY	Mike Doerden
REVISED ON	29-July-14
TC-ECR	00014738
ASM	REV. H

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THIS DOCUMENT IS TEAMCENTER CONTROLLED — UNITS INCH (MM)

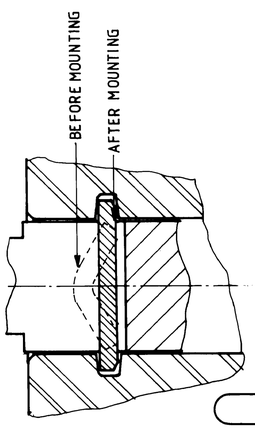
TITLE: ASSEMBLY AIR OP. ELEV. 3.1/2"-5.1/2" | SIZE: D | DRAWING NO. 36056 | SHEET 4 OF 4

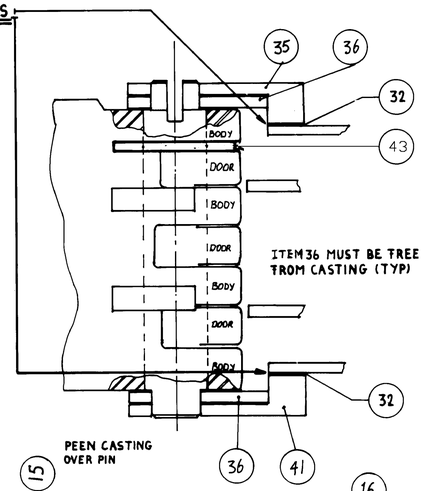
NOTE: IF NECESSARY FILL UP WITH SHIMS

MASK CYLINDER ROD BEFORE PAINTING !!
NO PAINT MAY BE APPLIED TO CYLINDER ROD !!

TOP EAR 5 44 45
BOTTOM EAR 6 7 8

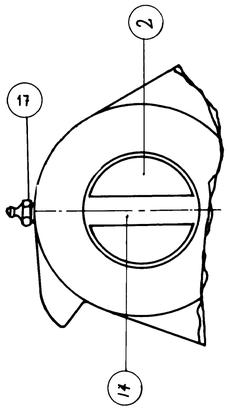
TYPICAL INSTALLATION FOR LOCK BAR OF HINGE PIN & LATCH PIN





ITEM 36 MUST BE FREE FROM CASTING (TYP)

PEEN CASTING OVER PIN

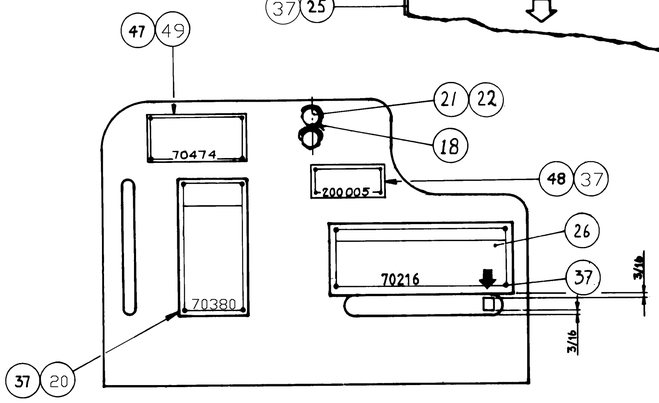


NOTE: AFTER ASSEMBLY LENGTHEN SPRING TO HOLD ELEVATOR TIGHTLY CLOSED

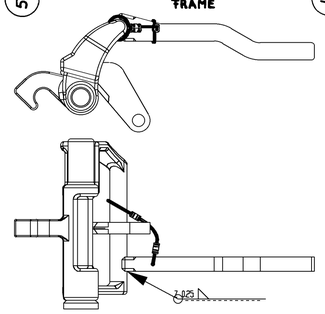
SEE NOTE *

SEE NOTE *

NOTE: MOUNT 4 HINGE PLATES WITH CURVE FACING FRONT FRAME



FRONT VIEW



WHEN ASSEMBLED, WELD INDICATOR PIN AS SHOWN
USE WELD INSTRUCTION WING-001

LEGACY PARTNUMBER	ORACLE PARTNUMBER
70222Y122	10146383-001
70222Y123	10146383-003
70222Z123	10146383-018
70222Y124	10146383-005
70222Y678	10146383-007
70222Y740	10146383-009
70222Z740	10146383-019
70222Y770	10146383-011
70222Y789	10146383-013
70222Z789	10146383-020
70222Y756	10146383-017

TOP HOLE FOR HGG
BOTTOM HOLE FOR HYC

NOTE: WELDLOCK

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	1	D	70218	DOOR.
2	1	B	70217	HINGE PIN.
3	1	B	30613	LATCH PIN.
4	2	B	30492	LINK BLOCK.
5	2	–	939099-97	HEX.HD.CAP SCREW DRILLED SHANK.
6	2	A	8145	LINK BLOCK BOLT.
7	2	–	50512-C	NUT, HEX-SLOTTED.
8	2	–	51402-12	COTTER PIN.
9	1	D	70247	CLOSING TRIGGER ASSEMBLY.
10	1	D	70214	REAR FRAME ASSEMBLY.
11	1	D	70219	BODY.
12	1	D	70230	LATCH ASSEMBLY.
13	1	A	36901	LOCK BAR LATCH PIN.
14	1	A	30609	LOCK BAR HINGE PIN.
15	1	A	31216	DOOR LUG PIN.
16	1	D	70189	FRONT FRAME ASSEMBLY.
17	3	–	53201	GREASE FITTING.
18	8	–	947879-14	LOCK WIRE.
19	1	B	SEE TABLE	TRIGGER FINGER.
20	1	–	70380	WARNING PLATE, MOVING PARTS. FRONT.
21	2	–	50008-14-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
22	2	–	50908-C	WASHER, LOCK-REGULAR.
23	4	–	50010-10-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
24	4	–	50910-C	WASHER, LOCK-REGULAR.
25	1	B	70215	WARNING PLATE, MOVING PARTS. REAR.
26	1	B	70216	WARNING PLATE, OVERHEAD LOAD.
27	–	–	–	–
28	2	B	35145	PIN, RETAINER.
29	2	–	50812-N-C	WASHER, FLAT.
30	2	–	51812-C	FLEXLOC, LOCKNUTS.
31	1	B	202180	LATCH SPRING.
32	8	A	35526	SHIM.
33	4	–	50704-3-B-C	SET SCREW.
34	2	–	941071-215	GROOVE PIN.
35	1	C	70185	HINGE PLATE.
36	2	C	70186	HINGE PLATE.
37	16	–	53301-10-8	DRIVE SCREW, ROUND HEAD.
38	6	–	50008-18-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
39	2	–	50008-22-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
40	8	–	939656-9	LOCKWASHER.
41	1	B	203334	HINGE PLATE, LOWER.
42	1	A	70240	BAR, BODY HANDLE.
43	1	A	70354	SPACER, HINGE PIN.
44	2	–	50514-C	NUT, HEX-SLOTTED.
45	2	–	51402-16	COTTER PIN.
46	–	–	–	–
47	1	B	70474-6	NAMEPLATE.
48	1	B	200005	WARNING INSTRUCTION PLATE.
49	4	–	53301-6-5	DRIVE SCREW ROUND HEAD.
50	2	–	947879-3	LOCKWIRE.
T 51	1	–	979438-318	WIRE 7x7 STAINLESS STEEL.
T 52	2	–	979437-3	WIRE CLAMP.
53	–	–	–	–
54	1	–	990068-28	ASSY HOSE

PIPE SIZE	0'-4"	4.1/2"	5-6.5/8"
TRIGGER FINGER	70220	50058	30806

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	–		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	– LBS/	– KG	
CREATED BY	C. Dekkers	REV.	T
CREATED ON	13-Aug-97		
REVISED BY	Mike Doerden		
REVISED ON	25-Aug-14	ASM	
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.005
MACHINED SURFACES 125
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 SIDES

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: ASSEMBLY "HGG" AIR OP. ELEV. 4"-6.5/8"
SIZE D | DRAWING NO. 70222 | SHEET 1 OF 1

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
51	1		70474	NAME PLATE.
52	1		200005	WARNING INSTRUCTION PLATE.
53				
54	16		53301-10-8	DRIVE SCREW, ROUND HEAD.
55	1		70216	WARNING PLATE, OVERHEAD LOAD.
56	1		70215	WARNING PLATE, MOVING PARTS. REAR.
57	1		70380	WARNING PLATE, MOVING PARTS. FRONT.
58	1		32925	LOCK BAR.
59	8		35526	SHIM.
60	4		53301-6-5	DRIVE SCREW, ROUND HEAD.

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
26				
27	1		939512-2	CLEVIS PIN ASSEMBLY.
28	2		947879-3	LOCK WIRE.
AF 29	2		979438-318	WIRE 7x7 STAINLESS STEEL.
AF 30	4		979437-3	WIRE CLAMP.
31				
32	2		50006-14-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
33	5		50010-16-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
34	5		50210-C	NUT, HEX
35	2		51812-C	NUT, FLEXLOCK.
36	2		50704-3-B-C	SET SCREW
37	4		50008-12-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
38	4		50008-16-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
39	2		50906-C	LOCK WASHER.
40	5		50910-C	LOCK WASHER.
41	2		50812-N-C	WASHER, FLAT.
42	8		50908-C	LOCK WASHER.
43				
44	2		53201	GREASE FITTING.
45	2		941071-215	GROOVE PIN.
46	2		51402-12	COTTER PIN.
47				
48	1		947879-5	LOCKWIRE.
49	1		947879-800	LOCKWIRE.
50	5		947879-10	LOCKWIRE.

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	1		32755-2	BODY - ELEVATOR.
2	1		32756-2	DOOR - ELEVATOR.
3	1		36722	REAR FRAME SUBASSY.
4	1		36783	FRONT FRAME SUBASSY.
5	1		35718	TRIGGER ASS'Y (LESS TRIGGER).
6	1		36312	LATCH & LATCH LOCK ASS'Y.
7	2		201048	BALANCING STRAP
8				
9	1		36834	HINGE PLATE, LEFT.
10	1		36307	HINGE PLATE, LOWER LEFT.
11	1		36308	HINGE PLATE, LOWER RIGHT.
12	1		36480	HINGE PLATE, RIGHT.
13	1		36310	HINGE PIN.
14	2		35145	RETAINING PIN.
15	2		50514-C	NUT, HEX-SLOTTED.
16	2		51402-16	COTTER PIN.
17	2		9519	LINK BLOCK.
18	2		939099-97	HEX.HD.CAP SCREW DRILLED SHANK.
19	2		8145	LINK BLOCK BOLT
20	2		50512-C	NUT, HEX-SLOTTED.
21	1		32762	LATCH PIN.
22	1		36304	LATCH SPRING.
23				
24				
25				

NOTES :

1.) WEDGE DOOR DOWN AND AGAINST LATCH FOR BORING AND FACING.

2.) DISTANCE FROM TOP FACE OF ELEVATOR TO BOTTOM FACE OF LINK ARMS SHALL NOT VARY MORE THAN 1/16" FROM ONE SIDE TO THE OTHER, GRIND LINK ARMS IF NESESSARY TRANSVERSE CENTER LINE OF UPPER LINK ARMS OF BODY AND DOOR.

3.) ELEVATOR BODY AND DOOR MUST EXHIBIT CLOSING ACTION OF APPROXIMATELY .030 TO .040 AT THE BODY AND DOOR JAM PAD WHEN LATCH IS MOVED FROM FULL ENGAGEMENT TO DISENGAGEMENT, A 1/16" GAP MUST BE PROVIDED BETWEEN BODY AND DOOR WHEN LATCH IS SEATED ON LATCH LUG ON DOOR. GRIND CAST PAD ON DOOR TO OBTAIN THIS GAP CLEARANCE.

4.) DO NOT PAINT HOSES, CYLINDER RODS, AND OPEN ENDS OF FITTINGS.

5.) APPLY NAME PLATES (ITEMS 51, 52, 55, 56 & 57) AS INDICATED ON SHEETS 4 & 2 RESPECTIVELY AFTER PAINTING.

6.) SEE 15316-* FOR ELEVATOR BORING INSTRUCTIONS.

7.) SECURE NUT TO FRAME AFTER CYLINDER STROKE HAS BEEN ADJUSTED.

LEGACY PARTNUMBER	ORACLE PARTNUMBER
35636Y129	10139821-003
35636Y132	10139821-004
35636Y135	10139821-005
35636Y136	10139821-006
35636Y336	10139821-007
35636Y387	10139821-008
35636Y334	10139821-010
35636Y354	10139821-011
35636Y131	10139821-012
35636Y167	10139821-013
35636Y179	10139821-014
35636Y338	10139821-015
35636Y339	10139821-016
35636Y348	10139821-017
35636Y373	10139821-018
35636Y422	10139821-019
35636Y426	10139821-020
35636Y435	10139821-021

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	-		
SURF. FINISH/ PAINT SPEC	-	COLOR	-
WEIGHT	- LBS/	- KG	
CREATED BY	C. Dekkers	REV.	
CREATED ON	5-Oct-99		
REVISED BY	Mike Doerden		
REVISED ON	27-Aug-14		
TC-ECR	00026349	ASM	AF

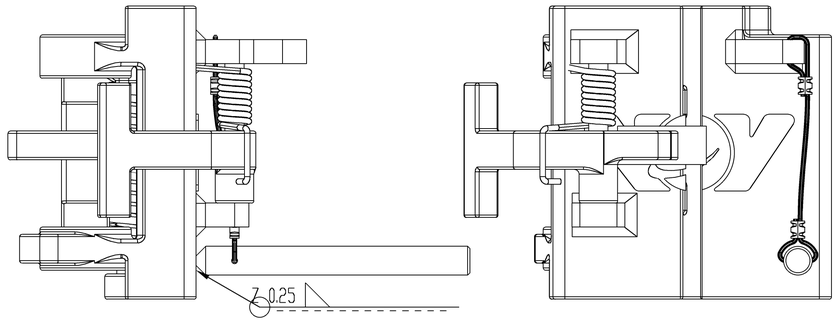
UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.025
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

DO NOT SCALE DOCUMENT	SCALE 1 : 1	PROJ.	
THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)		

TITLE: ASSY. "TA" AIR OP. ELEV FRAME 4.1/2"-8.5/8"

SIZE: D | DRAWING NO.: 35636 | SHEET 1 OF 4



△A WHEN ASSEMBLED, WELD INDICATOR PIN AS SHOWN. USE WELD INSTRUCTION WINQ-001.

LOCKING PIN FOR TRIGGER (REF.)

STAMP SERIAL No. APPROX AS SHOWN. AFTER BORING (SEE N/A)

STAMP ⍋ LOGO AFTER QA ACCEPTANCE APPROX. WHERE SHOWN.

N/S

'A'

'B'

'C'

NOTE:
SEE SHEET 4 FOR DETAILS OF VIEW 'A'-'A', SECTIONS 'B'-'B' & 'C'-'C'.

NOTE 4: DO NOT PAINT HOSES, CYLINDERRODS AND OPEN ENDS OF FITTINGS

SEE NOTE 4

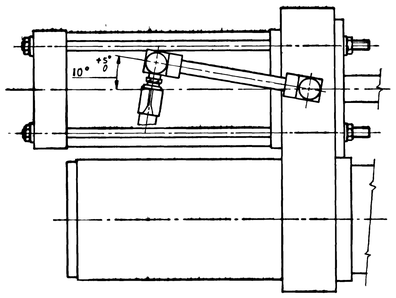
SEE NOTE 4

NOTE 7: SECURE NUT TO FRAME AFTER CYLINDER STROKE HAS BEEN ADJUSTED.

TACK (SEE NOTE 7)

ORACLE PART NUMBER	SEE TABLE			UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5	NATIONAL OILWELL VARCO
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY		3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE	
MATERIAL	–			BREAK SHARP CORNERS .010-.025	THIS DOCUMENT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH IS THE PROPERTY OF NATIONAL OILWELL VARCO, L.P. ITS AFFILIATES OR SUBSIDIARIES (ALL COLLECTIVELY REFERRED TO HEREIN AS "NOV"). IT IS LOANED FOR LIMITED PURPOSES ONLY AND REMAINS THE PROPERTY OF NOV. REPRODUCTION, IN WHOLE OR IN PART, OR USE OF THIS DESIGN OR DISTRIBUTION OF THIS INFORMATION TO OTHERS IS NOT PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF NOV. THIS DOCUMENT IS TO BE returned TO NOV UPON REQUEST OR UPON COMPLETION OF THE USE FOR WHICH IT WAS LOANED. THIS DOCUMENT AND THE INFORMATION CONTAINED AND REPRESENTED HEREIN IS THE COPYRIGHTED PROPERTY OF NOV.
SURF. FINISH/ PAINT SPEC	–	COLOR	–	MACHINED SURFACES 125/	
WEIGHT	– LBS/		– KG	TORCHCUT SURFACES 1000/	
				ALL WELD SYMBOLS ACC. TO ISO ALL WELD DIMENSIONS ARE Z DIM'S	
CREATED BY	C. Dekkers	REV.		DO NOT SCALE DOCUMENT	SCALE 1 : 1
CREATED ON	5-Oct-99				PROJ.
REVISED BY	Mike Doerden			THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
REVISED ON	27-Aug-14	ASM	AF		
TC-ECR	00026349				

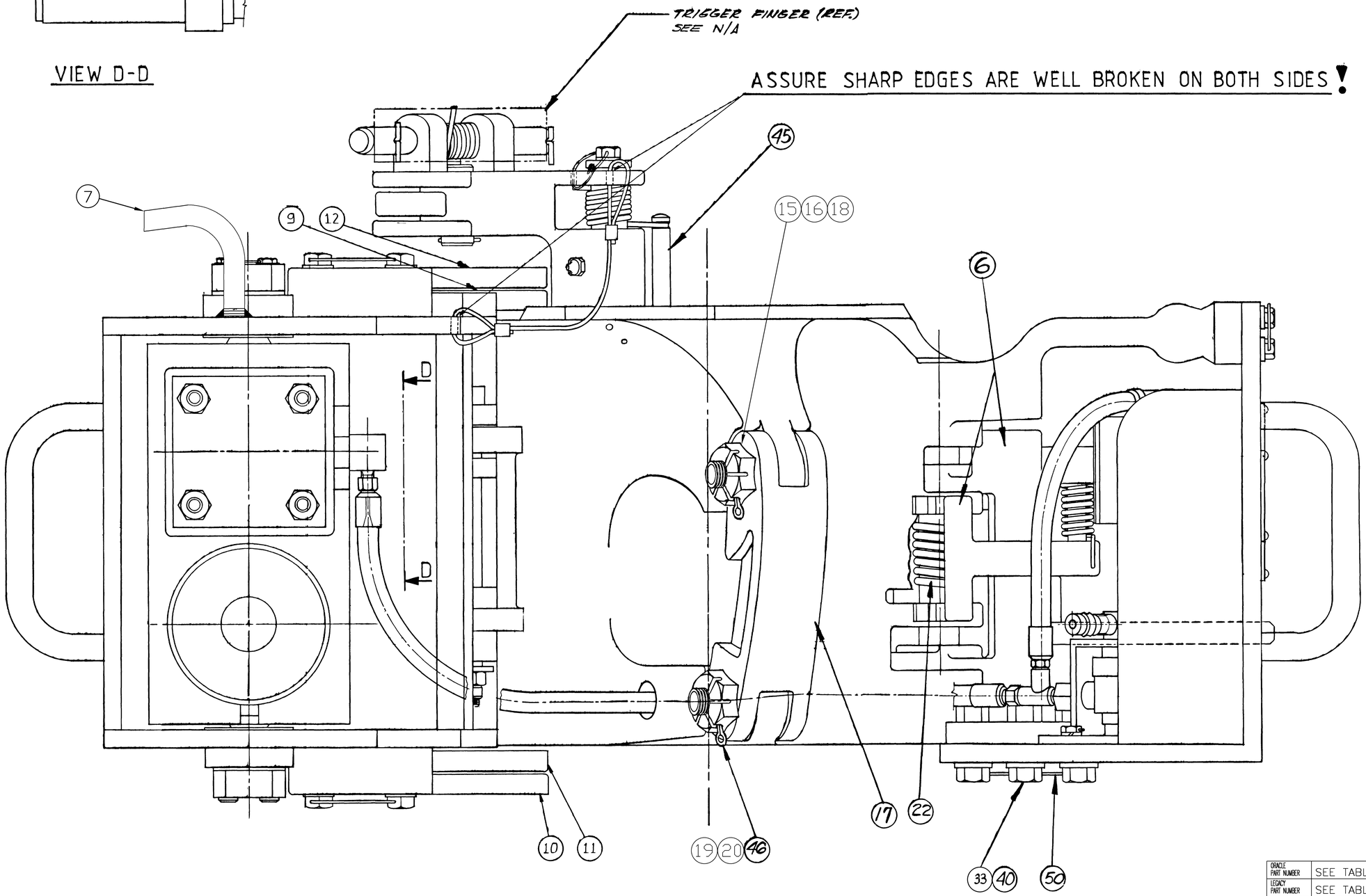
TITLE	SIZE	DRAWING NO.	SHEET
ASSY. "TA" AIR OP. ELEV FRAME 4.1/2"-8.5/8"	D	35636	2 OF 4



VIEW D-D

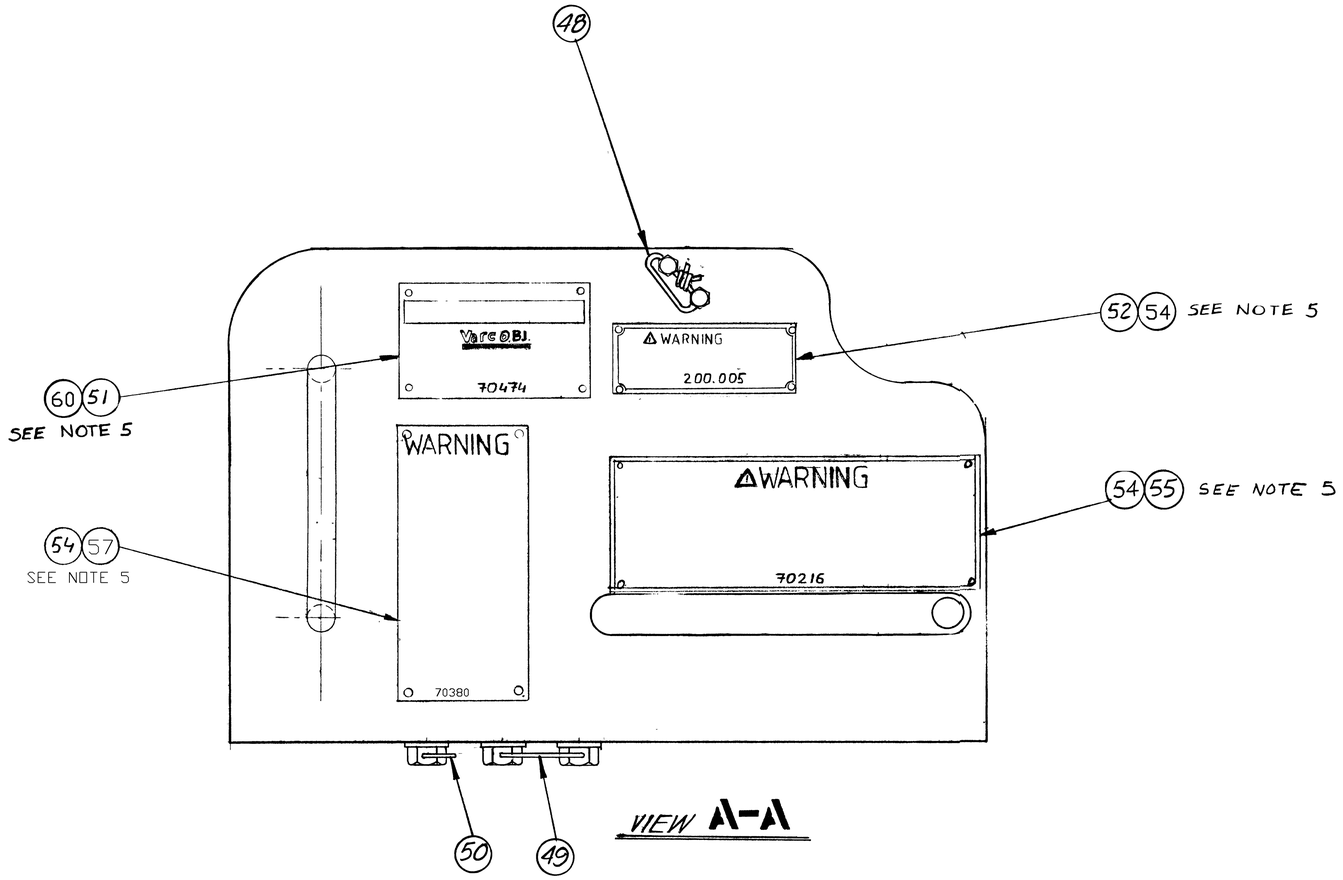
TRIGGER FINGER (REF.)
SEE N/A

ASSURE SHARP EDGES ARE WELL BROKEN ON BOTH SIDES !

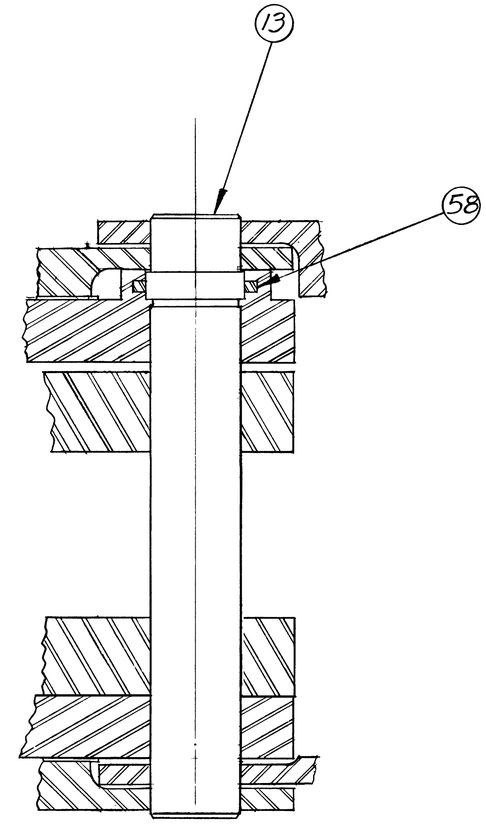


ORACLE PART NUMBER	SEE TABLE			UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± 5 DEGREE	NATIONAL OILWELL VARCO
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY			
MATERIAL	—			BREAK SHARP CORNERS.010-.005	
SURF. FINISH/ PAINT SPEC	—	COLOR	—	MACHINED SURFACES 250	
WEIGHT	— LBS/		— KG	TORCHCUT SURFACES 1000 ALL WELD SYMBOLS ACC. TO ISO ALL WELD DIMENSIONS ARE Z DIM'S	
CREATED BY	C. Dekkers	REV.		DO NOT SCALE DOCUMENT	SCALE 1 : 1
CREATED ON	5-Oct-99				
REVISED BY	Mike Doerden				
REVISED ON	27-Aug-14	ASM	AF	THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
TC-ECR	00026349				

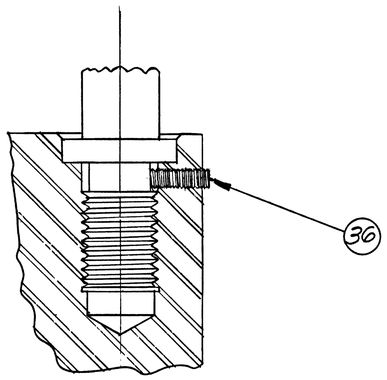
TITLE	ASSY. "TA" AIR OP. ELEV FRAME 4.1/2"-8.5/8"	SIZE D	DRAWING NO. 35636	SHEET 3 OF 4



VIEW A-A



SECTION B-B



SECTION C-C
SCALE: FULL

ORACLE PART NUMBER	SEE TABLE			UNLESS OTHERVISE SPECIFIED TOLERANCES OPER ANSI Y 14.5)	NATIONAL OILWELL VARCO
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY		3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE	THIS DOCUMENT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH IS THE PROPERTY OF NATIONAL OILWELL VARCO, L.P. ITS AFFILIATES OR SUBSIDIARIES (ALL COLLECTIVELY REFERRED TO HEREIN AS NOV). IT IS LOANED FOR LIMITED PURPOSES ONLY AND REMAINS THE PROPERTY OF NOV. REPRODUCTION, IN WHOLE OR IN PART, OR USE OF THIS DESIGN OR DISTRIBUTION OF THIS INFORMATION TO OTHERS IS NOT PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF NOV. THIS DOCUMENT IS TO BE returned TO NOV UPON REQUEST OR UPON COMPLETION OF THE USE FOR WHICH IT WAS LOANED. THIS DOCUMENT AND THE INFORMATION CONTAINED AND REPRESENTED HEREIN IS THE EXCLUSIVE PROPERTY OF NOV.
MATERIAL	—			BREAK SHARP CORNERS.010±.005	
SURF. FINISH/ PAINT SPEC	—	COLOR —		MACHINED SURFACES 250 µ"	
WEIGHT	— LBS/	— KG		TORCH CUT SURFACES 1000 µ"	
				ALL WELD SYMBOLS ACC. TO ISO ALL WELD DIMENSIONS ARE Z DIM'S	
CREATED BY	C. Dekkers	REV.		DO NOT SCALE DOCUMENT	SCALE 1 : 1
CREATED ON	5-Oct-99				PROJ.
REVISED BY	Mike Doerden			THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
REVISED ON	27-Aug-14	ASM	AF		
TC-ECR	00026349				
TITLE	ASSY. "TA" AIR OP. ELEV FRAME 4.1/2"-8.5/8"	SIZE	D	DRAWING NO.	35636
					SHEET 4 OF 4

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
51	1		70474	NAME PLATE.
52	1		200005	WARNING INSTRUCTION PLATE.
53				
54	16		53301-10-8	DRIVE SCREW, ROUND HEAD.
55	1		70216	WARNING PLATE, OVERHEAD LOAD.
56	1		70215	WARNING PLATE, MOVING PARTS. REAR.
57	1		70380	WARNING PLATE, MOVING PARTS. FRONT.
58	1		32925	LOCK BAR.
59	8		35526	SHIM.
60	4		53301-6-5	DRIVE SCREW, ROUND HEAD.

	ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
	26				
	27	1		939512-2	CLEVIS PIN ASSEMBLY.
	28	2		947879-3	LOCK WIRE.
△T	29	2		979438-318	WIRE 7x7 STAINLESS STEEL.
△T	30	4		979437-3	WIRE CLAMP.
	31				
	32	2		50006-14-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
	33	5		50010-16-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
	34	5		50210-C	NUT, HEX
	35	2		51812-C	NUT, FLEXLOCK.
	36	4		50704-3-B-C	SET SCREW
	37	4		50008-12-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
	38	4		50008-16-C8D	HEX.HD.CAP SCREW DRILLED HEAD.
	39	2		50906-C	LOCK WASHER.
	40	5		50910-C	LOCK WASHER.
	41	2		50812-N-C	WASHER, FLAT.
	42	8		50908-C	LOCK WASHER.
	43				
	44	2		53201	GREASE FITTING.
	45	2		941071-215	GROOVE PIN.
	46	2		51402-12	COTTER PIN.
	47				
	48	1		947879-5	LOCKWIRE.
	49	1		947879-800	LOCKWIRE.
	50	5		947879-10	LOCKWIRE.

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION
1	1		39346	BODY - ELEVATOR.
2	1		39347	DOOR - ELEVATOR.
3	1		36722	REAR FRAME SUBASSY.
4	1		36783	FRONT FRAME SUBASSY.
5	1		35718	TRIGGER ASS'Y (LESS TRIGGER).
6	1		36312	LATCH & LATCH LOCK ASS'Y.
7	2		201048	BALANCING STRAP.
8				
9	1		36834	HINGE PLATE, LEFT.
10	1		36307	HINGE PLATE, LOWER LEFT.
11	1		36308	HINGE PLATE, LOWER RIGHT.
12	1		36480	HINGE PLATE, RIGHT.
13	1		36310	HINGE PIN.
14	2		35145	RETAINING PIN.
15	2		50514-C	NUT, HEX-SLOTTED.
16	2		51402-16	COTTER PIN.
17	2		9519	LINK BLOCK.
18	2		939099-97	HEX.HD.CAP SCREW DRILLED SHANK.
19	2		8145	LINK BLOCK BOLT
20	2		50512-C	NUT, HEX-SLOTTED.
21	1		32762	LATCH PIN.
22	1		36304	LATCH SPRING.
23	1		30806	TRIGGER FINGER.
24				
25				

NOTES :

1.) WEDGE DOOR DOWN AND AGAINST LATCH FOR BORING AND FACING.
2.) DISTANCE FROM TOP FACE OF ELEVATOR TO BOTTOM FACE OF LINK ARMS SHALL NOT VARY MORE THAN 1/16" FROM ONE SIDE TO THE OTHER, GRIND LINK ARMS IF NESESSARY TRANSVERSE CENTER LINE OF UPPER LINK ARMS OF BODY AND DOOR.
3.) ELEVATOR BODY AND DOOR MUST EXHIBIT CLOSING ACTION OF APPROXIMATELY .030 TO .040 AT THE BODY AND DOOR JAM PAD WHEN LATCH IS MOVED FROM FULL ENGAGEMENT TO DISENGAGEMENT, A 1/16" GAP MUST BE PROVIDED BETWEEN BODY AND DOOR WHEN LATCH IS SEATED ON LATCH LUG ON DOOR. GRIND CAST PAD ON DOOR TO OBTAIN THIS GAP CLEARANCE.
4.) DO NOT PAINT HOSES, CYLINDER RODS, AND OPEN ENDS OF FITTINGS.
5.) APPLY NAME PLATES (ITEMS 51, 52, 55, 56 & 57) AS INDICATED ON SHEETS 4 & 2 RESPECTIVELY AFTER PAINTING.
6.) SECURE NUT TO FRAME AFTER CYLINDER STROKE HAS BEEN ADJUSTED.
7.) SEE DWG. D-39342 FOR MANUAL ELEVATOR ASSEMBLY.
8.) SEE 15316-* FOR ELEVATOR BORING INSTRUCTIONS.

LEGACY PARTNUMBER	ORACLE PARTNUMBER
39343Y370	10140042-002
39343Y139	10140042-005
39343Y141	10140042-006
39343Y346	10140042-007
39343Y367	10140042-008
39343Y427	10140042-009

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	

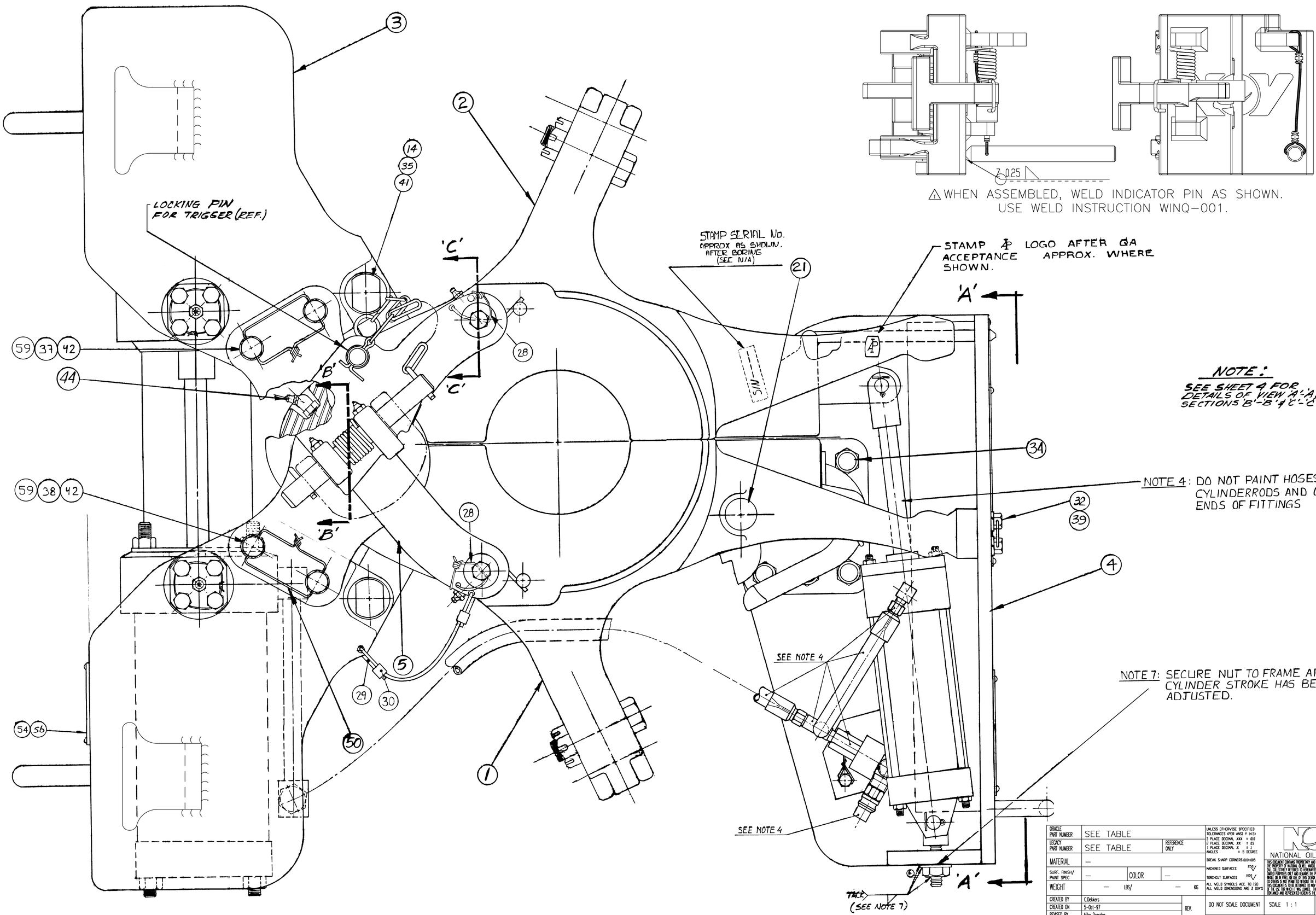
UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010±.005
MACHINED SURFACES 250√
TORCHCUT SURFACES 1000√
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

CREATED BY	C.Dekkers	REV.	
CREATED ON	5-Oct-97		
REVISED BY	Mike Daerden		
REVISED ON	26-Aug-14	ASM	T
TC-ECR	00026349		

DO NOT SCALE DOCUMENT
SCALE 1 : 1
PROJ.
THIS DOCUMENT IS TEAMCENTER CONTROLLED
UNITS INCH (MM)

TITLE ASSY. "TA" AIR OP. ELEV FRAME 8.1/2"-11.1/4"
SIZE D
DRAWING NO. 39343
SHEET 1 OF 4



⚠ WHEN ASSEMBLED, WELD INDICATOR PIN AS SHOWN. USE WELD INSTRUCTION WINQ-001.

NOTE: SEE SHEET 4 FOR DETAILS OF VIEW 'A-A', SECTIONS 'B'-'B' & 'C'-'C'.

NOTE 4: DO NOT PAINT HOSES, CYLINDERRODS AND OPEN ENDS OF FITTINGS

NOTE 7: SECURE NUT TO FRAME AFTER CYLINDER STROKE HAS BEEN ADJUSTED.

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	
CREATED BY	C.Dekkers	REV.	T
CREATED ON	5-Oct-97		
REVISED BY	Mike Doerden		
REVISED ON	26-Aug-14	ASM	
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± 5 DEGREE
BREAK SHARP CORNERS .010-.015
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

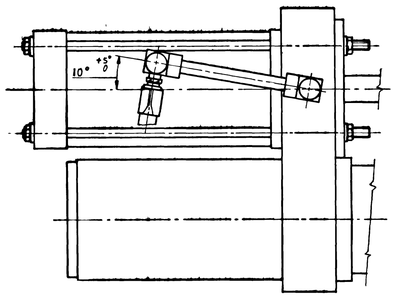
DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

NATIONAL OILWELL VARCO

TITLE: ASSY. "TA" AIR OP. ELEV FRAME 8.1/2"-11.1/4"

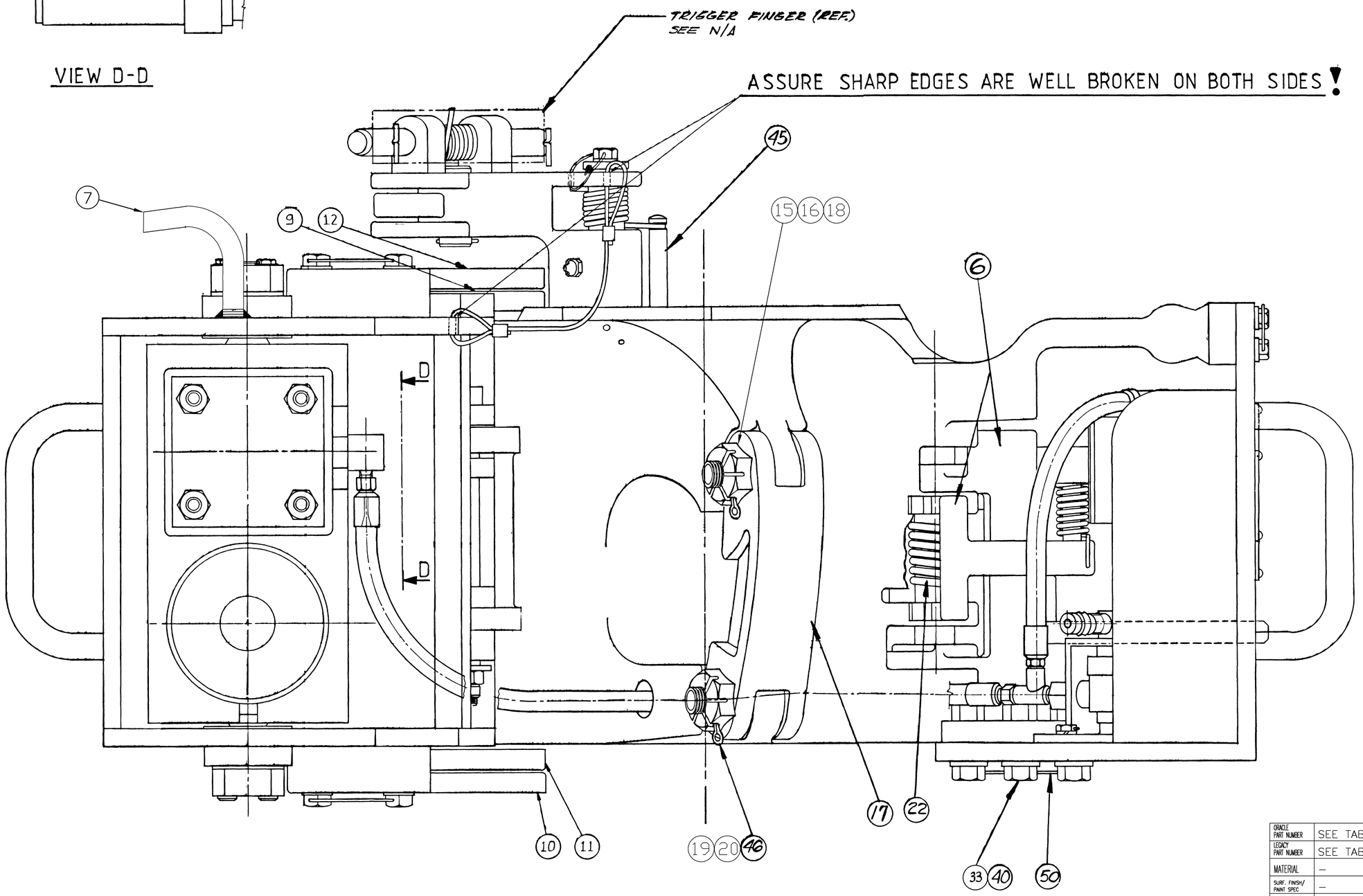
SIZE: D | DRAWING NO.: 39343 | SHEET 2 OF 4



VIEW D-D

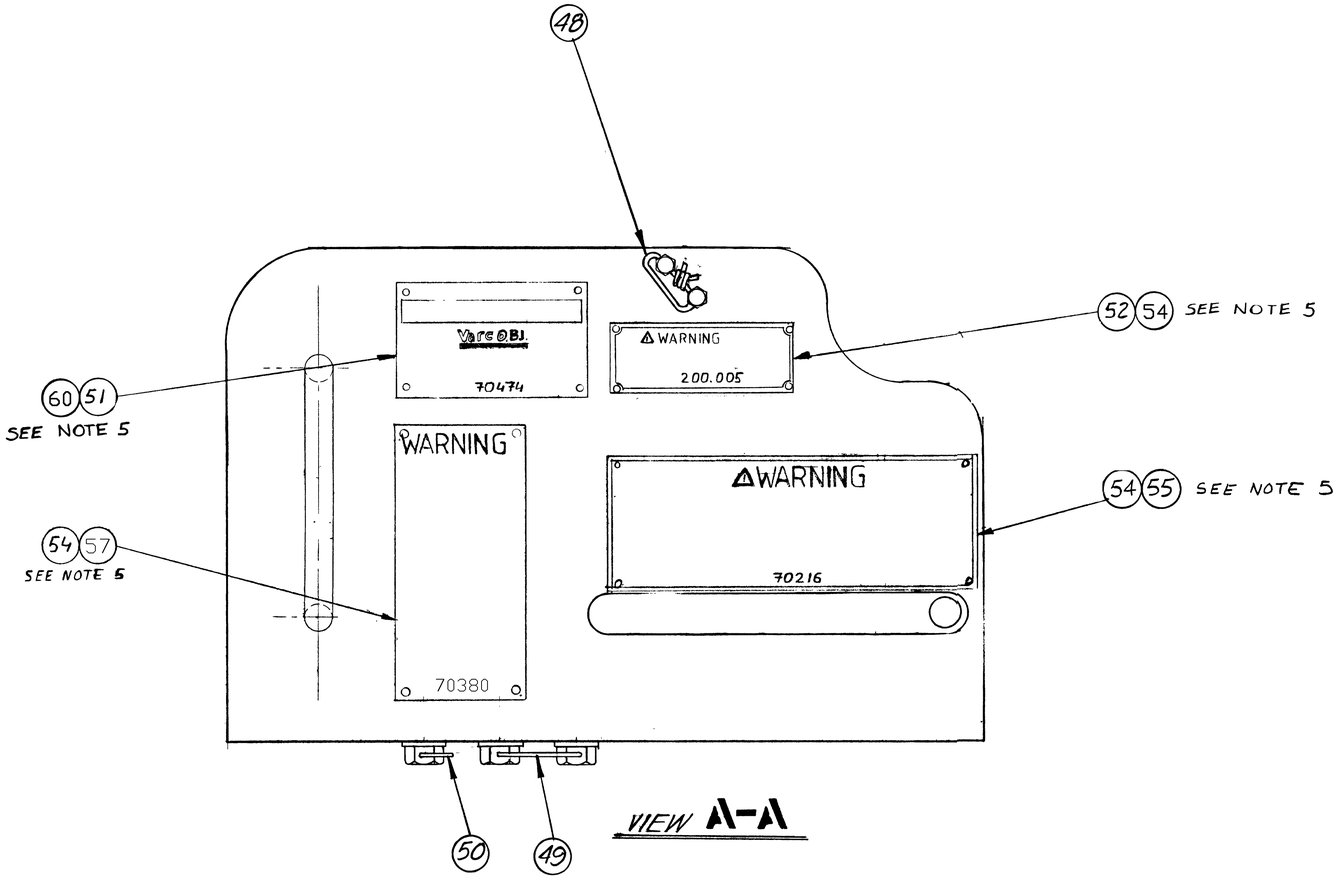
TRIGGER FINGER (REF.)
SEE N/A

ASSURE SHARP EDGES ARE WELL BROKEN ON BOTH SIDES !

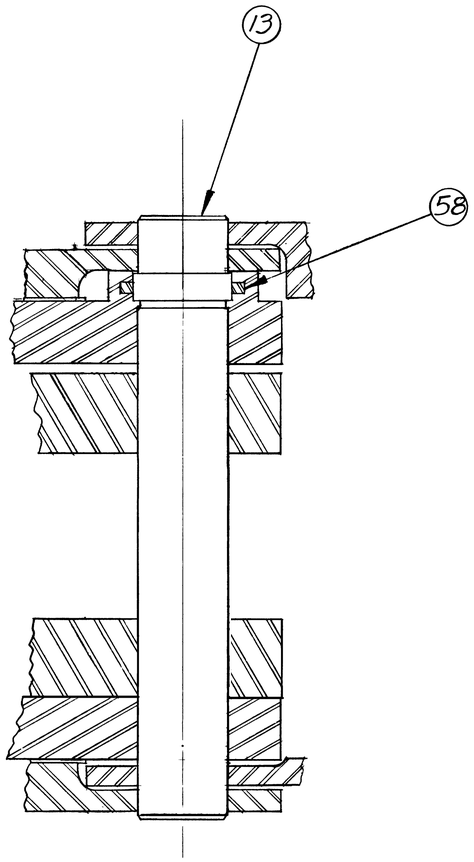


ORACLE PART NUMBER	SEE TABLE			UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5) 3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE	NATIONAL OILWELL VARCO
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY			
MATERIAL	—			BREAK SHARP CORNERS .010/.025	THIS DOCUMENT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH IS THE PROPERTY OF NATIONAL OILWELL VARCO, L.P. ITS AFFILIATES OR SUBSIDIARIES (ALL COLLECTIVELY REFERRED TO HEREINAFTER AS "NOV"). IT IS LOANED FOR LIMITED PURPOSES ONLY AND REMAINS THE PROPERTY OF NOV. REPRODUCTION, IN WHOLE OR IN PART, OR USE OF THIS DESIGN OR DISTRIBUTION OF THIS INFORMATION TO OTHERS IS NOT PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF NOV. THIS DOCUMENT IS TO BE RETURNED TO NOV UPON REQUEST OR UPON COMPLETION OF THE USE FOR WHICH IT WAS LOANED. THIS DOCUMENT AND THE INFORMATION CONTAINED AND REPRESENTED HEREIN IS THE EXCLUSIVE PROPERTY OF NOV.
SURF. FINISH/ PAINT SPEC	—	COLOR —		MACHINED SURFACES 250	
WEIGHT	— LBS/	— KG		TORCHCUT SURFACES 1000	
				ALL WELD SYMBOLS ACC. TO ISO ALL WELD DIMENSIONS ARE 2 DIM'S	
CREATED BY	C.Dekkers	REV.		DO NOT SCALE DOCUMENT	SCALE 1 : 1
CREATED ON	5-Oct-97				PROJ.
REVISED BY	Mike Doerden				
REVISED ON	26-Aug-14	ASM	T	THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
TC-ECR	00026349				

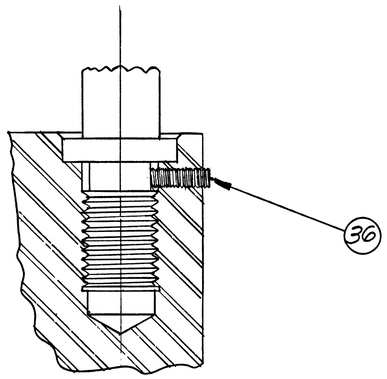
TITLE	SIZE	DRAWING NO.	SHEET
ASSY. "TA" AIR OP. ELEV FRAME 8.1/2"-11.1/4"	D	39343	3 OF 4



VIEW A-A



SECTION B-B



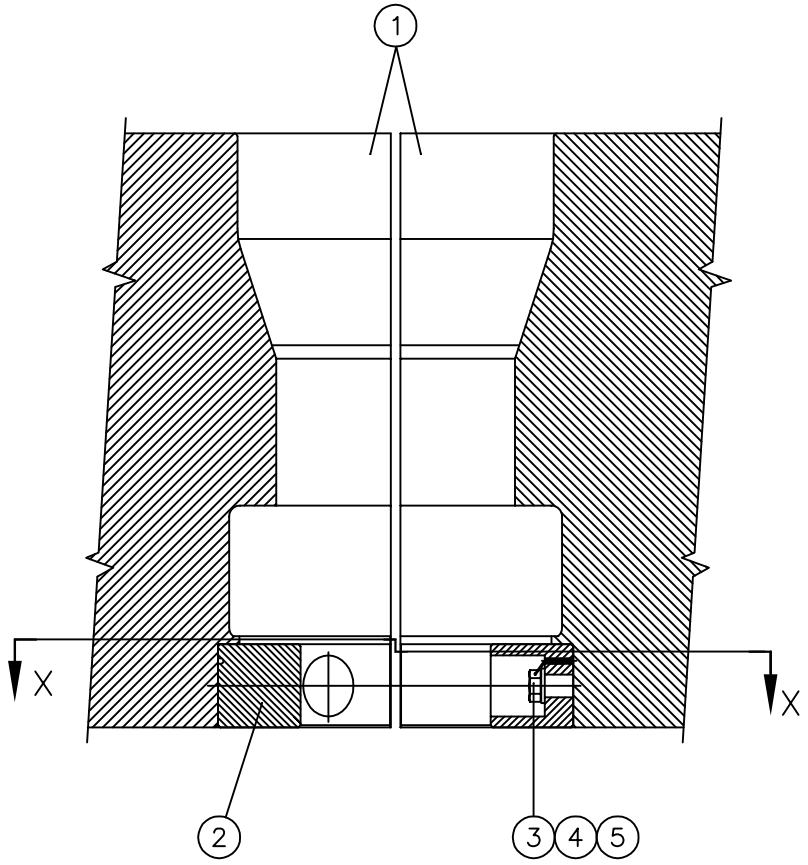
SECTION C-C
SCALE: FULL

ORACLE PART NUMBER	SEE TABLE			UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)	NATIONAL OILWELL VARCO
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY		3 PLACE DECIMAL .XXX ± .010 2 PLACE DECIMAL .XX ± .03 1 PLACE DECIMAL .X ± .1 ANGLES ± .5 DEGREE	THIS DOCUMENT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION WHICH IS THE PROPERTY OF NATIONAL OILWELL VARCO, L.P. ITS AFFILIATES OR SUBSIDIARIES (ALL COLLECTIVELY REFERRED TO HEREIN AS "NOV"). IT IS LOANED FOR LIMITED PURPOSES ONLY AND REMAINS THE PROPERTY OF NOV. REPRODUCTION, IN WHOLE OR IN PART, OR USE OF THIS DESIGN OR DISTRIBUTION OF THIS INFORMATION TO OTHERS IS NOT PERMITTED WITHOUT THE EXPRESS WRITTEN CONSENT OF NOV. THIS DOCUMENT IS TO BE RETURNED TO NOV UPON REQUEST OR UPON COMPLETION OF THE USE FOR WHICH IT WAS LOANED. THIS DOCUMENT AND THE INFORMATION CONTAINED AND REPRESENTED HEREIN IS THE EXPRESSED PROPERTY OF NOV.
MATERIAL	—			BREAK SHARP CORNERS .010-.025 MACHINED SURFACES 250 TORCH CUT SURFACES 1000	
SURF. FINISH/ PAINT SPEC	—	COLOR —		ALL WELD SYMBOLS ACC. TO ISO ALL WELD DIMENSIONS ARE 2 D.W.'S	
WEIGHT	— LBS/ — KG				
CREATED BY	C.Dekkers	REV.		DO NOT SCALE DOCUMENT	SCALE 1 : 1
CREATED ON	5-Oct-97				PROJ.
REVISED BY	Mike Doerden			THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
REVISED ON	26-Aug-14				
TC-ECR	00026349	ASM	T		

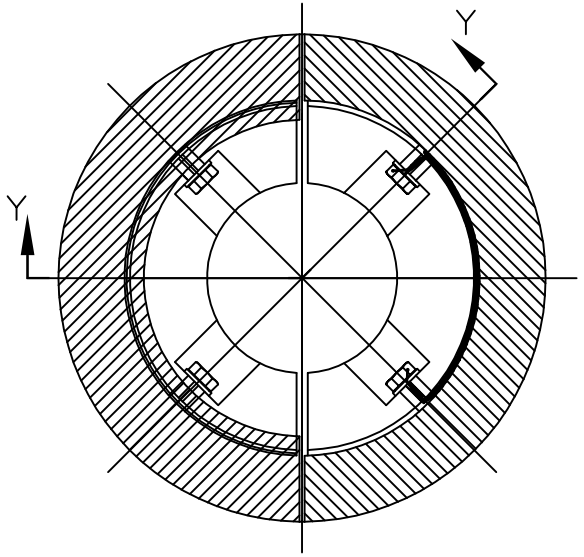
TITLE: ASSY. "TA" AIR OP. ELEV FRAME 8.1/2"-11.1/4"

SIZE D | DRAWING NO. 39343 | SHEET 4 OF 4

ITEM	QTY.	ORACLE PARTNR.	DESCRIPTION
1	1	10139758–***	GG air op. elevator without bore
2	1	10137213–***	Wear bushing
3	4	939098–406	Hexagon head cap screw
4	4	939352–61	Spring washer
5	2	947879–25	Lock wire



SECTION Y–Y



SECTION X–X

USABLE FOR BORECODE
121
122
123
124
805

SEE NOTE 1.

△D –CHANGED PARTNUMBER.
–REMOVED BORECODE DIMENSIONS
–UPDATED DRAWING

ORACLE PART NUMBER	10153678–***		
LEGACY PART NUMBER	200024(–)	REFERENCE ONLY	
MATERIAL	SEE PL 200024(–)		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	722 LBS/	328 KG	
CREATED BY	Hans van Rijsingen		
CREATED ON	24-Mar-93		
REVISED BY	Mike Doerden		
REVISED ON	20-Sep-13		
TC-ECR	00018304	DAD	
REV.	D		

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

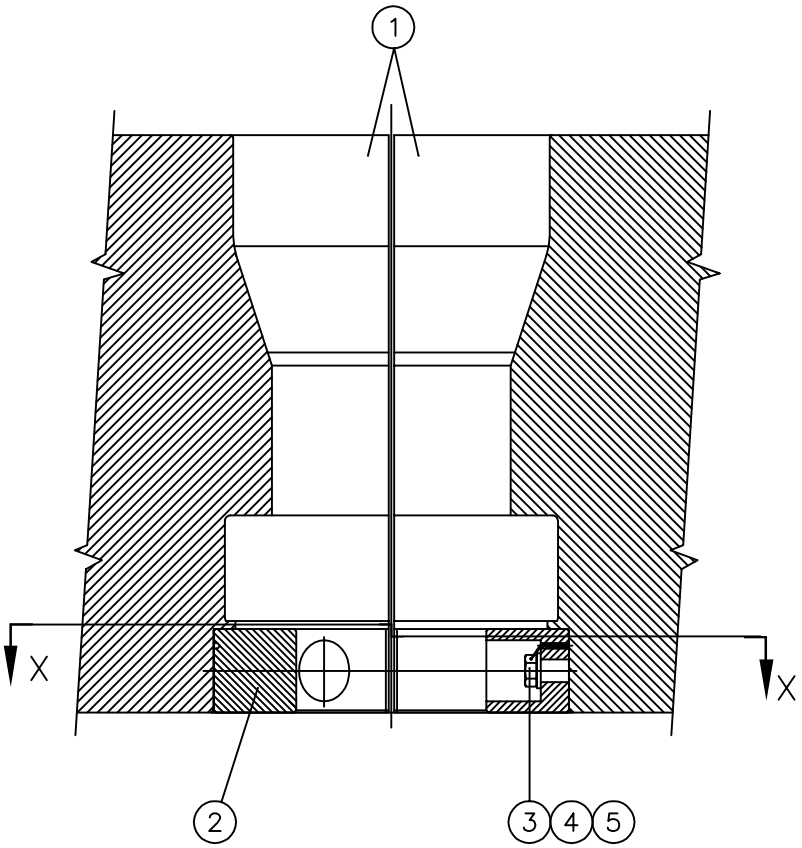
NATIONAL OILWELL VARCO

SCALE 1 : 1
PROJ.
UNITS INCH (MM)

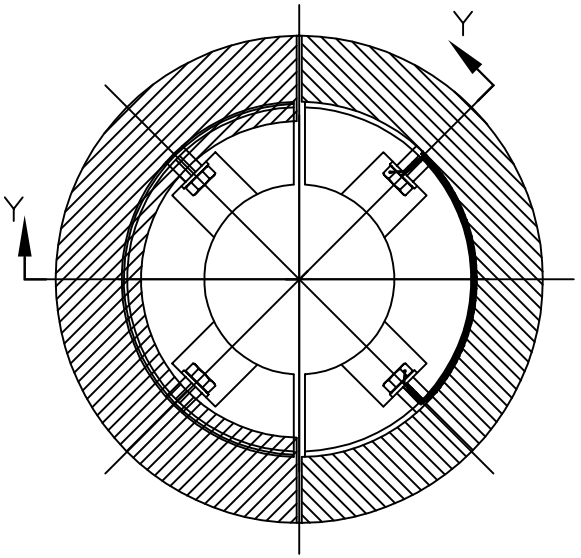
TITLE: ASSEMBLY GG AIR OP. ELEVATOR WITH WEARBUSHING
SIZE C | DRAWING NO. 200024(–) | SHEET 1 OF 1

NOTES:
1. WHEN BORE 123 IS APPLICABLE THE PARTNUMBER WILL BE 10359113–***.

ITEM	QTY.	PARTNUMBER	DESCRIPTION
1	1	10139835–***	MGG air op. elevator without bore
2	1	10137213–***	Wear bushing
E 3	4	50007–10–C8D	Hexagon head cap screw
E 4	4	50907–C	Lock washer
5	2	947879–25	Lock wire



SECTION Y–Y



SECTION X–X

E LEGACY PARTNUMBER	ORACLE PARTNUMBER
200057Y119	10021901–001
200057Y120	10021901–007
200057Z120	10021901–014
200057Y121	10021901–015
200057Z121	10021901–016
200057Y122	10021901–017
200057Y123	10021901–018

ORACLE PART NUMBER	10021901–***		
LEGACY PART NUMBER	200057(–)	REFERENCE ONLY	
MATERIAL	SEE PL 200057(–)		
SURF. FINISH/ PAINT SPEC	–	COLOR –	
WEIGHT	722 LBS/	328 KG	
CREATED BY	Hans van Rijzingen		
CREATED ON	24-Mar-93		
REVISED BY	Mike Doerden		
REVISED ON	18-Sep-13	DAD	REV. E
TC-ECR	00026349		

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

NATIONAL OILWELL VARCO

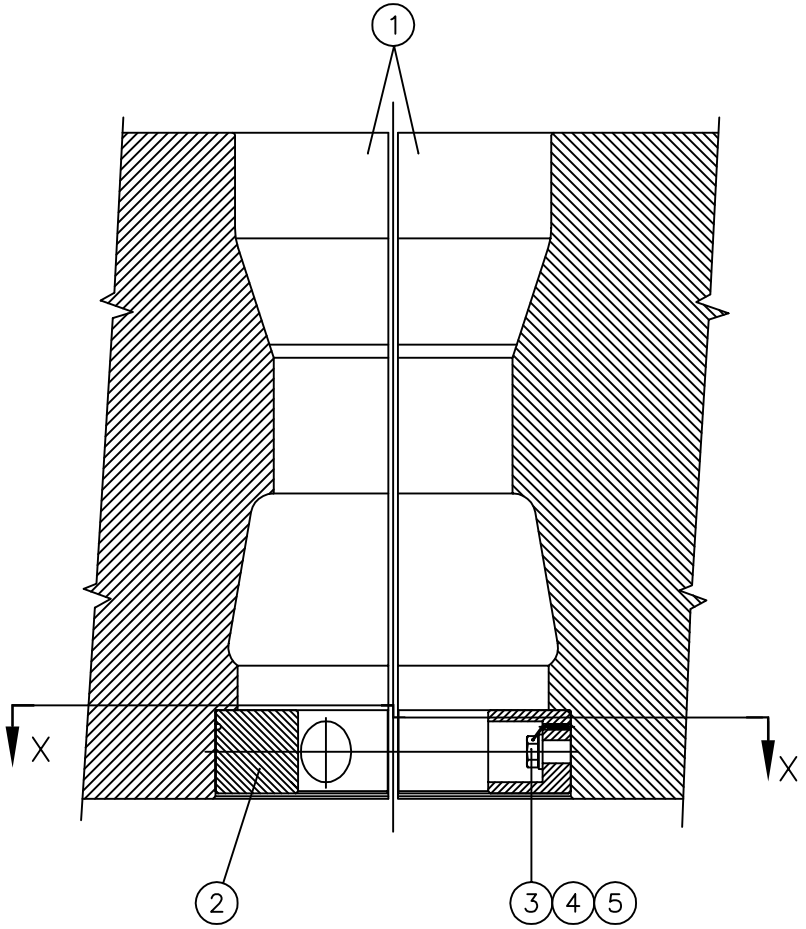
DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1
UNITS INCH (MM)
PROJ.

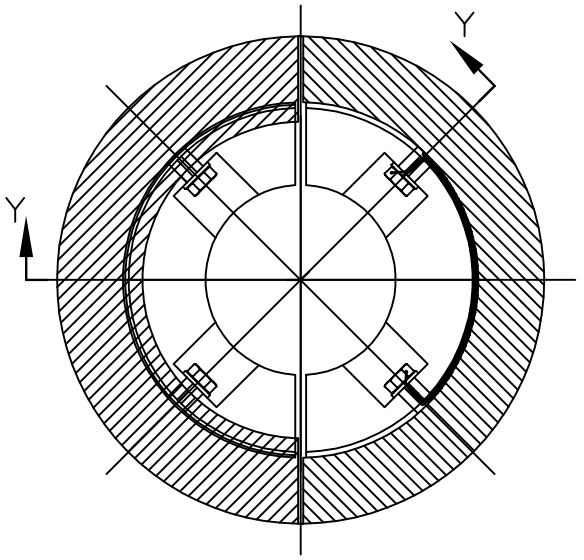
TITLE: Assy. MGG air operated elevator with wearbushing

SIZE C | DRAWING NO. 200057(–) | SHEET 1 OF 1

ITEM	QTY.	PARTNUMBER	DESCRIPTION
1	1	10146383–***	HGG air operated elevator without bore
2	1	10137213–***	Wear bushing
3	4	50007–10–C8D	Hexagon head cap screw
4	4	50907–C	Spring washer
5	2	947879–25	Lock wire



SECTION Y–Y



SECTION X–X

LEGACY PARTNUMBER	ORACLE PARTNUMBER
200059Y122	10706059–009
200059Y123	10021972–001
200059Y124	10706059–001
200059Y756	10706059–008

USABLE FOR BORECODE
121
122
123
124
756

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	SEE PL 200059(–)		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	– LBS/	– KG	
CREATED BY	Hans van Rijzingen		
CREATED ON	24-Mar-93		
REVISED BY	Mike Doerden		
REVISED ON	26-Aug-14		
TC-ECR	00026349	DAD	REV. E

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.005
MACHINED SURFACES 250 µ/
TORCHCUT SURFACES 1000 µ/
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

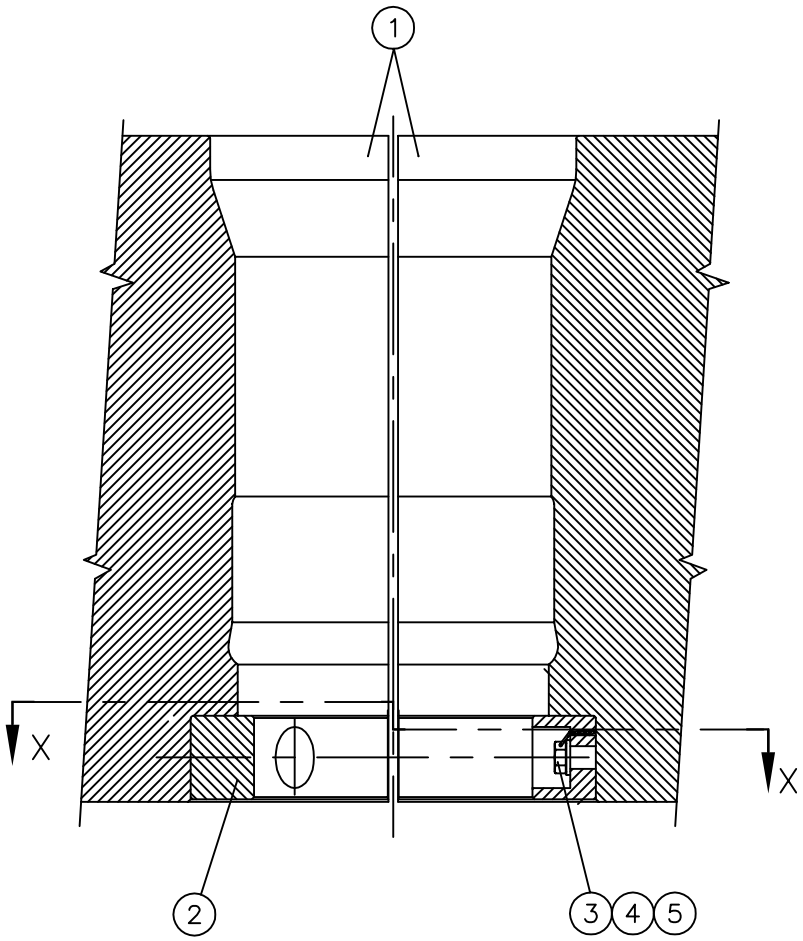
DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED

NATIONAL OILWELL VARCO

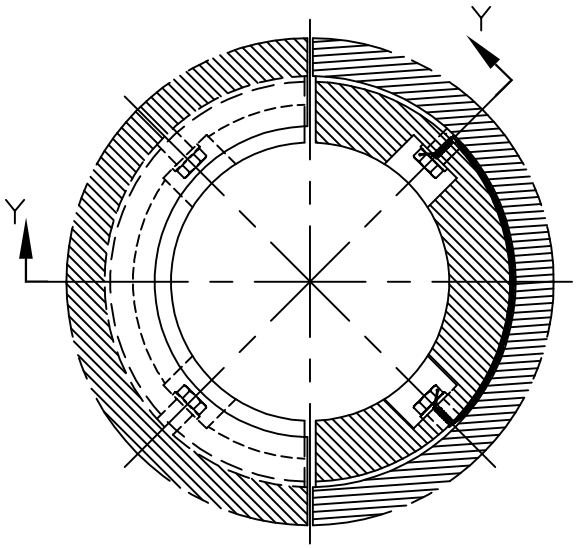
SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: Assembly HGG air op. elevator with wear bushing
SIZE C
DRAWING NO. 200059(–)
SHEET 1 OF 1

ITEM	QTY.	ORACLE PARTNR.	DESCRIPTION
1	1	10146383–***	HGG air operated elevator without bore
2	1	10137285–***	Wear bushing
3	4	50007–10–C8D	Hexagon head cap screw
4	4	50907–C	Spring washer
5	2	947879–25	Lock wire



SECTION Y–Y



SECTION X–X

LEGACY PARTNUMBER	ORACLE PARTNUMNBER
200059Y678	10153768–005
200059Y740	10022115–001
200059Y770	10153768–002
200059Y789	10111259–001

USABLE FOR BORECODE
678
740
770
789

ORACLE PART NUMBER	SEE TABLE		
LEGACY PART NUMBER	SEE TABLE	REFERENCE ONLY	
MATERIAL	–		
SURF. FINISH/ PAINT SPEC	–	COLOR	–
WEIGHT	– LBS/	– KG	
CREATED BY	Hans van Rijzingen		
CREATED ON	24-Mar-93		
REVISED BY	Mike Doerden		
REVISED ON	26-Aug-14		
TC-ECR	00026349	DAD	REV. G

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010-.005
MACHINED SURFACES 250 µ/
TORCHCUT SURFACES 1000 µ/
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE 2 DIM'S

NATIONAL OILWELL VARCO

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS TEAMCENTER CONTROLLED
SCALE 1 : 1
UNITS INCH (MM)
PROJ.

TITLE: ASSEMBLY HGG AIR OP. ELEVATOR WITH WEARBUSHING
SIZE C | DRAWING NO. 200061(-) | SHEET 1 OF 1

WARNING

THE INSPECTION CRITERIA AND MAXIMUM WEAR ALLOWANCES CONTAINED IN THIS (THESE) DOCUMENT(S) ARE ONLY VALID WHEN THE RELATED EQUIPMENT IS IN OTHERWISE GOOD CONDITION, HAS NOT BEEN MISUSED, AND DOES NOT HAVE EXCESSIVE WEAR, CRACKS OR OTHER DEFECTS, OR PREVIOUS WELD REPAIR THESE INSPECTION CRITERIA AND MAXIMUM WEAR ALLOWANCES APPLY ONLY TO CERTAIN CRITICAL COMPONENTS AND, AS SUCH, CANNOT ON THEIR OWN DETERMINE THE OVERALL CONDITION OF THE EQUIPMENT AND ITS SUITABILITY FOR CONTINUED USE

ORIGINAL

PART NO	QTY	NEXT ASS'Y	FINAL ASS'Y

Varco BJ
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL XXX ± .010
2 PLACE DECIMAL XX ± .03
1 PLACE DECIMAL X ± 1
ANGELS ± 5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250

	NAME	DATE
PREPARED	H.v.R.	10 15-92
CHECKED	A.Keijzer	2 25 93
APPROVED		2 Mar 93

PROJ
SCALE NONE
UNITS INCH (MM)
MATERIAL —
WEIGHT - LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	11103	H.v.R.	2 5 '93	A.Keijzer

ACAD FILE NO WDB000 DWG

TITLE WEAR DATA
GENERAL WARNING

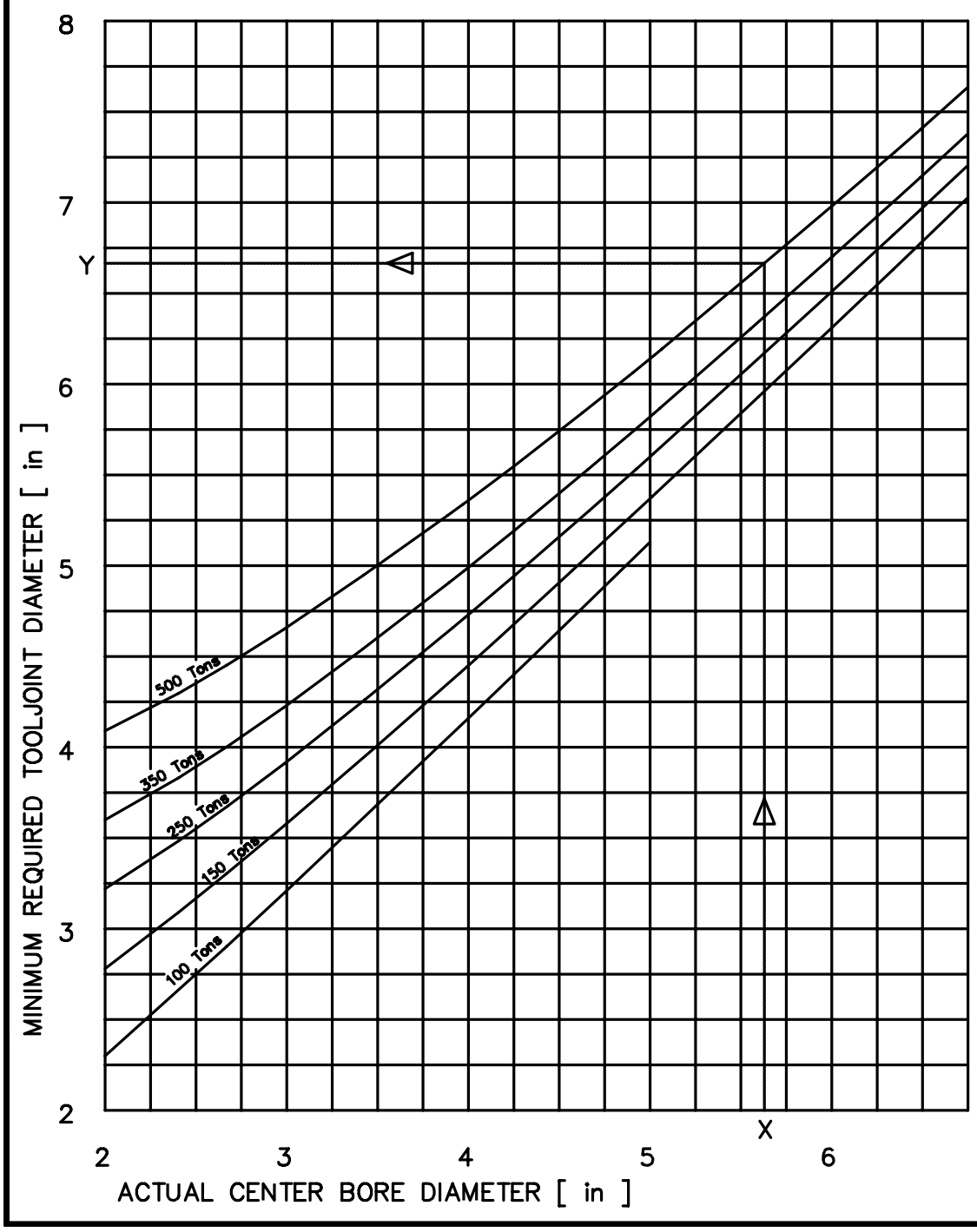
SIZE B

DRAWING NO. WD-000

SHEET 1 OF 1

REDRAWN / REPLACED BY:

REPLACES



How to check your center bore:

1 Determine your actual center bore diameter (largest) in inches. (X)
2 The maximum wear on the diameter of the center bore is 0.25". But:
3 Before using your elevator, always check the tooljoint/bore combination by means of the table on the left.
4 Follow the line up to the line corresponding with the rating of your elevator. (Rating in short tons.)
5 Read on the left the minimum required tooljoint diameter in inches that can safely be handled with your elevator. (Y)

As soon as your tooljoint diameter falls below the corresponding rating line, you have to change either your elevator or your pipe.

Note:

In case your elevator has a wearbushing, keep this wearbushing in good condition to prevent wear of your center bore.

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco. B.J.
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ç .010
2 PLACE DECIMAL .XX ç .03
1 PLACE DECIMAL .X ç .1
ANGELS ç .5 DEGREE
BREAK SHARP CORNERS .010 ç .005
MACHINED SURFACES 250

	NAME	DATE
PREPARED	H.v.R.	10-15-'92
CHECKED		
APPROVED		

PROJ.
SCALE
UNITS INCH (MM)
MATERIAL
WEIGHT - LBS/ - KG.

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	11103	H.v.R.	2-5-'93	

ACAD FILE NO.: WDB001.DWG

TITLE: TOOLJOINT/BORE WEAR TABLE
18° BORE TYPE ELEVATORS

SIZE: B
DRAWING NO.: WD-001
SHEET 1 OF 1

REDRAWN / REPLACED BY:
REPLACES:

	PREPARED	CHECKED	APPROVED	B	535701	A.s.T.	10-08-'99	-	E				
NAME	H. v. R.			A	11103	H. v. R.	2-5-'85	-	D				
DATE	10-15-'92			REV.	E.C.N.	NAME	DATE	CHECKED	C	600278	A. d. P.	4-23-'91	

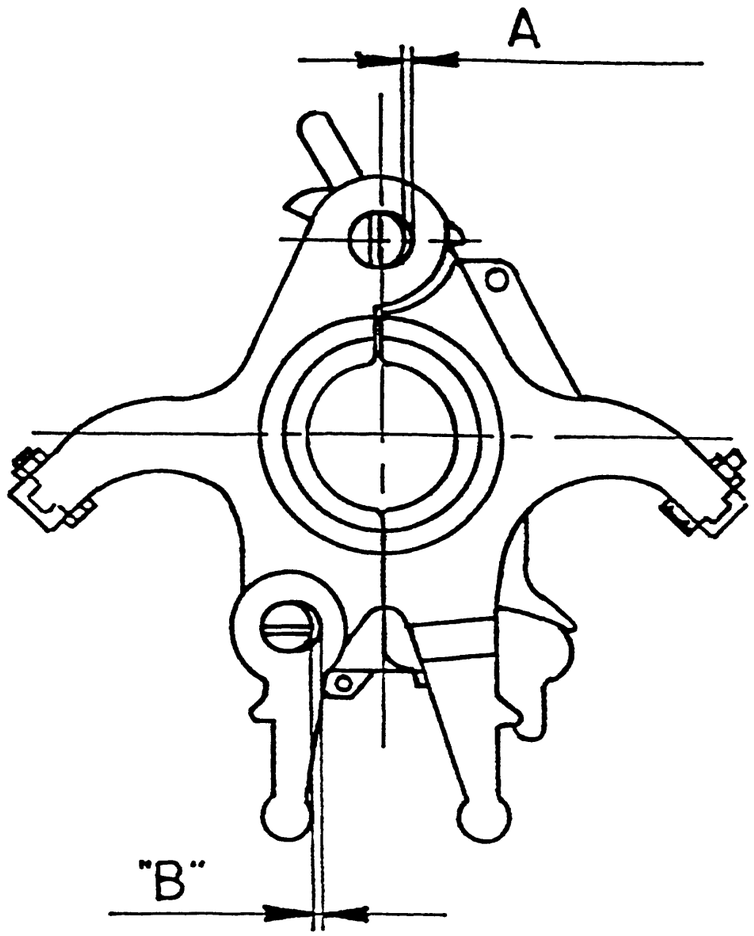
TITLE: MAX. WEAR DATA FOR 18° CENTER LATCH ELEV. TO MAINTAIN 100% RATING

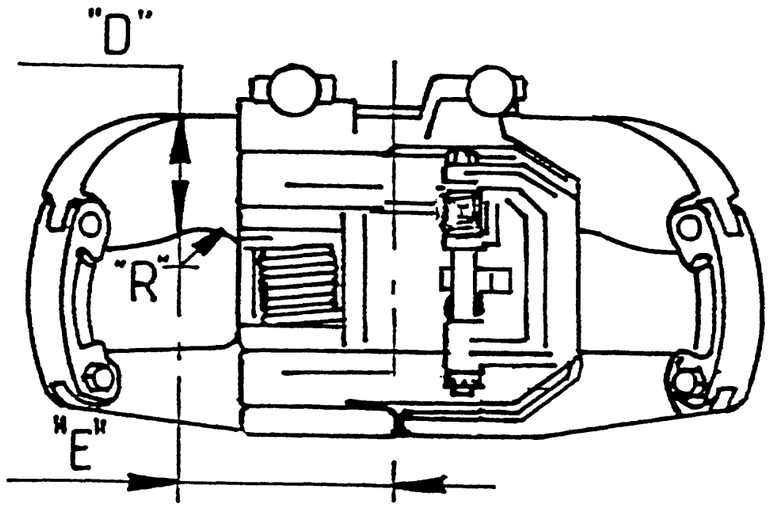
Varco. B.J.

ETEH-LEUR, THE NETHERLANDS

DRAWING NO. B-WD-010

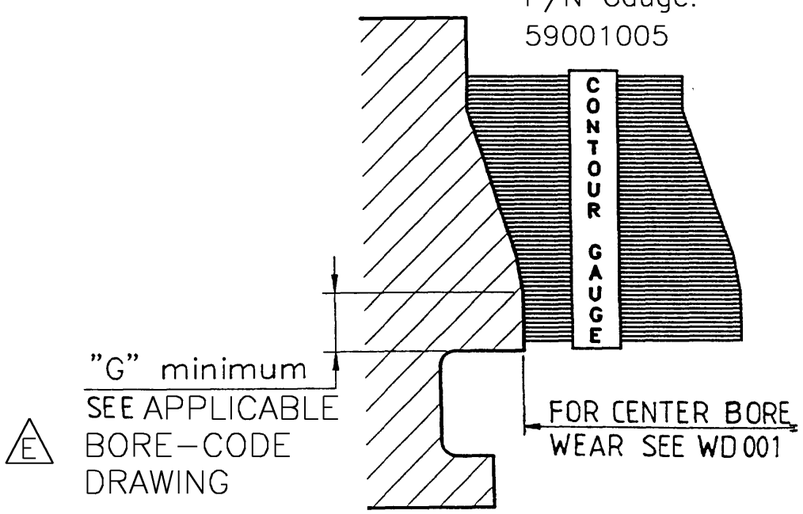
	ELEVATOR TYPE	GG	GG–AO	MGG	MGG	MGG–AO	HGG	HGG–AO	MG	RG	RG	RG	RGG
	RATED CAPACITY	350 TONS	350 TONS	175 TONS	250 TONS	250 TONS	500 TONS	500 TONS	100 TONS	125 TONS	175 TONS	200 TONS	150 TONS
	PART NO. ASS'Y	31068(–)	35143(–)	13884(–)	35005(–)	36056(–)	70013(–)	70222(–)	30157(–)	30156(–)	23540(–)	23606(–)	200680(–)
	SIZE	4 -- 5-1/2	4 -- 5-1/2	2-3/8 -- 3-1/2	3-1/2 -- 5-1/2	3-1/2 -- 5-1/2	4 -- 6-5/8	4 -- 6-5/8	2-3/8 -- 5	2-3/8 -- 3-1/2	4 -- 4-1/2	5 -- 5-1/2	2-3/8--3-1/2
													B
STANDARD PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	33998	35141	13888	34908	36058	30553	70217	26813	23569	23545	23609	200683
	TOTAL CLEARANCE "A"	0.045	0.045	0.030	0.030	0.030	0.045	0.045	0.030	0.030	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	2.494	2.494	1.870	2.307	2.307	3.243	3.243	1.495	1.745	1.994	2.119	1.870
	BORE DIA. NEW MAX.	2.502	2.502	1.877	2.315	2.315	3.252	3.252	1.502	1.752	2.002	2.127	1.877
	BORE DIA. WORN MAX.	2.525	2.525	1.895	2.333	2.333	3.275	3.275	1.520	1.770	2.020	2.145	1.895
	LATCH PIN SIDE												
	LATCH PIN PART. NO.	33999	33999	13154	34907	34907	30613	30613	26814	23544	24045	24045	200684
	TOTAL CLEARANCE "B"	0.035	0.035	0.030	0.030	0.030	0.045	0.045	0.030	0.030	0.030	0.030	0.030
	LATCH PIN DIA. NEW MIN.	1.870	1.870	1.495	1.682	1.682	2.244	2.244	1.120	1.245	1.495	1.495	1.495
	BORE DIA. NEW MAX.	1.877	1.877	1.502	1.689	1.689	2.252	2.252	1.127	1.252	1.502	1.502	1.502
	BORE DIA. WORN MAX.	1.895	1.895	1.520	1.708	1.708	2.275	2.275	1.145	1.270	1.520	1.520	1.520
1/16 OVERSIZE PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	33998–06	35141–06	13888–06	34908–06	36058–06	30553–06	70217–06	26813–06	23569–06	23545–06	23609–06	200683–06
	TOTAL CLEARANCE "A"	0.045	0.045	0.030	0.030	0.030	0.045	0.045	0.030	0.030	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	2.557	2.557	1.933	2.370	2.370	3.306	3.306	1.558	1.807	2.057	2.182	1.933
	BORE DIA. NEW MAX.	2.565	2.565	1.940	2.378	2.378	3.315	3.315	1.565	1.814	2.065	2.190	1.940
	BORE DIA. WORN MAX.	2.588	2.588	1.958	2.396	2.396	3.338	3.338	1.583	1.833	2.083	2.208	1.958
	LATCH PIN SIDE												
	LATCH PIN PART. NO.	33999–06	33999–06	13154–06	34907–06	34907–06	30613–06	30613–06	26814–06	23544–06	24045–06	24045–06	200684–06
	TOTAL CLEARANCE "B"	0.035	0.035	0.030	0.030	0.030	0.045	0.045	0.030	0.030	0.030	0.030	0.030
	LATCH PIN DIA. NEW MIN.	1.933	1.933	1.558	1.745	1.745	2.307	2.307	1.183	1.308	1.558	1.558	1.558
	BORE DIA. NEW MAX.	1.940	1.940	1.565	1.752	1.752	2.315	2.315	1.190	1.315	1.565	1.565	1.565
	BORE DIA. WORN MAX.	1.958	1.958	1.583	1.770	1.770	2.338	2.338	1.208	1.333	1.583	1.583	1.583
1/8 OVERSIZE PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	33998–12	35141–12	13888–12	34908–12	36058–12	30553–12	70217–12	26813–12	23569–12	23545–12	23609–12	200683–12
	TOTAL CLEARANCE "A"	0.045	0.045	0.030	0.030	0.030	0.045	0.045	0.030	0.030	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	2.619	2.619	1.994	2.432	2.432	3.368	3.368	1.620	1.870	2.119	2.244	1.994
	BORE DIA. NEW MAX.	2.627	2.627 B	2.002	2.440	2.440	3.377	3.377	1.627	1.877	2.127	2.252	2.002
	BORE DIA. WORN MAX.	2.650	2.650 B	2.020	2.458	2.458	3.400	3.400	1.645	1.895	2.045	2.270	2.020
	LATCH PIN SIDE												
	LATCH PIN PART. NO.	33999–12	33999–12		34907–12	34907–12	30613–12	30613–12	26814–12				
	TOTAL CLEARANCE "B"	0.035	0.035		0.030	0.030	0.045	0.045	0.030				
	LATCH PIN DIA. NEW MIN.	1.994	1.994		1.807	1.807	2.369	2.369	1.245				
	BORE DIA. NEW MAX.	2.002	2.002		1.814	1.814	2.377	2.377	1.252				
	BORE DIA. WORN MAX.	2.020	2.020		1.832	1.832	2.400	2.400	1.270				
EARS	DIMENSION "D" MIN.	4.50	4.50	3.00	4.25	4.25	5.75	5.75	3.75	4.00 C	4.00	4.00	3.625 C
	RADIUS "R" *	1.875	1.875	2.00	1.875	1.875	2.50	2.50	1.50	1.625	1.625	1.625	2.00
	DIMENSION "E" *	7.375	7.375	6.25	6.813	6.813	8.625	8.625	5.00	5.125	5.625	6.625	6.25
	* = PLACE WHERE "D" IS TO BE MEASURED. (SEE SHEET 2)												





- MINIMUM BORE TAPER ANGLE IS 16°.
- ALLOWABLE LATCH LOCK PIN CLEARANCE WILL BE DETERMINED BY FUNCTIONING.

P/N Gauge:
59001005



MEASURE THE ACTUAL BORE TAPER ANGLE WITH A CONTOUR GAUGE IN SEVERAL AREAS AROUND THE ELEVATOR BORE AND SUPERIMPOSE THE ACTUAL PATTERN OF THE ELEVATOR BORE ONTO THE INSPEC-TION SHEET WD 011.

ORIGINAL

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGELS ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250

	NAME	DATE	PROJ.
PREPARED	H.v.R.	10-15-'92	
CHECKED		2-25-'93	SCALE NONE
APPROVED		21APR93	UNITS INCH (MM)

MATERIAL —
WEIGHT - LBS/ - KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E	00011747	N.U.	16/1/13	
D	701889	N.U.	4/14/11	
C	600278	A.d.P.	4/24/01	
B	535701	A.v.T.	10-08-98	C.D.
A	11103	H. V.R.	2-5-'93	

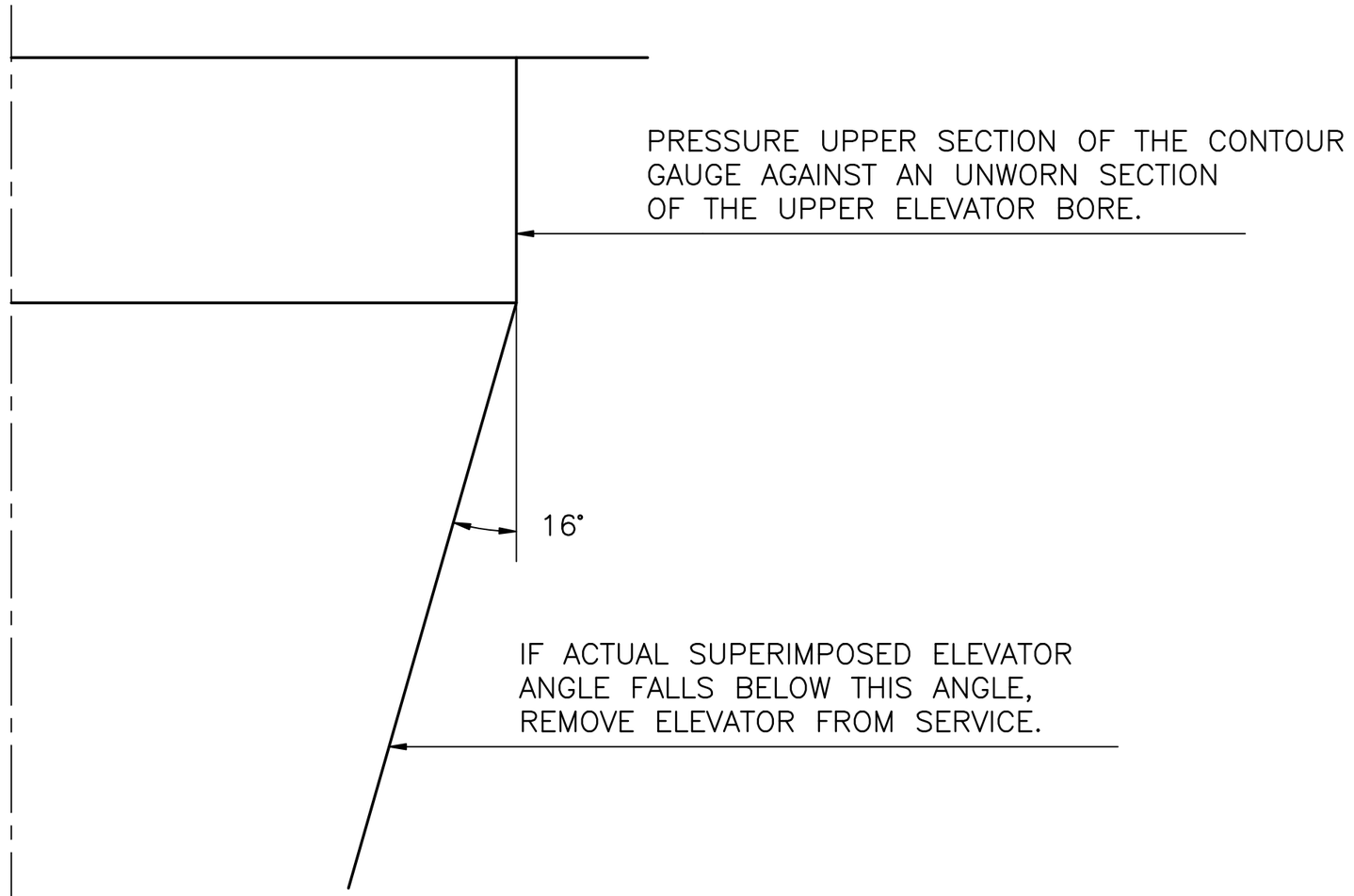
ACAD FILE NO. : WDB010B.DWG

TITLE: MAX. WEAR DATA FOR 18° CENTER LATCH ELEVATORS TO MAINTAIN 100% RATING

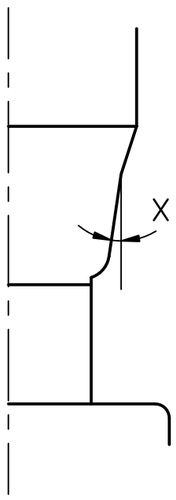
SIZE B | DRAWING NO. WD-010 | SHEET 2 OF 2

REDRAWN / REPLACED BY:

REPLACES:



JOB No.	
ID Nos.	
INSPECTOR	
DATE	



NOTE:

IN CASE OF UNDERCUTTING, X IS THE ANGLE TO BE SUPERIMPOSED.

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ OIL TOOLS

ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX € .010
2 PLACE DECIMAL .XX € .03
1 PLACE DECIMAL .X € .1
ANGELS € .5 DEGREE

BREAK SHARP CORNERS .010 € .005

MACHINED SURFACES 250

	NAME	DATE	PROJ.	MATERIAL
PREPARED	H.v.R.	11-25-'92		
CHECKED			SCALE 1 : 1	
APPROVED			UNITS INCH (MM)	WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	11103	H.v.R.	2-5-'93	

ACAD FILE NO. : WDB011.DWG

TITLE INSPECTION SHEET
18° TAPERED BORE

SIZE B

DRAWING NO. WD-011

SHEET 1 OF 1

REDRAWN / REPLACED BY:

REPLACES:

	PREPARED	CHECKED	APPROVED	B	11192	R.M.	12-3-'93		E				
NAME	A.KRIJNEN			A	11103	A.KRIJNEN	2-5-'93	-	D				
DATE	10-28-'92			REV.	E.C.N.	NAME	DATE	CHECKED	C	535801	7 DEC 93	W.B.	

TITLE

MAX. WEAR DATA FOR VARCO BJ TA AND RA ELEV. TO MAINTAIN 100% RATING

Varco BJ
EINDHOVEN, THE NETHERLANDS

DRAWING NO. B-WD-050

SHEET 1 OF 2

	ELEVATOR TYPE	RA				TA		TA			TA		TA
	RATED CAPACITY	125 TONS	150 TONS	175 TONS	175 TONS	150 TONS	150 TONS	100 TONS	100 TONS	100 TONS	65 TONS	65 TONS	35 TONS
	PART NO. ASS'Y	25462(–)	25459(–)	25456(–)	25453(–)	32754(–)	39342(–)	32383(–)	32384(–)	200000	32385(–)	32386(–)	32387(–)
	SIZE	2-3/8 -- 3-1/2	4 -- 4-1/2	4-1/2 -- 5-1/2	6-5/8 -- 7	4-1/2 -- 8-5/8	8-1/2 -- 11-1/4	2-3/8 -- 2-7/8	3-1/2 -- 5	4-3/4 -- 8-5/8	1.660 -- 2-7/8	3-1/2 -- 4-1/2	1.050 -- 2-7/8
STANDARD PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	5251–1	12704–1	25590	25590	32924	32924	32915	32919	32919	32916	32915	32917
	TOTAL CLEARANCE "A"	0.030	0.030	0.030	0.030	0.035	0.035	0.030	0.035	0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	1.245	1.495	1.621	1.621	2.369	2.369	1.745	1.933	1.933	1.620	1.745	1.245
	BORE DIA. NEW MAX.	1.252	1.502	1.627	1.627	2.377	2.377	1.752	1.940	1.940	1.627	1.752	1.252
	BORE DIA. WORN MAX.	1.270	1.520	1.645	1.645	2.395	2.395	1.770	1.958	1.958	1.645	1.770	1.270
	LATCH PIN SIDE												
	LATCH PIN PART. NO.	5389–1	5445–1	5470–1	5470–1	32762	32762	50713	32424–1	200004	32424–3	50713	32424–4
	TOTAL CLEARANCE "B"	0.035	0.035	0.035	0.035	0.035	0.035	0.030	0.030	0.035	0.030	0.030 ⚠88	0.030
	LATCH PIN DIA. NEW MIN.	0.996	1.121	1.121	1.121	1.120	1.120	0.746	0.745	1.121	0.746	0.746	0.622
	BORE DIA. NEW MAX.	1.002	1.127	1.127	1.127	1.127	1.127	0.752	0.752	1.127	0.752	0.752	0.626
	BORE DIA. WORN MAX.	1.020	1.145	1.145	1.145	1.145	1.145	0.770	0.770	1.145	0.770	0.770	0.645
1/16 OVERSIZED PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	5251–1–06	12704–1–06			32924–06	32924–06	32915–06	32919–06	32919–06	32916–06	32915–06	32917–06
	TOTAL CLEARANCE "A"	0.030	0.030			0.035	0.035	0.030	0.035	0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	1.307	1.557			2.432	2.432	1.808	1.994	1.994	1.683	1.808	1.307
	BORE DIA. NEW MAX.	1.315	1.565			2.440	2.440	1.815	2.002	2.002	1.690	1.815	1.315
	BORE DIA. WORN MAX.	1.333	1.583			2.458	2.458	1.833	2.020	2.020	1.708	1.833	1.333
	LATCH PIN SIDE								⚠82		⚠83	⚠84	⚠85
	LATCH PIN PART. NO.		5445–1–06			32762–06	32762–06	50713–06	32424–106	200004–06	32424–306	50713–06	32424–406
	TOTAL CLEARANCE "B"		0.035			0.035	0.035	0.030	0.030	0.035	0.030	0.030	0.030
	LATCH PIN DIA. NEW MIN.		1.183			1.183	1.183	0.808	0.808	1.183	0.809	0.808	0.684
	BORE DIA. NEW MAX.		1.190			1.190	1.190	0.815	0.815	1.190	0.815	0.815	0.689
	BORE DIA. WORN MAX.		1.208			1.208	1.208	0.833	0.833	1.208	0.833	0.833	0.707
1/8 OVERSIZED PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	5251–1–12	12704–1–12			32924–12	32924–12	32915–12		32919–12	32916–12	32915–12	32912–12
	TOTAL CLEARANCE "A"	0.030	0.030			0.035	0.035	0.030		0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	1.370	1.621			2.494	2.494	1.870		2.056	1.745	1.870	1.370
	BORE DIA. NEW MAX.	1.377	1.627			2.502	2.502	1.877		2.065	1.752	1.877	1.377
	BORE DIA. WORN MAX.	1.395	1.645			2.520	2.520	1.895		2.083	1.770	1.895	1.395
	LATCH PIN SIDE												
	LATCH PIN PART. NO.		5445–1–12		⚠81 TA AIR OPERATED 150 TON								
	TOTAL CLEARANCE "B"		0.045		HINGE PIN PART NO. 36310, 36310–06, 36310–12								
	LATCH PIN DIA. NEW MIN.		1.245		FOR SIZES SEE								
	BORE DIA. NEW MAX.		1.252		TA 150 MANUAL ELEVATORS								
	BORE DIA. WORN MAX.		1.270										
EARS	DIMENSION "D" MIN.	3.25	4.00	4.25	4.25	3.50	3.50	2.32	2.32	2.40	2.00	2.00	1.32
	RADIUS "R"	1.50	1.50	1.63	1.63	2.00	2.00	1.63	1.63	1.63	1.63	1.63	1.00
	DIMENSION "E"	3.94	4.50	5.19	5.88	7.19	9.00	4.25	5.13	7	4.25	5.00	3.25

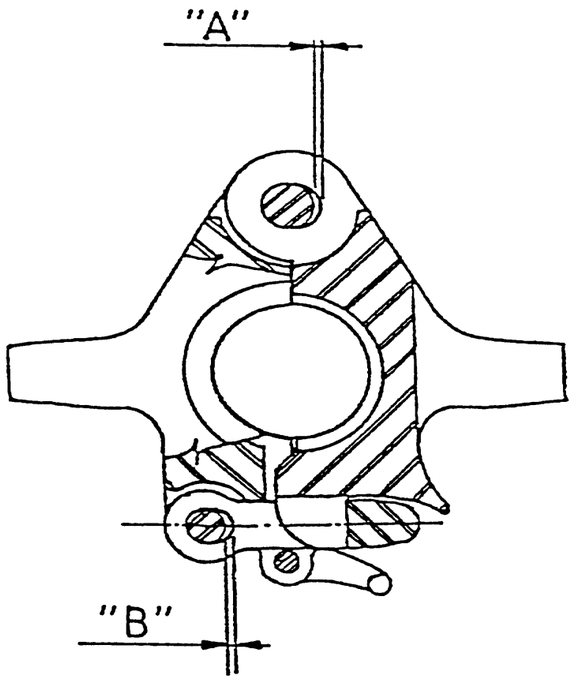
* PLACE WHERE "D" IS TO E MEASURED (SEE WD 050 SH 2 OF 2).

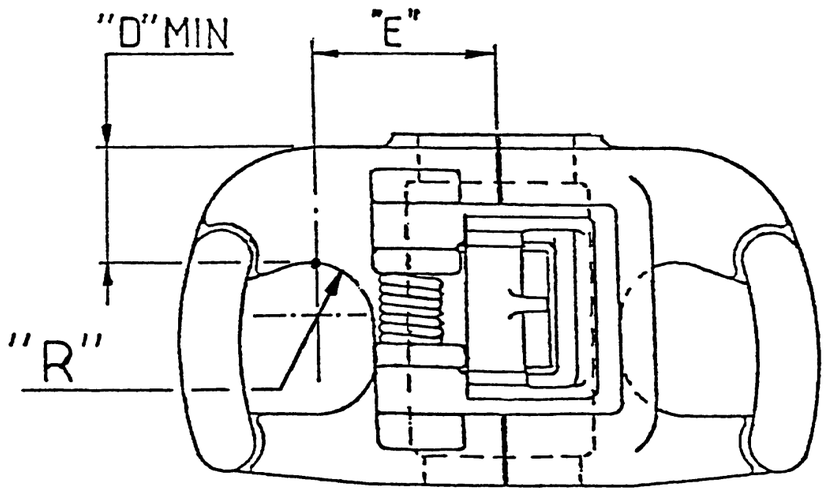
ACAD FILE NO. WDB050A

ORIGINAL

PART NUMBER
WDB050B

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION





– ALLOWABLE LATCH LOCK PIN CLEARANCE WILL BE DETERMINED BY FUNCTIONING.

ORIGINAL

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco® BJ™
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGELS ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250

	NAME	DATE
PREPARED	A. KRIJNEN	10-28-'92
CHECKED	A. Krijnen	2-25-'93
APPROVED	[illegible]	21 MAR 93

PROJ.
MATERIAL
SCALE NONE
UNITS INCH (MM)
WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C	535801	W.B.	7 DEC 98	F.S.
B	11192	A.d.P	1-12-'93	[illegible]
A	11103	A. KRIJNEN	2-5-'93	A. Krijnen

ACAD FILE NO. : WDB050B

TITLE: MAX. WEAR DATA FOR VARCO BJ TA AND RA ELEV. TO MAINTAIN 100% RATING

SIZE B | DRAWING NO. WD-050 | SHEET 2 OF 2

REDRAWN / REPLACED BY:

REPLACES:

	PREPARED	CHECKED	APPROVED	B					E
NAME	R.M.			A	11192	R.M.	12-3-'93		D
DATE	12-3-'93			REV.	E.C.N.	NAME	DATE	CHECKED	C

TITLE

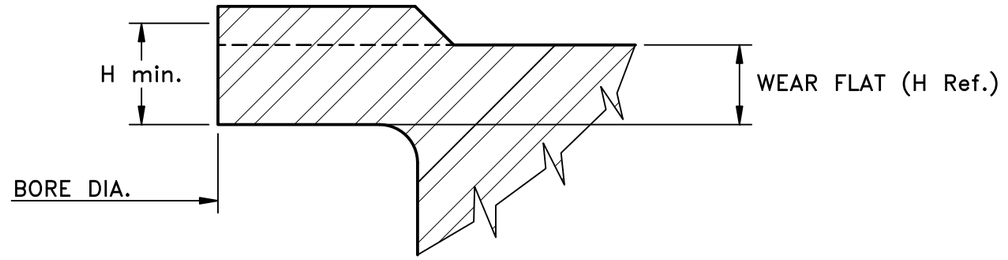
MAX. COLLAR WEAR DATA VARCO BJ A-TYPE ELEV. TO MAINTAIN 100% RATING

Varco. BJ. OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

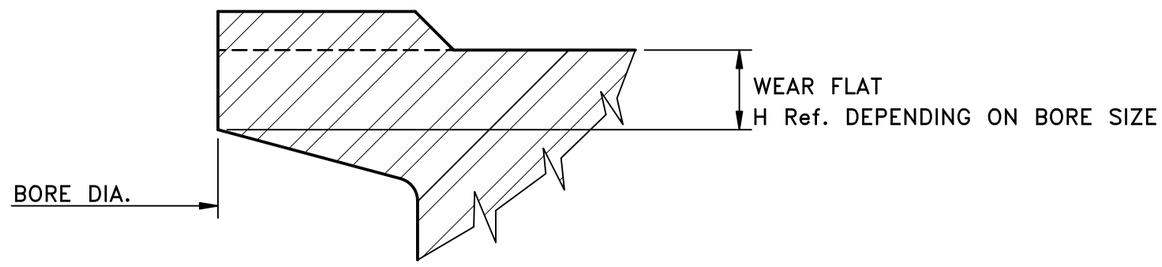
DRAWING NO. B-WD-051

SHEET 1 OF 1

ELEVATOR TYPE	RA				TA		TA			TA		TA	
RATED CAPACITY	125 TONS	150 TONS	175 TONS	175 TONS	150 TONS	150 TONS	100 TONS	100 TONS	100 TONS	65 TONS	65 TONS	35 TONS	
PART NO. ASS'Y	25462(–)	25459(–)	25456(–)	25453(–)	32754(–)	39342(–)	32383(–)	32384(–)	200000	32385(–)	32386(–)	32387(–)	
SIZE	2-3/8 -- 3-1/2	4 -- 4-1/2	4-1/2 -- 5-1/2	6-5/8 -- 7	4-1/2 -- 8-5/8	8-1/2 -- 11-1/4	2-3/8 -- 2-7/8	3-1/2 -- 5	4-3/4 -- 8-5/8	1.660 -- 2-7/8	3-1/2 -- 4-1/2	1.050 -- 2-7/8	
BORE SIZE	< 3–1/2	ALL	ALL	ALL	ALL	ALL	≤ 2–5/8	< 4	ALL	< 1–3/4	ALL		
H min. (Ref.)	1 5/8	FLAT(1–7/8)	FLAT(1–3/4)	FLAT(1–3/4)	FLAT	FLAT	1–3/8	1–5/16	FLAT	1–3/16	FLAT(1–1/4)		
BORE SIZE	≥ 3–1/2						> 2–5/8	≥ 4		≥ 1–3/4			
H min. (Ref.)	1 3/8						FLAT(1–1/4)	FLAT(1–1/4)		FLAT(1–1/4)			



TA 35, 65, 100 TON ELEVATOR



TA 150 TON ELEVATOR

ACAD FILE NO. WDB051

	PREPARED	CHECKED	APPROVED										
NAME	D.M.	A.K.	C.Q.	B	11192	A.d.P.	1-5-'94	C.Q.	E				
				A	11103	D.M.	2-5-'93	C.Q.	D	600278	A.d.P.	04-24-'91	
DATE	2-12-'93	2-25-'93	5-21-'93	REV.	E.C.N.	NAME	DATE	CHECKED	C	575401	C.D.	05-10-'89	J.v.B.

TITLE: MAX. WEAR DATA FOR SLIP ELEVATORS TO MAINTAIN 100% RATING

Varco. B.J.
ETTEN-LEUR, THE NETHERLANDS

DRAWING NO. B-WD-060

SHEET 1 OF 2

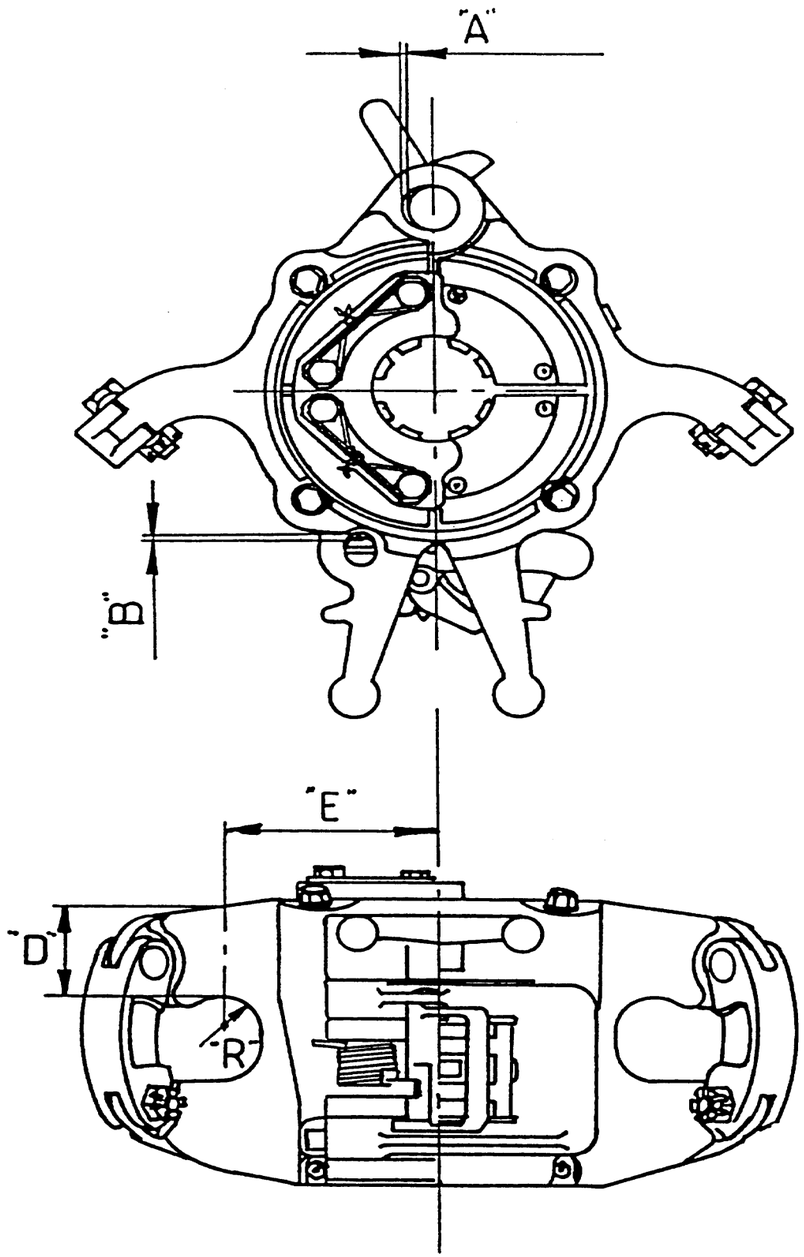
	ELEVATOR TYPE								
	RATED CAPACITY	LYT	MYT	YT	HYT	YC	MYC	HYC	HYC. AIR
	PART NO. ASS'Y	20 TONS	40 TONS	75 TONS	150 TONS	75 TONS	125 TONS	200 TONS	200 TONS
		28750	29328	55600	39284	24140 B1	200360	55310	70166
STANDARD PINS	HINGE PIN SIDE								
	HINGE PIN PART. NO.	28753	29333	23116-1	39239	24181	200364	55311	70180
	TOTAL CLEARANCE "A"	0.025	0.025	0.030	0.035	0.035	0.040	0.045	0.045
	HINGE PIN MIN. DIA. NEW	0.996	1.245	1.620	1.994	1.745	2.369	2.869	2.869
	MAX. BORE DIA. NEW	1.002	1.252	1.627	2.002	1.752	2.377	2.878	2.878
	BORE DIA. WORN MAX.	1.015	1.265	1.645	2.020	1.770	2.400	2.900	2.900
	LATCH PIN SIDE								
	LATCH PIN PART. NO.	28757	29334	24182	39238	24182	200365	55312	55312
	TOTAL CLEARANCE "B"	0.025	0.025	0.030	0.035	0.035	0.035	0.045	0.045
	LATCH PIN MIN. DIA. NEW	0.622	0.933	1.370	1.745	1.370	1.620	1.745	1.745
	MAX. BORE DIA. NEW	0.627	0.940	1.377	1.752	1.377	1.627	1.752	1.752
	BORE DIA. WORN MAX.	0.640	0.953	1.395	1.770	1.395	1.645	1.775	1.775
1/16 OVERSIZED PINS	HINGE PIN SIDE								
	HINGE PIN PART. NO.	28753-06	29333-06 D		39239-06	24181-06	200364-06	55311-06	70180-06
	TOTAL CLEARANCE "A"	0.025	0.025		0.035	0.035	0.040	0.045	0.045
	HINGE PIN MIN. DIA. NEW	1.059	1.308		2.056	1.807	2.432	2.931	2.931
	MAX. BORE DIA. NEW	1.065	1.315		2.065	1.815	2.440	2.940	2.940
	BORE DIA. WORN MAX.	1.078	1.328		2.083	1.833	2.463	2.963	2.963
	LATCH PIN SIDE								
	LATCH PIN PART. NO.	28757-06		24182-06		24182-06	200365-06	55312-06	55312-06
	TOTAL CLEARANCE "B"	0.025		0.030		0.035	0.035	0.045	0.045
	LATCH PIN MIN. DIA. NEW	0.684		1.432		1.432	1.683	1.807	1.807
	MAX. BORE DIA. NEW	0.690		1.440		1.440	1.690	1.814	1.814 C1
	BORE DIA. WORN MAX.	0.703		1.458		1.458	1.708	1.837	1.837
1/8 OVERSIZED PINS	HINGE PIN SIDE								
	HINGE PIN PART. NO.		29333-12 D		39239-12	24181-12	200364-12	55311-12	70180-12
	TOTAL CLEARANCE "A"		0.025		0.035	0.035	0.040	0.045	0.045
	HINGE PIN MIN. DIA. NEW		1.370		2.119	1.870	2.494	2.994	2.994
	MAX. BORE DIA. NEW		1.377		2.127	1.878	2.502	3.002	3.002
	BORE DIA. WORN MAX.		1.390		2.145	1.895	2.525	3.025	3.025
	LATCH PIN SIDE								
	LATCH PIN PART. NO.						200365-12	55312-12	55312-12
	TOTAL CLEARANCE "B"						0.035	0.045	0.045
	LATCH PIN MIN. DIA. NEW						1.745	1.870	1.870
	MAX. BORE DIA. NEW						1.752	1.877	1.877 C2
	BORE DIA. WORN MAX.						1.770	1.900	1.900
EARS	DIMENSION "D" MIN.	1.438	2.188	3.31	3.625	3.25	3.80	3.625	3.625
	MEASURE POINT DIM "D" *	4.00	5.25	6.50	8.688	8.50	9.375	11.063	11.063
	"R" *	1.50	1.50	1.50	2.00	1.50	1.625	2.00	2.00

* PLACE WHERE "D" IS TO BE MEASURED (SEE WD 060 SH 2 OF 2).

ORIGINAL

PART NUMBER
WD 060

ITEM	QTY	DWG. SIZE	PART NUMBER	DESCRIPTION



ORIGINAL

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGELS ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250

	NAME	DATE
PREPARED	R.J. V.	10-16-'92
CHECKED		2-25-'93
APPROVED		2-25-'93

PROJ.
SCALE 1 : 1
UNITS INCH (MM)
MATERIAL
WEIGHT LBS/ KG

REV.		F.C.N.	NAME	DATE	CHECKED
M					
L					
K					
J					
H					
G					
F					
E					
D		600278	A.d.P.	4/24/01	
C		575401	C.D.	05-10-'99	J.v.B.
B		11192	A.d.P.	1-5-'94	
A		11103	R.J. V.	2-5-'93	

ACAD FILE NO. : WDB060B.DWG

TITLE: MAX. WEAR DATA FOR SLIP TYPE ELEVATOR TO MAINTAIN 100% RATING

SIZE B | DRAWING NO. WD-060 | SHEET 2 OF 2

REDRAWN / REPLACED BY:

REPLACES:

	PREPARED	CHECKED	APPROVED	B	11192	R.M.	12-3-'93		E
NAME	A.KRIJNEN			A	11103	A.KRIJNEN	2-5-'93	-	D
DATE	10-28-'92			REV.	E.C.N.	NAME	DATE	CHECKED	C

535801 7 DEC 98 W.B.

TITLE

MAX. WEAR DATA FOR VARCO BJ MAA AND AA ELEV. TO MAINTAIN 100% RATING

Varco BJ
EINDHOVEN, THE NETHERLANDS

DRAWING NO. B-WD-080

SHEET 1 OF 2

	ELEVATOR TYPE	MAA				TA		TA			TA		TA
	RATED CAPACITY	175 TONS	225 TONS	250 TONS	175 TONS	150 TONS	150 TONS	100 TONS	100 TONS	100 TONS	65 TONS	65 TONS	35 TONS
	PART NO. ASS'Y	12526(–)	12713(–)	13373(–)	25453(–)	32754(–)	39342(–)	32383(–)	32384(–)	200000	32385(–)	32386(–)	32387(–)
	SIZE	2-3/8 -- 3-1/2	4 -- 4-1/2	5 -- 7	6-5/8 -- 7	4-1/2 -- 8-5/8	8-1/2 -- 11-1/4	2-3/8 -- 2-7/8	3-1/2 -- 5	4-3/4 -- 8-5/8	1.660 -- 2-7/8	3-1/2 -- 4-1/2	1.050 -- 2-7/8
STANDARD PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	12704	8035	13376	25590	32924	32924	32915	32919	32919	32916	32915	32917
	TOTAL CLEARANCE "A"	0.030	0.030	0.030	0.030	0.035	0.035	0.030	0.035	0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	1.495	1.493	1.745	1.621	2.369	2.369	1.745	1.933	1.933	1.620	1.745	1.245
	BORE DIA. NEW MAX.	1.503	1.503	1.753	1.627	2.377	2.377	1.752	1.940	1.940	1.627	1.752	1.252
	BORE DIA. WORN MAX.	1.520	1.520	1.770	1.645	2.395	2.395	1.770	1.958	1.958	1.645	1.770	1.270
	LATCH PIN SIDE												
	LATCH PIN PART. NO.	11758	11758	12980	5470–1	32762	32762	50713	32424–1	200004	32424–3	50713	32424–4
	TOTAL CLEARANCE "B"	0.035	0.035	0.035	0.035	0.035	0.035	0.030	0.030	0.035	0.030	0.030 ⚠ 80	0.030
	LATCH PIN DIA. NEW MIN.	1.121	1.121	1.370	1.121	1.120	1.120	0.746	0.745	1.121	0.746	0.746	0.622
	BORE DIA. NEW MAX.	1.127	1.127	1.378	1.127	1.127	1.127	0.752	0.752	1.127	0.752	0.752	0.626
	BORE DIA. WORN MAX.	1.145	1.145	1.395	1.145	1.145	1.145	0.770	0.770	1.145	0.770	0.770	0.645
1/16 OVERSIZED PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.	12704–06	8035–06	13376–06		32924–06	32924–06	32915–06	32919–06	32919–06	32916–06	32915–06	32917–06
	TOTAL CLEARANCE "A"	0.030	0.030	0.030		0.035	0.035	0.030	0.035	0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.	1.558	1.558	1.808		2.432	2.432	1.808	1.994	1.994	1.683	1.808	1.307
	BORE DIA. NEW MAX.	1.566	1.565	1.816		2.440	2.440	1.815	2.002	2.002	1.690	1.815	1.315
	BORE DIA. WORN MAX.	1.583	1.583	1.833		2.458	2.458	1.833	2.020	2.020	1.708	1.833	1.333
	LATCH PIN SIDE								⚠ 82		⚠ 83	⚠ 84	⚠ 85
	LATCH PIN PART. NO.	11758–06	11758–06	12980–06		32762–06	32762–06	50713–06	32424–106	200004–06	32424–306	50713–06	32424–406
	TOTAL CLEARANCE "B"	0.035	0.035	0.035		0.035	0.035	0.030	0.030	0.035	0.030	0.030	0.030
	LATCH PIN DIA. NEW MIN.	1.183	1.183	1.433		1.183	1.183	0.808	0.808	1.183	0.809	0.808	0.684
	BORE DIA. NEW MAX.	1.189	1.189	1.441		1.190	1.190	0.815	0.815	1.190	0.815	0.815	0.689
	BORE DIA. WORN MAX.	1.208	1.208	1.458		1.208	1.208	0.833	0.833	1.208	0.833	0.833	0.707
1/8 OVERSIZED PINS	HINGE PIN SIDE												
	HINGE PIN PART. NO.		8035–12	13376–12		32924–12	32924–12	32915–12		32919–12	32916–12	32915–12	32912–12
	TOTAL CLEARANCE "A"		0.030	0.030		0.035	0.035	0.030		0.035	0.030	0.030	0.030
	HINGE PIN DIA. NEW MIN.		1.618	1.870		2.494	2.494	1.870		2.056	1.745	1.870	1.370
	BORE DIA. NEW MAX.		1.627	1.878		2.502	2.502	1.877		2.065	1.752	1.877	1.377
	BORE DIA. WORN MAX.		1.645	1.895		2.520	2.520	1.895		2.083	1.770	1.895	1.395
	LATCH PIN SIDE												
	LATCH PIN PART. NO.		5445–1–12	12980–12									
	TOTAL CLEARANCE "B"		0.045	0.035									
	LATCH PIN DIA. NEW MIN.		1.245	1.495									
	BORE DIA. NEW MAX.		1.252	1.503									
	BORE DIA. WORN MAX.		1.270	1.520									
EARS	DIMENSION "D" MIN.	3.675	4.00	4.125	4.25	3.50	3.50	2.32	2.32	2.40	2.00	2.00	1.32
	RADIUS "R"	2	2	2	1.63	2.00	2.00	1.63	1.63	1.63	1.63	1.63	1.00
	DIMENSION "E"	4.75	5	6.5	5.88	7.19	9.00	4.25	5.13	7	4.25	5.00	3.25

* PLACE WHERE "D" IS TO E MEASURED (SEE WD 080 SH 2 OF 2),HIGH POINT OF RADIUS.

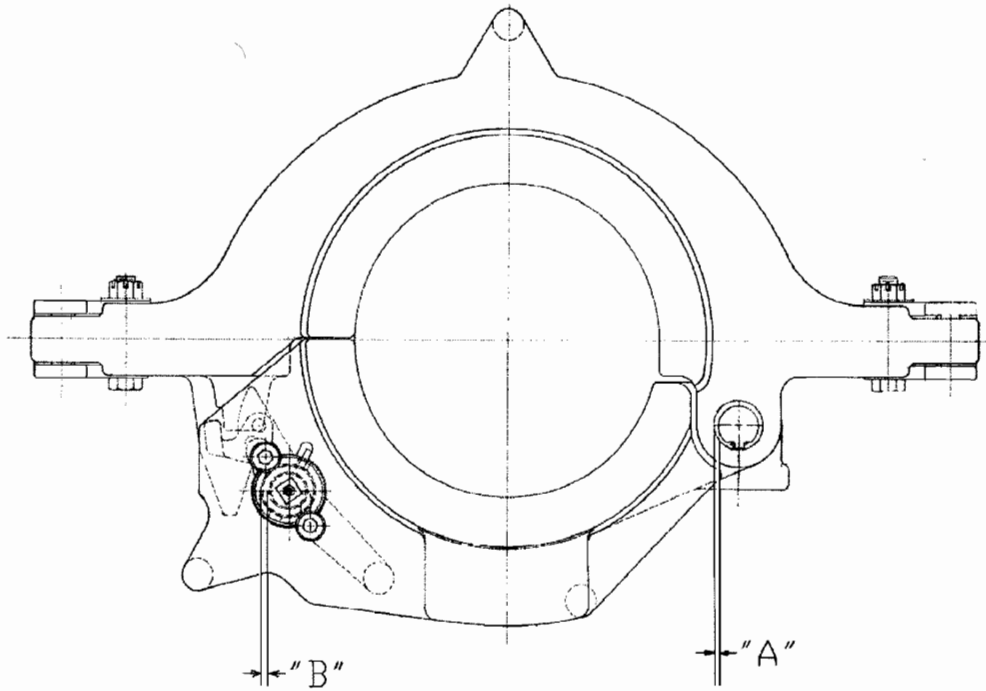
	PREPARED	CHECKED	APPROVED	REV					
NAME	E. de Post			A				-	D
DATE	12-8-'15			REV.	C.E.N.	NAME	DATE	CHECKED	C

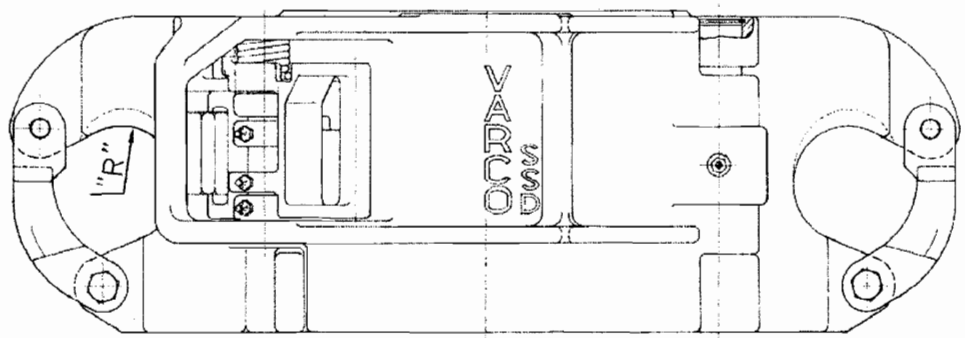
TITLE

MAX. WEAR DATA FOR VARCO SSD ELEV. TO MAINTAIN 100% RATING

NOV
NATIONAL OILWELL VARCO

DRAWING NO. B-WD-080



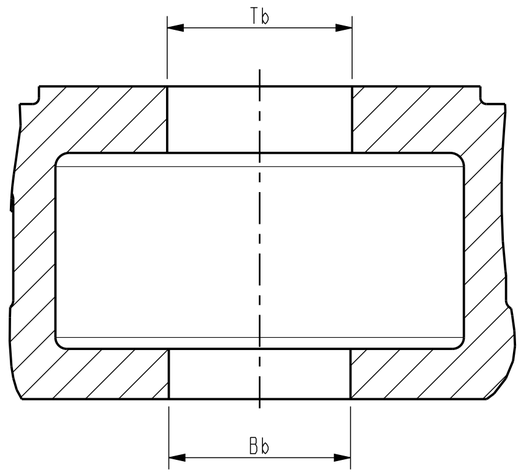


TABULATED CASING BORE DATA

CASING SIZE		BORE CODE	TOP BORE (Tb)		BOTTOM BORE (Bb)		MARK ELEVATOR
INCH	MM		INCH	MM	INCH	MM	
4.1/2"	114.30	129	4.604"	116.94	4.604"	116.94	4.1/2" OD CAS.
4.3/4"	120.65	130	4.857"	123.37	4.857"	123.37	4.3/4" OD CAS.
5"	127.00	131	5.111"	129.82	5.111"	129.82	5" OD CAS.
5.1/8"	130.18	482	5.237"	133.02	5.237"	133.02	5.1/8" OD CAS.
5.1/4"	133.35	919	5.364"	136.25	5.364"	136.25	5.1/4" OD CAS.
5.1/2"	139.70	132	5.617"	142.68	5.617"	142.68	5.1/2" OD CAS.
5.3/4"	146.05	133	5.870"	149.10	5.870"	149.10	5.3/4" OD CAS.
5.7/8"	149.23	889	5.996"	152.30	5.996"	152.30	5.7/8" OD CAS.
6"	152.40	134	6.123"	155.52	6.123"	155.52	6" OD CAS.
6.1/4"	158.75	505	6.376"	161.95	6.376"	161.95	6.1/4" OD CAS.
6.1/2"	165.10	486	6.629"	168.38	6.629"	168.38	6.1/2" OD CAS.
6.5/8"	168.28	135	6.756"	171.60	6.756"	171.60	6.5/8" OD CAS.
6.3/4"	171.45	920	6.882"	174.80	6.882"	174.80	6.3/4" OD CAS.
6.7/8"	174.63	890	7.009"	178.03	7.009"	178.03	6.7/8" OD CAS.
7"	177.80	136	7.136"	181.25	7.136"	181.25	7" OD CAS.
7.1/4"	184.15	863	7.389"	187.68	7.389"	187.68	7.1/4" OD CAS.
7.1/2"	190.50	888	7.642"	194.11	7.642"	194.11	7.1/2" OD CAS.
7.5/8"	193.68	137	7.768"	197.31	7.768"	197.31	7.5/8" OD CAS.
7.3/4"	196.85	705	7.895"	200.53	7.895"	200.53	7.3/4" OD CAS.
8"	203.20	757	8.148"	206.96	8.148"	206.96	8" OD CAS.
8.1/8"	206.38	697	8.275"	210.19	8.275"	210.19	8.1/8" OD CAS.
8.1/2"	215.90	646	8.654"	219.81	8.654"	219.81	8.1/2" OD CAS.
8.5/8"	219.08	139	8.781"	223.04	8.781"	223.04	8.5/8" OD CAS.
8.3/4"	222.25	804	8.907"	226.24	8.907"	226.24	8.3/4" OD CAS.
8.7/8"	225.43	754	9.034"	229.46	9.034"	229.46	8.7/8" OD CAS.
9"	228.60	140	9.161"	232.69	9.161"	232.69	9" OD CAS.
9.1/8"	231.78	883	9.287"	235.89	9.287"	235.89	9.1/8" OD CAS.
9.3/8"	238.13	865	9.540"	242.32	9.540"	242.32	9.3/8" OD CAS.
9.1/2"	241.30	747	9.667"	245.54	9.667"	245.54	9.1/2" OD CAS.
9.5/8"	244.48	141	9.780"	248.41	9.780"	248.41	9.5/8" OD CAS.
9.3/4"	247.65	769	9.907"	251.64	9.907"	251.64	9.3/4" OD CAS.
9.7/8"	250.83	649	10.033"	254.84	10.033"	254.84	9.7/8" OD CAS.
10"	254.00	471/581/831	10.160"	258.06	10.160"	258.06	10" OD CAS.
10.1/8"	257.18	846	10.287"	261.29	10.287"	261.29	10.1/8" OD CAS.
10.1/4"	260.35	808	10.413"	264.49	10.413"	264.49	10.1/4" OD CAS.
10.5/8"	269.88	453	10.793"	274.14	10.793"	274.14	10.5/8" OD CAS.
10.3/4"	273.05	142	10.919"	277.34	10.919"	277.34	10.3/4" OD CAS.
10.7/8"	276.23	921	11.046"	280.57	11.046"	280.57	10.7/8" OD CAS.
11"	279.40	704	11.173"	283.79	11.173"	283.79	11" OD CAS.
11.5/8"	259.28	586	11.805"	299.85	11.805"	299.85	11.5/8" OD CAS.
11.3/4"	298.45	143	11.932"	303.07	11.932"	303.07	11.3/4" OD CAS.
11.7/8"	301.63	729	12.058"	306.27	12.058"	306.27	11.7/8" OD CAS.
12"	304.80	711	12.185"	309.50	12.185"	309.50	12" OD CAS.
12.1/8"	307.98	758	12.312"	312.72	12.312"	312.72	12.1/8" OD CAS.
12.1/4"	311.15	720	12.438"	315.93	12.438"	315.93	12.1/4" OD CAS.
12.5/8"	320.68	866	12.818"	325.58	12.818"	325.58	12.5/8" OD CAS.
12.3/4"	323.85	345	12.944"	328.78	12.944"	328.78	12.3/4" OD CAS.
12.7/8"	327.03	676	13.058"	331.67	13.058"	331.67	12.7/8" OD CAS.

TABULATED CASING BORE DATA

CASING SIZE		BORE CODE	TOP BORE (Tb)		BOTTOM BORE (Bb)		MARK ELEVATOR
INCH	MM		INCH	MM	INCH	MM	
13"	330.20	809	13.185"	334.90	13.185"	334.90	13" OD CAS.
13.3/8"	339.73	144	13.564"	344.53	13.564"	344.53	13.3/8" OD CAS.
13.1/2"	342.90	616/856	13.691"	347.75	13.691"	347.75	13.1/2" OD CAS.
13.5/8"	346.08	596	13.817"	350.95	13.817"	350.95	13.5/8" OD CAS.
13.7/8"	352.43	944	14.070"	357.38	14.070"	357.38	13.7/8" OD CAS.
14"	355.60	690	14.197"	360.60	14.197"	360.60	14" OD CAS.
14.1/2"	368.30	877	14.703"	373.46	14.703"	373.46	14.1/2" OD CAS.
14.3/4"	374.65	489	14.956"	379.88	14.956"	379.88	14.3/4" OD CAS.
15"	381.00	825	15.210"	386.33	15.210"	386.33	15" OD CAS.
16"	406.40	145	16.222"	412.04	16.222"	412.04	16" OD CAS.
16.1/16"	407.99	689	16.285"	413.64	16.285"	413.64	16.1/16" OD CAS.
16.1/4"	412.75	934	16.475"	418.47	16.475"	418.47	16.1/4" OD CAS.
16.5/8"	422.28	896	16.855"	428.18	16.855"	428.18	16.5/8" OD CAS.
16.3/4"	425.45	664	16.981"	431.32	16.981"	431.32	16.3/4" OD CAS.
17"	431.80	813	17.235"	437.77	17.235"	437.77	17" OD CAS.
17.7/8"	454.03	859	18.120"	460.25	18.120"	460.25	17.7/8" OD CAS.
18"	457.20	723	18.247"	463.47	18.247"	463.47	18" OD CAS.
18.3/16"	461.96	803	18.438"	468.33	18.438"	468.33	18.3/16" OD CAS.
18.1/2"	469.90	852	18.753"	476.33	18.753"	476.33	18.1/2" OD CAS.
18.5/8"	473.08	146	18.880"	479.55	18.880"	479.55	18.5/8" OD CAS.
18.3/4"	476.25	490	19.006"	482.75	19.006"	482.75	18.3/4" OD CAS.
19.1/2"	495.30	760	19.766"	502.06	19.766"	502.06	19.1/2" OD CAS.
19.5/8"	498.48	602	19.892"	505.26	19.892"	505.26	19.5/8" OD CAS.
20"	508.00	147	20.272"	514.91	20.272"	514.91	20" OD CAS.
20.1/2"	520.70	851	20.780"	527.81	20.780"	527.81	20.1/2" OD CAS.
20.3/4"	527.05	925	21.033"	534.24	21.033"	534.24	20.3/4" OD CAS.
20.7/8"	530.23	738	21.159"	537.44	21.159"	537.44	20.7/8" OD CAS.
21"	533.40	640	21.285"	540.64	21.285"	540.64	21" OD CAS.
21.1/4"	539.75	814	21.538"	547.07	21.538"	547.07	21.1/4" OD CAS.
21.1/2"	546.10	148	21.790"	553.47	21.790"	553.47	21.1/2" OD CAS.
22"	558.80	688	22.295"	566.29	22.295"	566.29	22" OD CAS.
22.1/2"	571.50	876	22.800"	579.12	22.800"	579.12	22.1/2" OD CAS.
23.1/2"	596.90	627	23.810"	604.77	23.810"	604.77	23.1/2" OD CAS.
24"	609.60	630	24.315"	617.60	24.315"	617.60	24" OD CAS.
24.1/2"	622.30	149	24.820"	630.43	24.820"	630.43	24.1/2" OD CAS.
25"	635.00	918	25.325"	643.26	25.325"	643.26	25" OD CAS.
26"	660.40	650	26.335"	668.91	26.335"	668.91	26" OD CAS.
27"	685.80	692	27.345"	694.56	27.345"	694.56	27" OD CAS.
28"	711.20	693	28.355"	720.22	28.355"	720.22	28" OD CAS.
29"	736.60	945	29.365"	745.87	29.365"	745.87	29" OD CAS.
30"	762.00	644	30.375"	771.53	30.375"	771.53	30" OD CAS.
32"	812.80	694	32.395"	822.83	32.395"	822.83	32" OD CAS.
36"	914.40	695	36.435"	925.45	36.435"	925.45	36" OD CAS.



TOLERANCES ON BORE DIMENSIONS	
4.1/2" ≤ Tb ≤ 10"	+0.016" (0.40MM) -0.016" (0.40MM)
4.1/2" ≤ Bb ≤ 20"	+0.031" (0.79MM) -0.016" (0.40MM)
10" < Tb ≤ 20"	+0.031" (0.79MM) -0.016" (0.40MM)
10" < Bb ≤ 20"	+0.063" (1.59MM) -0.016" (0.40MM)
Tb > 20"	+0.063" (1.59MM) -0.031" (0.79MM)
Bb > 20"	+0.063" (1.59MM) -0.031" (0.79MM)

REVISION △J:
-UPDATED DRAWING.

NOTES:
1. BOTTOM BORE IS OPTIONAL SOME ELEVATORS DESIGNS DO NOT HAVE A BOTTOM BORE.

△J ORACLE PARTNUMBER	N/A		
LEGACY PARTNUMBER	N/A	REFERENCE ONLY	
MATERIAL	N/A		
SURF. FINISH / PAINTSPEC.	-	COLOR	-
WEIGHT	- Lbs		- kg
CREATED BY	Mike Daerden	REVISION	
CREATED ON	28-Apr-14 04:52:55 AM		
REVISED BY	Mike Daerden		
REVISED ON	30-Apr-14 04:35:37 AM		
TC - ECR	00012821	DAD	J

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

DO NOT SCALE DOCUMENT
THIS DOCUMENT IS NOV TEAMCENTER CONTROLLED

SCALE 1:1
UNITS INCH (mm)
PROJ.

NATIONAL OILWELL VARCO

TITLE: ELEVATOR BORE CHART FOR CASING

SIZE C | DRAWING NO. 15316-2 | SHEET 1 OF 1

TUBING SIZE	STYLE	BORE CODE	TOP BORE	BOTTOM BORE	STAMP ELEVATOR
1.050	PLAIN	150	1.125	1.125	1.05 OD TBG
	UPSET	151	1.422	1.422	1.05 OD EU TBG
1.315	PLAIN	152	1.390	1.390	1.31 OD TBG
	UPSET	153	1.578	1.578	1.31 OD EU TBG
1.660	PLAIN	154	1.734	1.734	1.66 OD TBG
	UPSET	155	1.922	1.922	1.66 OD EU TBG
1.900	PLAIN	156	1.984	1.984	1.90 OD TBG
	UPSET	157	2.203	2.203	1.90 OD EU TBG
2 3/8	PLAIN	158	2.453	2.453	2 3/8 OD TBG
	UPSET	159	2.703	2.703	2 3/8 OD EU TBG
2 7/8	PLAIN	160	2.953	2.953	2 7/8 OD TBG
	UPSET	161	3.203	3.203	2 7/8 OD EU TBG
3 1/2	PLAIN	162	3.578	3.578	3 1/2 OD TBG
	UPSET	163	3.859	3.859	3 1/2 OD EU TBG
4	PLAIN	164	4.078	4.078	4 OD TBG
	UPSET	165	4.359	4.359	4 OD EU TBG
4 1/2	PLAIN	129	SEE 15316-2		4 1/2 OD TBG
	UPSET	167	4.859	4.859	4 1/2 OD EU TBG

CAUTION: DO NOT USE EXTERNAL UPSET ELEVATORS ON NON UPSET (PLAIN) TUBING

BORE TOLERANCES : TOP BORE Tb ± 1/64

BOTTOM BORE + 1/32

− 1/64

NOTES : 1. TO ARRIVE AT FINAL ASS'Y NO. USE FRAME ASS'Y NO. AND ADD BORE CODE NO. (EXAMPLE : 32384−163)

2. BORE SIZE MEASURED WITH LATCH AND LATCH LUG SURFACE CONTACT

3. CONVERSION FACTOR 1INCH = 25,4 MM

ORACLE PART NUMBER	—		
LEGACY PART NUMBER	—	REFERENCE ONLY	
MATERIAL	—		
SURF. FINISH/ PAINT SPEC	—	COLOR	—
WEIGHT	— LBS/	— KG	
CREATED BY	Bob de Pont		
CREATED ON	17-Nov-94		
REVISED BY	Mike Doerden		
REVISED ON	9-Dec-13	DAD	
TC-ECR			

REV. P

UNLESS OTHERWISE SPECIFIED TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS.010±.005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

DO NOT SCALE DOCUMENT

THIS DOCUMENT IS TEAMCENTER CONTROLLED

SCALE 1 : 1

UNITS INCH (MM)

PROJ.

TITLE: ELEVATOR BORE CHART FOR TUBING

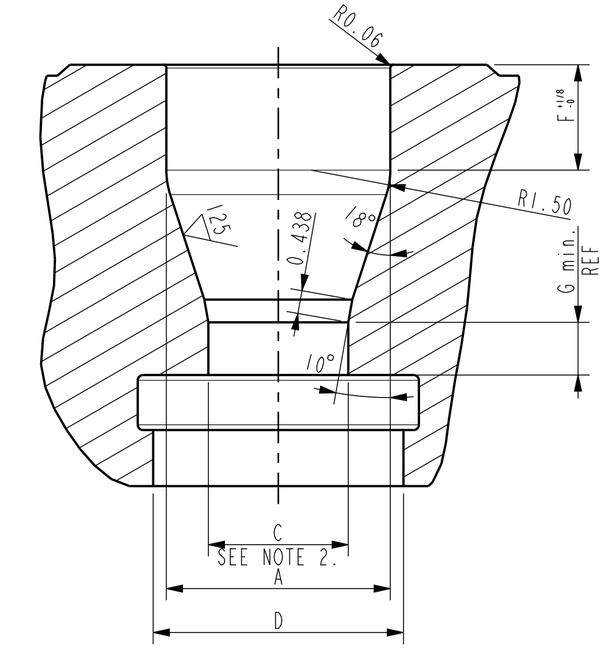
SIZE: B

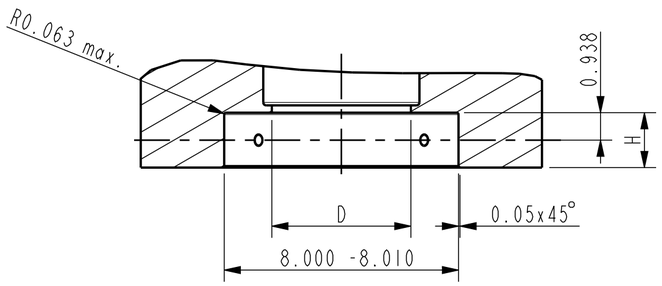
DRAWING NO.: 15316-3

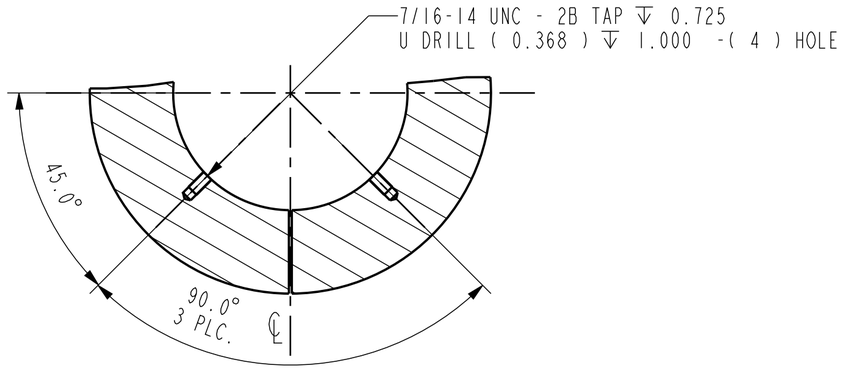
SHEET 1 OF 1

ELEVATOR BORES FOR 18" DRILL PIPE

BORECODE		116	117	118	119	120	121	122	123	124
TYPE	MARK ELEVATOR	2.3/8" EU	2.7/8" IU	2.7/8" EU	3.1/2" IU	3.1/2" EU	4" IU	4 " EU, 4.1/2" IU, 4.1/2" IEU	4.1/2" EU, 5" IEU	5.1/2"
MG	FRAME	30157	30517	30157	30157	30157	30157	30157	30157	
	A	4.250"	4.750"	4.750"	5.500"	5.500"	6.500"	6.750"	7.125"	
	C	2.656"	3.094"	3.281"	3.781"	3.969"	4.281"	4.781"	5.250"	
	D	4.750"	4.750"	4.750"	4.750"	4.750"	4.750"	5.250"	5.250"	
	F	2.000"	2.000"	2.000"	2.000"	2.000"	1.375"	1.375"	1.375"	
	*G	0.125"	0.125"	0.125"	0.125"	0.125"	0.125"	0.125"	0.125"	
RGG	FRAME	200680	200680	200680	200680	200680				
	A	4.250"	4.750"	4.750"	5.500"	5.500"				
	C	2.656"	3.094"	3.281"	3.781"	3.969"				
	D	4.750"	4.750"	4.750"	4.750"	4.750"				
	F	1.750"	1.750"	1.750"	1.750"	1.750"				
	*G	0.500"	0.500"	0.500"	0.500"	0.500"				
GG	FRAME					31068 & 35143	31068 & 35143	31068 & 35143	31068 & 35143	31068 & 35143
	A					5.500"	6.500"	6.750"	7.125"	7.875"
	C					3.969"	4.281"	4.781"	5.250"	5.812"
	D					7.000"	7.000"	7.000"	7.000"	7.000"
	F					1.375"	1.375"	2.375"	2.375"	2.375"
	*G					0.125"	0.125"	0.375"	0.500"	0.625"
HGG	FRAME						70013 & 70222	70013 & 70222	70013 & 70222	70013 & 70222
	A						6.500"	6.750"	7.125"	7.875"
	C						0.281"	4.781"	5.250"	5.812"
	D						7.000"	7.000"	7.000"	7.000"
	F						1.375"	2.375"	2.375"	2.375"
	*G						0.625"	0.375"	0.500"	0.625
MGG	FRAME				35005 & 36056	35005 & 36056	35005 & 36056	35005 & 36056	35005 & 36056	35005 & 36056
	A				5.500"	5.500"	6.500"	6.750"	7.125"	7.875"
	C				3.781"	3.969"	4.281"	4.781"	5.250"	5.813"
	D				7.000"	7.000"	7.000"	7.000"	7.000"	7.000"
	F				2.500"	2.500"	2.500"	2.500"	2.500"	2.500"
	*G				1.000"	1.000"	1.000"	1.000"	1.000"	1.000"
GG WITH WEAR BUSHING	FRAME						200024 & 200056	200024 & 200056	200024 & 200056	200024 & 200056
	H						1.875"	1.875"	1.875"	1.875"
HGG WITH WEAR BUSHING	FRAME						200059 & 200060	200059 & 200060	200059 & 200060	200059 & 200060
	H						2.000"	2.000"	2.000"	2.000"
MGG WITH WEAR BUSHING	FRAME				200057 & 200058	200057 & 200058	200057 & 200058	200057 & 200058	200057 & 200058	200057 & 200058
	H				1.875"	1.875"	1.875"	1.875"	1.875"	1.875"







TYPES GG, MGG AND HGG WITH WEAR BUSHING.

NOTES:
1. BORE MUST BE PERPENDICULAR TO FINISHED BOTTOM OF ELEVATOR TO WHITIN 0.1°.
2. TOLERANCES OF BORE ARE LINEAR +0.0313 -0.000 ANGULAR -2° -0°
3. * = WEAR LIMIT DIMENSION.

REVISION △1 :
-UPDATED DRAWING.

ORACLE PARTNUMBER	N/A		
LEGACY PARTNUMBER	N/A	REFERENCE ONLY	
MATERIAL	-		
SURF. FINISH / PAINTSPEC.	-	COLOR	-
WEIGHT	- Lbs	- kg	
CREATED BY	Mike Daerden	REVISION	
CREATED ON	23-Apr-14 04:47:25 AM		
REVISED BY	Mike Daerden		
REVISED ON	29-Apr-14 05:40:05 AM		
TC - ECR	00012821	DAD	V

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250
TORCHCUT SURFACES 1000
ALL WELD SYMBOLS ACC. TO ISO
ALL WELD DIMENSIONS ARE Z DIM'S

DO NOT SCALE DOCUMENT | SCALE 1:1 | PROJ.

THIS DOCUMENT IS NOV TEAMCENTER CONTROLLED | UNITS INCH (mm)

NATIONAL OILWELL VARCO

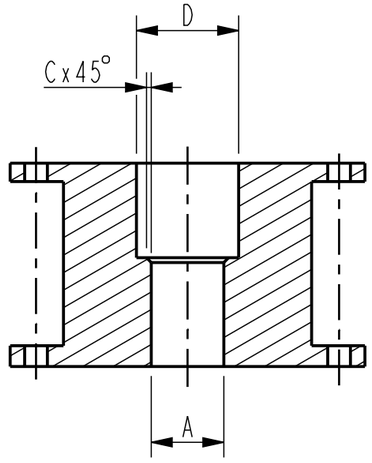
TITLE: ELEVATOR BORE CHART F/DRILL PIPE HAVING 18" SHOULDERD TOOL POINTS

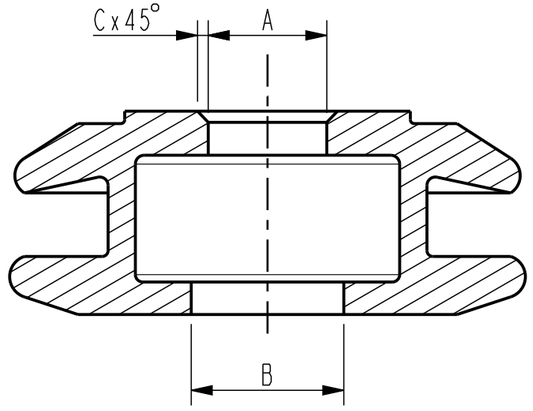
SIZE C | DRAWING NO. 15316-5 | SHEET 1 OF 1

DRILL COLLAR OD	BORE CODE	A		C		B		D	
		INCH	MM	INCH	MM	INCH	MM	INCH	MM
3.1/8"	735	2.813"	71.45	0.063"	1.60	3.250"	82.55	3.625"	92.08
3.3/8"	736	3.063"	77.80	0.063"	1.60	3.500"	88.90	3.875"	98.43
3.1/2"	625	3.188"	80.98	0.063"	1.60	3.625"	92.08	4.000"	101.60
3.3/4"	582	3.438"	87.33	0.063"	1.60	3.875"	98.43	4.250"	107.95
3.7/8"	802	3.563"	90.50	0.063"	1.60	4.000"	101.60	4.375"	111.13
4.1/8"	177	3.813"	96.85	0.063"	1.60	4.250"	107.95	4.625"	117.48
4.1/4"	674	3.938"	100.03	0.063"	1.60	4.375"	111.13	4.750"	120.65
4.1/2"	554	4.188"	106.38	0.063"	1.60	4.625"	117.48	5.000"	127.00
4.3/4"	435	4.375"	111.13	0.063"	1.60	4.875"	123.83	5.250"	133.35
4.7/8"	466	4.500"	114.30	0.063"	1.60	5.000"	127.00	5.375"	136.53
5"	530	4.625"	117.48	0.063"	1.60	5.125"	130.18	5.500"	139.70
5.1/4"	179	4.875"	123.83	0.063"	1.60	5.375"	136.53	5.750"	146.05
5.1/2"	180	5.125"	130.18	0.063"	1.60	5.625"	142.88	6.000"	152.40
5.5/8"	609	5.250"	133.35	0.063"	1.60	5.750"	146.05	6.125"	155.58
5.3/4"	181	5.375"	136.53	0.063"	1.60	5.875"	149.23	6.250"	158.75
6"	362	5.500"	139.70	0.063"	1.60	6.125"	155.58	6.500"	165.10
6.1/4"	337	5.750"	146.05	0.063"	1.60	6.375"	161.93	6.750"	171.45
6.3/8"	409	5.875"	149.23	0.063"	1.60	6.500"	165.10	6.875"	174.63
6.1/2"	373	6.000"	152.40	0.063"	1.60	6.625"	168.28	7.000"	177.80
6.5/8"	667	6.125"	155.58	0.063"	1.60	6.750"	171.45	7.125"	180.98
6.3/4"	387	6.188"	157.18	0.094"	2.39	6.875"	174.63	7.250"	184.15
7"	361	6.313"	160.35	0.094"	2.39	7.125"	180.98	7.500"	190.50
7.3/16"	606	6.625"	168.28	0.063"	1.60	7.313	185.75	7.688"	195.28
7.1/4"	357	6.688"	169.88	0.094"	2.39	7.375"	187.33	7.750"	196.85
7.1/2"	188	6.938"	176.23	0.094"	2.39	7.625"	193.68	8.000"	203.20
7.3/4"	339	7.188"	182.58	0.094"	2.39	7.875"	200.03	8.250"	209.55
8"	336	7.438"	188.93	0.094"	2.39	8.125"	206.38	8.500"	215.90
8.1/8"	610	7.563"	192.10	0.094"	2.39	8.250"	209.55	8.625"	219.08
8.1/4"	422	7.688"	195.28	0.094"	2.39	8.375"	212.73	8.750"	222.25
8.1/2"	426	7.938"	201.63	0.094"	2.39	8.625"	219.08	9.000"	228.60
8.5/8"	613	8.063"	204.80	0.094"	2.39	8.750"	222.25	9.125"	231.78
8.3/4"	553	8.125"	206.38	0.125"	3.18	8.875"	225.43	9.250"	234.95
9"	427	8.375"	212.73	0.125"	3.18	9.125"	231.78	9.500"	241.30
9.1/4"	564	8.625"	219.08	0.125"	3.18	9.375"	238.13	9.750"	247.65
9.1/2"	370	8.875"	225.43	0.125"	3.18	9.625"	244.48	10.000"	254.00
9.5/8"	600	9.000"	228.60	0.125"	3.18	9.750"	247.65	10.125"	257.18
9.3/4"	367	9.125"	231.78	0.125"	3.18	9.875"	250.83	10.250"	260.35
10"	195	9.375"	238.13	0.125"	3.18	10.125"	257.18	10.500"	266.70
10.3/4"	527	10.125"	257.18	0.125"	3.18	10.875"	276.23	11.250"	285.75
11"	419	10.375"	263.53	0.125"	3.18	11.125"	282.58	11.500"	292.10
11.1/4"	196	10.625"	269.88	0.125"	3.18	11.375"	288.93	11.750"	298.45
11.3/4"	715	11.125"	282.58	0.125"	3.18	11.875"	301.63	12.250"	311.15
12.3/4"	716	12.125"	307.98	0.125"	3.18	12.875"	327.03	13.250"	336.55
14"	578	13.375"	339.73	0.125"	3.18	14.125"	358.78	14.500"	368.30
16.3/4"	717	16.125"	409.58	0.125"	3.18	16.875"	428.63	17.250"	438.15

ELEVATOR/BUSHING BORES BASED ON DRILL COLLAR O.D.

DRILL COLLAR O.D. RANGES	A	B	C	D
4" -4.5/8"	O.D. MINUS 0.313"	O.D. PLUS 0.125"	0.063"	O.D. PLUS 0.500"
4.3/4" - 5.5/8"	O.D. MINUS 0.375"	O.D. PLUS 0.125"	0.063"	O.D. PLUS 0.500"
5.3/4" - 6.5/8"	O.D. MINUS 0.500"	O.D. PLUS 0.125"	0.063"	O.D. PLUS 0.500"
6.3/4" - 8.5/8"	O.D. MINUS 0.563"	O.D. PLUS 0.125"	0.063"	O.D. PLUS 0.500"
8.3/4" & LARGER	O.D. MINUS 0.625"	O.D. PLUS 0.125"	0.063"	O.D. PLUS 0.500"





REVISION AC :
- UPDATED DRAWING.
- ADDED BORECODES.
- ADDED NOTE.

AC
NOTES:
1. FOR WEAR DATA SEE DWG. 15316-6A.
2. MARK THE PART WITH THE DRILL COLLAR O.D. AND THE TEXT "GROOVED".

TOLERANCES ON BORE DIMENSIONS	
A	+0.000 -0.031
B	+0.063 -0.000

AC ORACLE PARTNUMBER	N/A		
LEGACY PARTNUMBER	N/A	REFERENCE ONLY	
MATERIAL	N/A		
SURF. FINISH / PAINTSPEC.	-	COLOR	-
WEIGHT	- Lbs		- kg
CREATED BY	Mike Daerden	REVISION	
CREATED ON	25-Apr-14 03:21:43 AM		
REVISED BY	Mike Daerden		
REVISED ON	01-May-14 04:30:00 AM		
TC - ECR	00012821	DAD	

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

TORCHCUT SURFACES 1000

ALL WELD SYMBOLS ACC. TO ISO

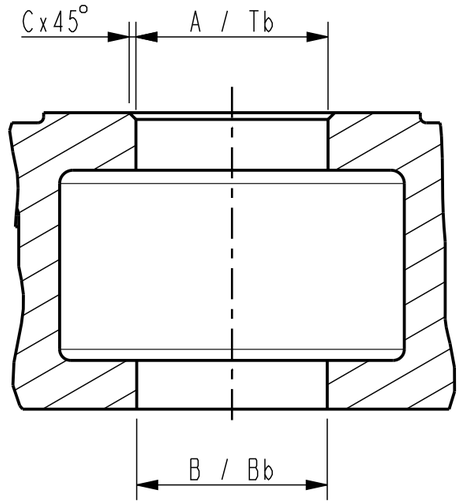
ALL WELD DIMENSIONS ARE Z DIM'S

NATIONAL OILWELL VARCO

DO NOT SCALE DOCUMENT	SCALE 1:1	PROJ.
THIS DOCUMENT IS NOV TEAMCENTER CONTROLLED	UNITS INCH (mm)	

TITLE	SIZE	DRAWING NO.	SHEET
DC ZIP BORES	B	15316-6	1 OF 1

DRILL COLLAR OD	BORE CODE	A / Tb		C		B / Bb	
		INCH	MM	INCH	MM	INCH	MM
2.1/2"	201	2.656"	67.46	0.063"	1.59	2.656"	67.46
2.3/4"	203	2.906"	73.81	0.063"	1.59	2.906"	73.81
2.7/8"	824	3.000"	76.20	0.063"	1.59	3.000"	76.20
3"	205	3.156"	80.16	0.063"	1.59	3.156"	80.16
3.1/8"	206	3.281"	83.34	0.063"	1.59	3.281"	83.34
3.1/4"	207	3.406"	86.51	0.063"	1.59	3.406"	86.51
3.3/8"	575	3.516"	89.31	0.063"	1.59	3.516"	89.31
3.1/2"	209	3.656"	92.86	0.063"	1.59	3.656"	92.86
3.3/4"	211	3.906"	99.21	0.063"	1.59	3.906"	99.21
3.7/8"	763	4.031"	102.39	0.063"	1.59	4.031"	102.39
4"	213	4.156"	105.56	0.063"	1.59	4.156"	105.56
4.1/8"	519	4.281"	108.74	0.063"	1.59	4.281"	108.74
4.1/4"	548	4.406"	111.91	0.063"	1.59	4.406"	111.91
4.1/2"	215	4.656"	118.26	0.063"	1.59	4.656"	118.26
4.3/4"	354	4.938"	125.43	0.063"	1.59	4.938"	125.43
5"	552	5.188"	131.78	0.063"	1.59	5.188"	131.78
5.1/4"	219	5.438"	138.13	0.063"	1.59	5.438"	138.13
5.1/2"	411	5.688"	144.48	0.063"	1.59	5.688"	144.48
5.3/4"	222	5.969"	151.61	0.063"	1.59	5.969"	151.61
6"	349	6.219"	157.96	0.063"	1.59	6.219"	157.96
6.1/4"	348	6.469"	164.31	0.063"	1.59	6.469"	164.31
6.3/8"	331	6.594"	167.49	0.063"	1.59	6.594"	167.49
6.1/2"	765	5.719"	145.26	0.063"	1.59	5.719"	145.26
6.3/4"	338	7.000"	177.80	0.063"	1.59	7.000"	177.80
7"	372	7.250"	184.15	0.063"	1.59	7.250"	184.15
7.1/4"	355	7.500"	190.50	0.063"	1.59	7.500"	190.50
7.3/8"	599	7.625"	193.68	0.063"	1.59	7.625"	193.68
7.1/2"	766	7.750"	196.85	0.063"	1.59	7.750"	196.85
7.3/4"	550	8.000"	203.20	0.063"	1.59	8.000"	203.20
8"	334	8.250"	209.55	0.063"	1.59	8.250"	209.55
8.1/4"	347	8.500"	215.90	0.063"	1.59	8.500"	215.90
8.1/2"	580	8.781"	223.04	0.063"	1.59	8.781"	223.04
8.3/4"	226	9.031"	229.39	0.063"	1.59	9.031"	229.39
9"	356	9.281"	235.74	0.063"	1.59	9.281"	235.74
9.1/4"	227	9.531"	242.09	0.063"	1.59	9.531"	242.09
9.1/2"	346	9.781"	248.44	0.063"	1.59	9.781"	248.44
9.5/8"	479	9.969"	253.21	0.063"	1.59	9.969"	253.21
9.3/4"	680	9.094"	230.99	0.063"	1.59	9.094"	230.99
10"	228	10.344"	262.74	0.063"	1.59	10.344"	262.74
10.1/2"	229	10.844"	275.44	0.063"	1.59	10.844"	275.44
11"	230	11.344"	288.14	0.063"	1.59	11.344"	288.14
11.3/4"	621	12.094"	307.19	0.063"	1.59	12.094"	307.19
14"	679	14.344"	364.34	0.063"	1.59	14.344"	364.34



REVISION AC :
-UPDATED DRAWING.
-ADDED BORECODES.

AC
NOTES:
1. MARK THE PART WITH THE DRILL COLLAR O.D. AND THE TEXT "WITH LIFT PLUG".

TOLERANCES ON BORE DIMENSIONS	
A / Tb	+0.000 -0.031
B / Bb	+0.063 -0.000

AC ORACLE PARTNUMBER	N/A		
LEGACY PARTNUMBER	N/A	REFERENCE ONLY	
MATERIAL	-		
SURF. FINISH / PAINTSPEC.	-	COLOR	-
WEIGHT	- Lbs		- kg
CREATED BY	Mike Daerden	REVISION	
CREATED ON	25-Apr-14 04:25:35 AM		
REVISED BY	Mike Daerden		
REVISED ON	01-May-14 04:30:00 AM		
TC - ECR	00012821	DAD	R

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

TORCHCUT SURFACES 1000

ALL WELD SYMBOLS ACC. TO ISO

ALL WELD DIMENSIONS ARE Z DIM'S

DO NOT SCALE DOCUMENT

THIS DOCUMENT IS NOV TEAMCENTER CONTROLLED

NATIONAL OILWELL VARCO

SCALE 1:1

PROJ.

UNITS INCH (mm)

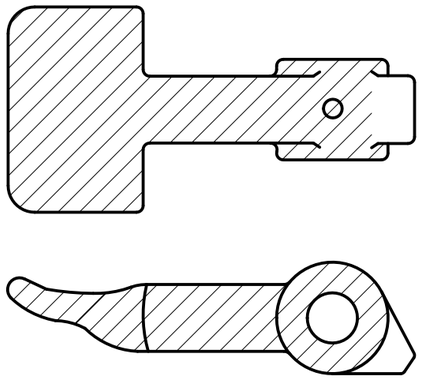
TITLE: DRILL COLLARS WITH LIFT PLUG

SIZE: B

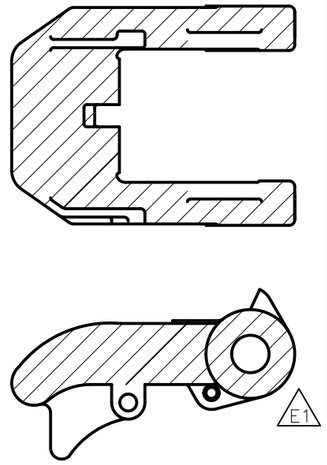
DRAWING NO.: 15316-8

SHEET 1 OF 1

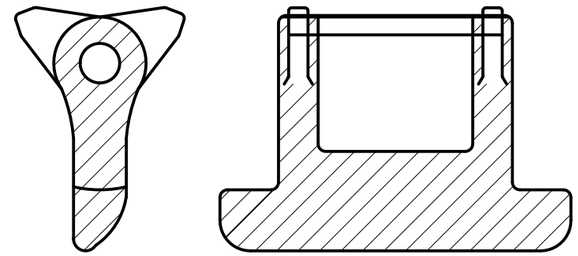
TYPE	PART NO.
MDD 5–7	8069
XLD 2 3/8–3 1/2	17407



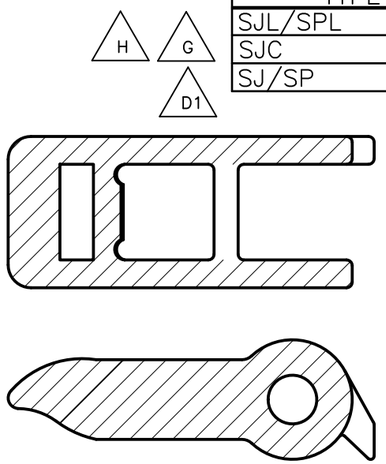
TYPE	PART NO.
GG 4–5 1/2	31071
MGG 3 1/2–5 1/2	34906
RG 2 3/8–3 1/2	23543/13151
MG 2 3/8–5	11763
HGG 4 1/2–5 1/2	30460
YT 2 1/4–2 3/4	15348
YC 2 1/4–2 3/4	15348
MYC 3 1/2–7	200363
RA 2 3/8–3 1/2	11111
MAA 5–7	11763
HYC 3 1/2–7 5/8	55503
MAA 5–7	12945
AA 3 1/2–7	11763
MAA 2 3/8–4 1/2	11763
RA 4–7	11763
SLX 24–30	11763
BX ELEV. FRAME 1	201566
BX ELEV. FRAME 2	201605



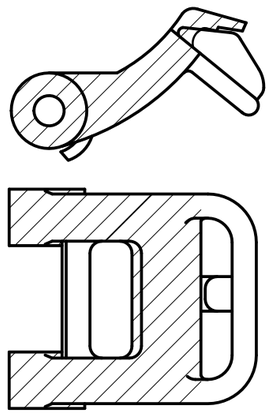
TYPE	PART NO.
SLB 2 3/8–3 1/2	36947
SLB 3 1/2–4 1/2	36996
SLX 6 5/8–13 3/8	31331
SLX 16–24 1/2	33634
SLX 3 1/2–5 1/2	33813
SLX 1.660–2 7/8	33697



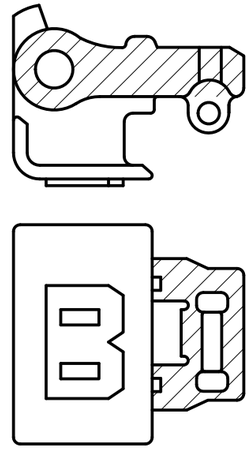
TYPE	PART NO.
SJL/SPL	200026
SJC	73202/73203
SJ/SP	33026



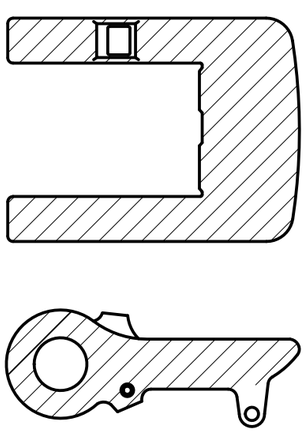
TYPE	PART NO.
SX 16	30597–2
SX 18 5/8–20	30597
SX 9 3/4–13 3/8	29945



TYPE	PART NO.
MYT 1.315–2 7/8	30652
TA 1.660–4 1/2	32380
TA 1.059–2 7/8	32446
TA 5 1/2–11 1/4	32752
TA 4 3/4–11 1/4	32752–1
HYT 2 3/8–3 1/2	39162
LYT 1.05–2 1/16	30644



TYPE	PART NO.
SLBB 4–6 5/8	32230
SLBB 4 1/2– 5	30974



NOTES:

1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT. F1

PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED
TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE
BREAK SHARP CORNERS .010 ± .005
MACHINED SURFACES 250

	NAME	DATE
PREPARED	M v/d M	06-29-'92
CHECKED	A.KRIJNEN	07-07-'92
APPROVED	C.QUIST	07-20-'92

PROJ.
SCALE NONE
UNITS INCH (MM)
MATERIAL
WEIGHT LBS/ KG

REV.		E.C.N.	NAME	DATE	CHECKED
M					
L					
K					
J					
H		600383	K.P.	07-03-'01	A.d.P.
G		563001	W.B.	14 Okt 98	F.S.
F		531501	ADe	10 Jan'97	H.T.
E		529301	ADe	7 nov 96	AdP
D		11055	M v/d M	08-03-'92	C.Quist
C	X	11009	M v/d M	06-29-'92	A.KRIJNEN
B		-	-	-	-
A		-	-	-	-

ACAD FILE NO. : CA201.DWG

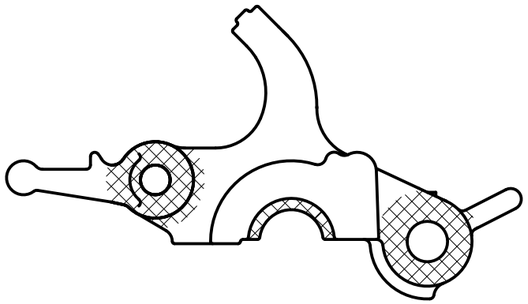
TITLE
CRITICAL AREAS ELEVATOR LATCHES

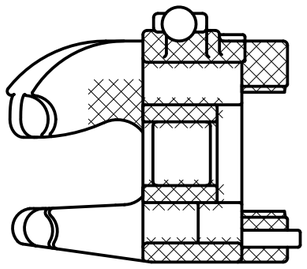
SIZE B | DRAWING NO. CA-201 | SHEET 1 OF 1

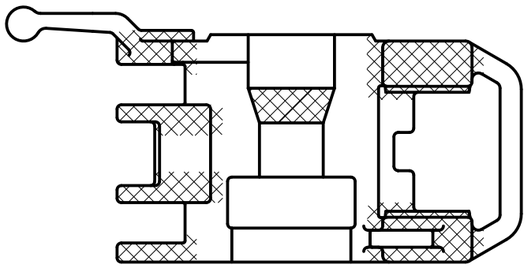
REDRAWN / REPLACED BY:

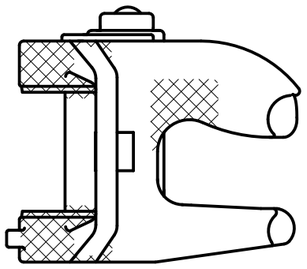
REPLACES: B-CA-201 REV.B DATE:01-06-'92

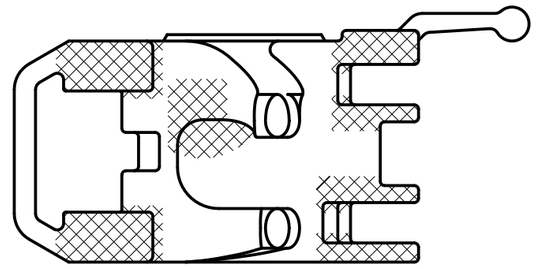
NOTES:
1. HATCHED AREAS ARE COSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.

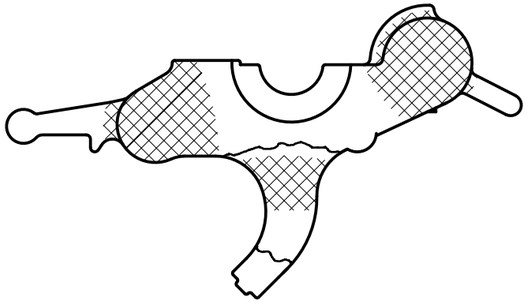












	1	—	
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ™ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE
PREPARED	L.Hoppenbr	15-05-97
CHECKED	C.Dekkers	15-05-97
APPROVED	R.v.Dooren	15-05-97

PROJ.

SCALE 1 : 8

UNITS INCH (MM)

MATERIAL

WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	539001	C.D.	20-05-97	A.d.P.

ACAD FILE NO. : CA300M.DWG

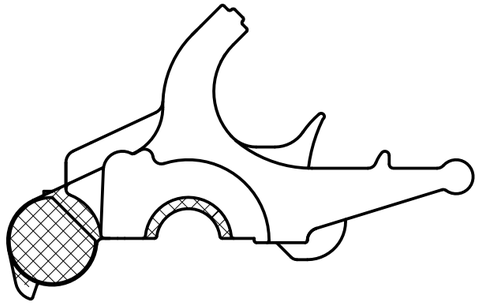
TITLE: CRITICAL AREAS BODY CENTER LATCH "G" TYPE ELEV. MACHINING.

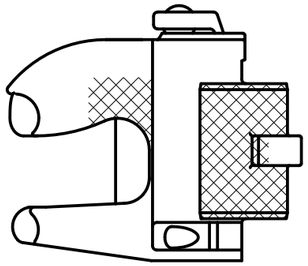
SIZE B | DRAWING NO. CA-300-M | SHEET 1 OF 1

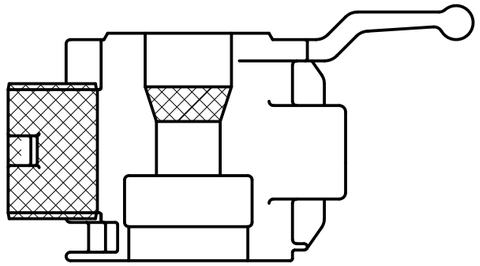
REDRAWN / REPLACED BY:

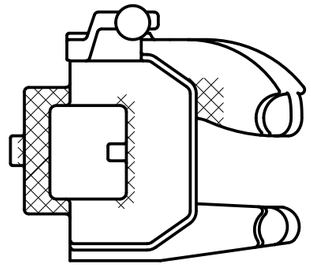
REPLACES: CA200.DWG

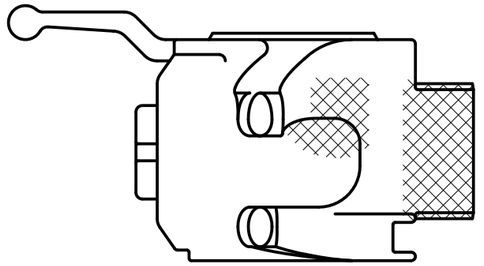
NOTES:
1. HATCHED AREAS ARE COSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.

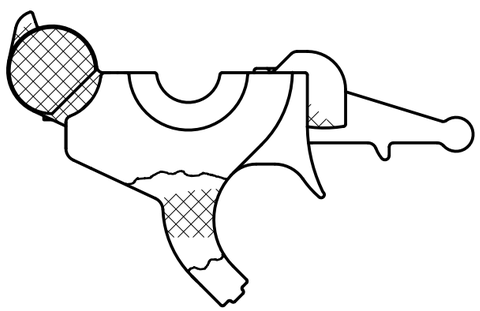












	1	—	
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE
PREPARED	L.Hoppenbr	20-05-97
CHECKED	C.Dekkers	20-05-97
APPROVED	R.v.Dooren	20-05-97

PROJ.

SCALE 1 : 8

UNITS INCH (MM)

MATERIAL

WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	539001	C.D.	20-05-97	A.d.P.

ACAD FILE NO. : CA301M.DWG

TITLE CRITICAL AREAS DOOR CENTER LATCH "G" TYPE ELEV. MACHINING.

SIZE B

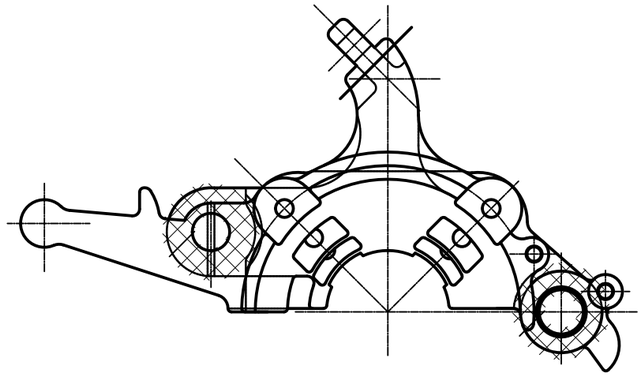
DRAWING NO. CA-301-M

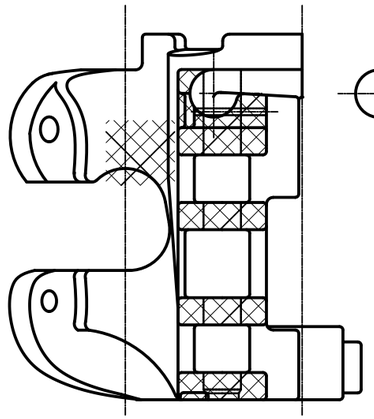
SHEET 1 OF 1

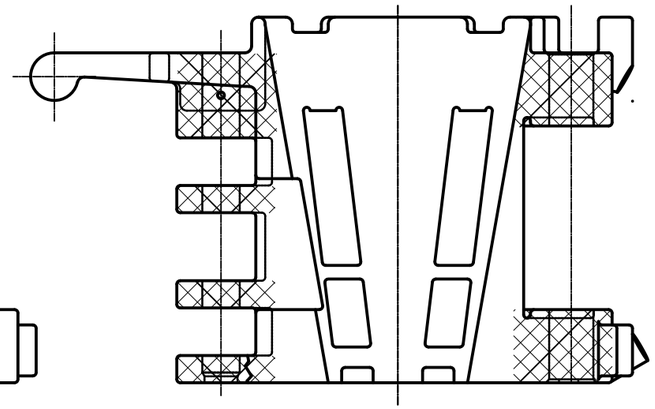
REDRAWN / REPLACED BY:

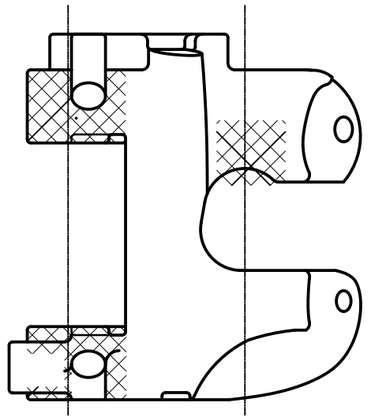
REPLACES: CA200.DWG

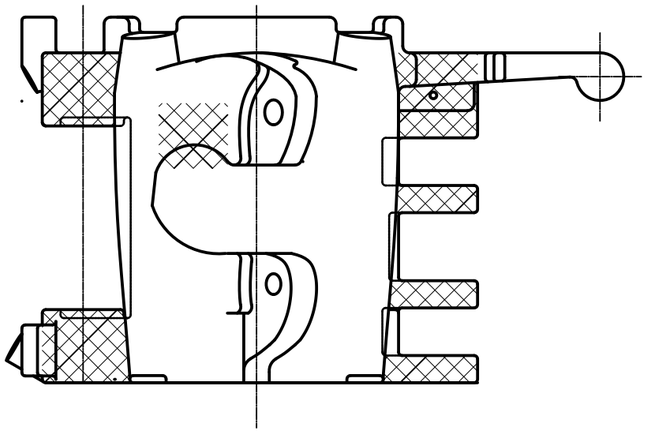
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.

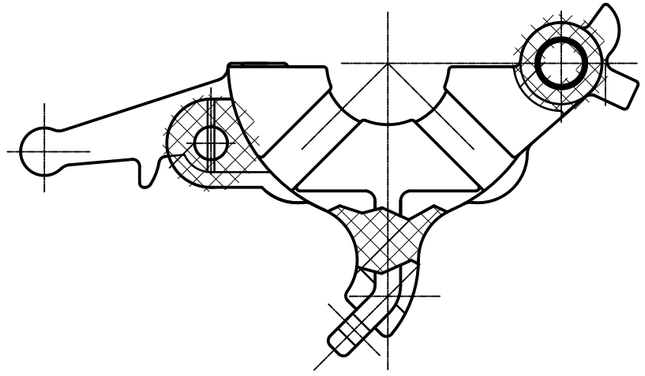












1	—		
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE
PREPARED	PvC	08-07-'97
CHECKED	C.D.	10-07-'97
APPROVED	R.v.D.	11-07-'97

PROJ.

SCALE 1 : 5

UNITS INCH (MM)

MATERIAL

WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	541801	PvC	08-07-'97	C.D.

ACAD FILE NO. :

TITLE CRITICAL AREAS BODY
Y- TYPE ELEVATOR MACHINING

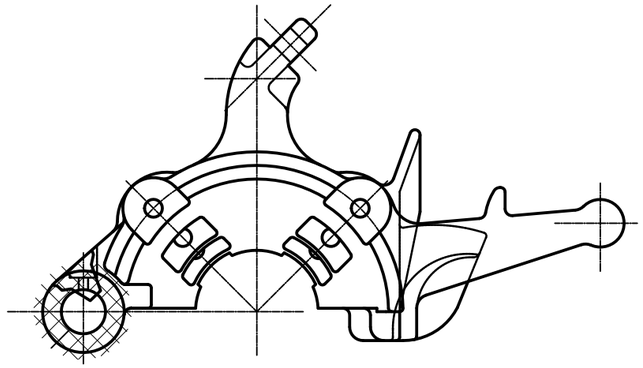
SIZE B

DRAWING NO. CA-302-M

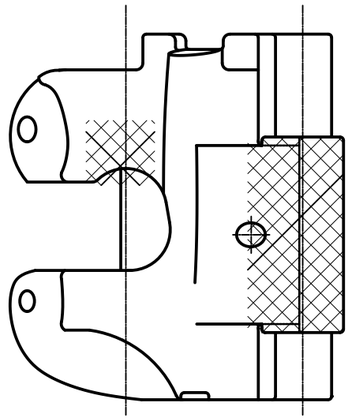
SHEET 1 OF 1

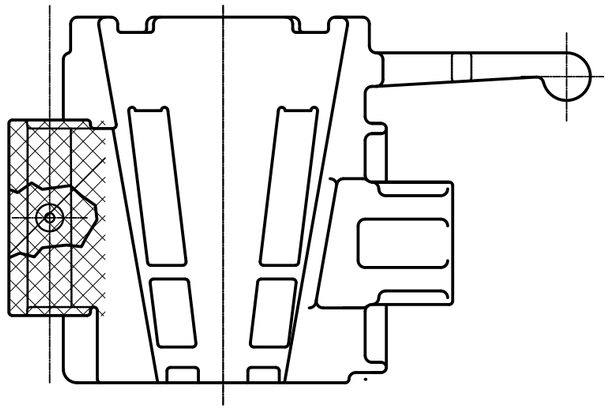
REDRAWN / REPLACED BY:

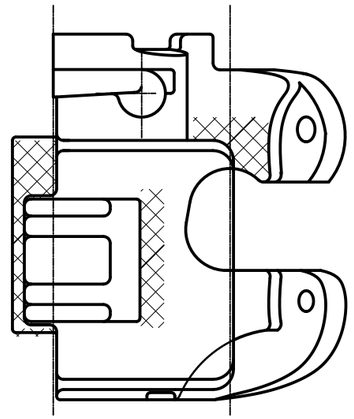
REPLACES:

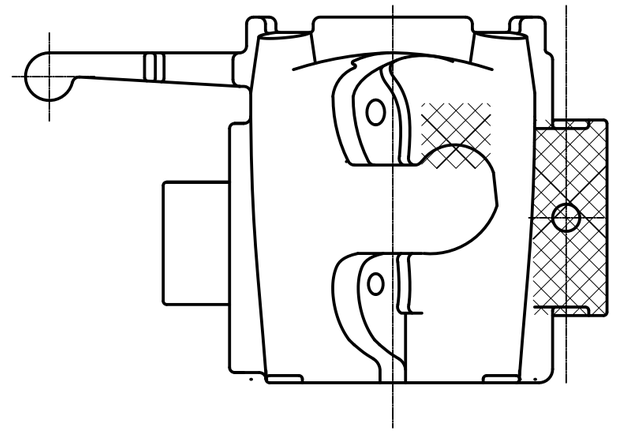


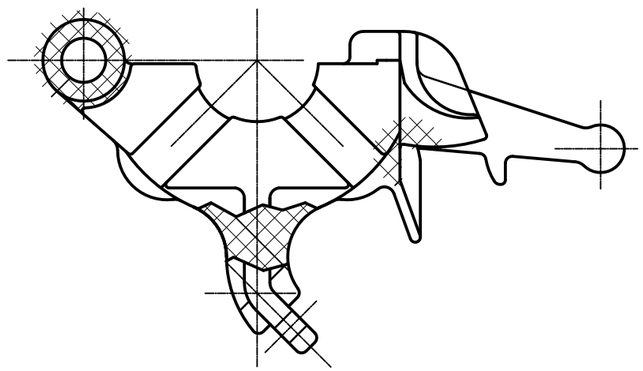
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.











	1	–	
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE	PROJ.
PREPARED	PvC	08-07-'97	
CHECKED	C.D.	10-07-'97	SCALE 1 : 5
APPROVED	R.v.D.	11-07-'97	UNITS INCH (MM)

MATERIAL

WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	541801	PvC	07-07-'97	C.D.

ACAD FILE NO. :

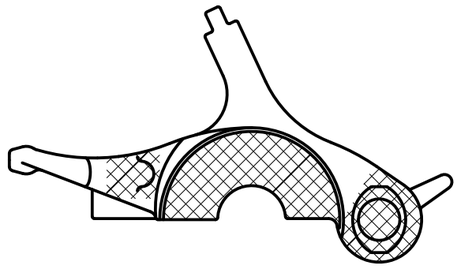
TITLE CRITICAL AREAS DOOR
Y- TYPE ELEVATOR MACHINING

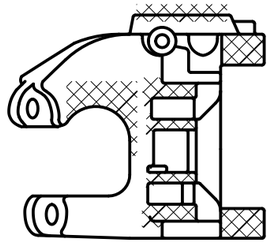
SIZE B | DRAWING NO. CA-303-M | SHEET 1 OF 1

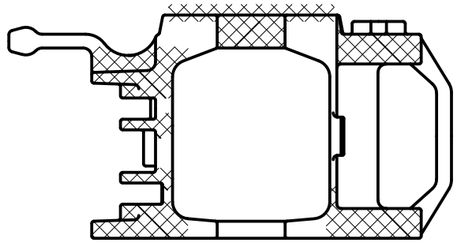
REDRAWN / REPLACED BY:

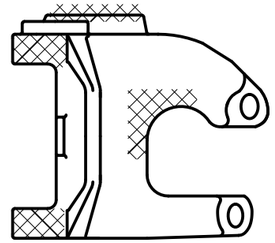
REPLACES:

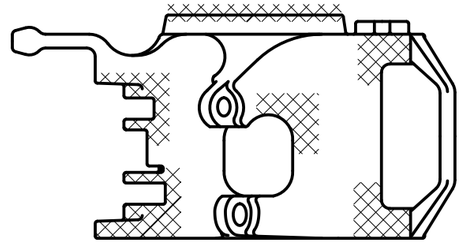
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.

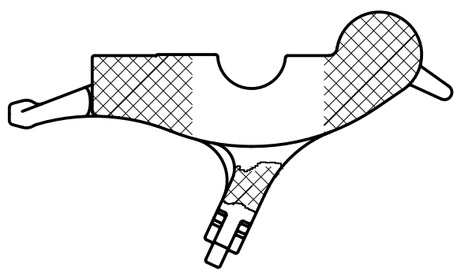












	1		
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ™ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE
PREPARED	C.Dekkers	01-22-'98
CHECKED	A.d.Pont	01-22-'98
APPROVED	H.Tiebout	01-22-'98

PROJ.

SCALE 1 : 8

UNITS INCH (MM)

MATERIAL

WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	554201	C.D.	01-22-'98	H.T.

ACAD FILE NO. :

TITLE CRITICAL AREAS BODY
A - TYPE ELEVATOR MACHINING

SIZE B

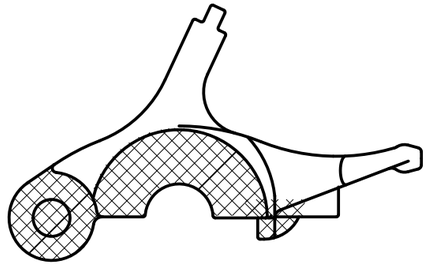
DRAWING NO. CA-304-M

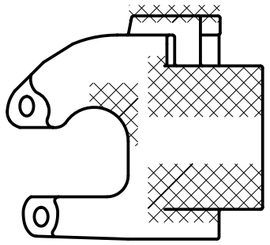
SHEET 1 OF 1

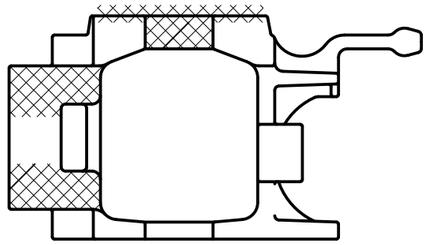
REDRAWN / REPLACED BY:

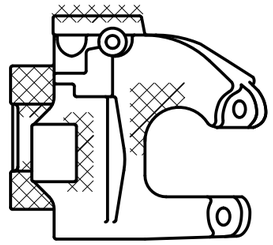
REPLACES: CA202.DWG

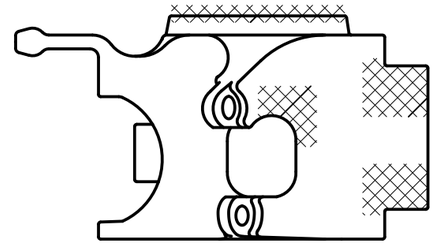
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.

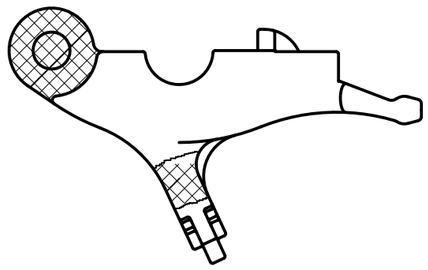












	1			
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y	

Varco BJ OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE	PROJ.	MATERIAL
PREPARED	P.v.Camp.	09-26-'97		
CHECKED	C.Dekkers	01-22-'98	SCALE 1 : 8	
APPROVED	H.Tiebout	01-22-'98	UNITS INCH (MM)	WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B				
A	554201	C.D.	01-22-'98	H.T.

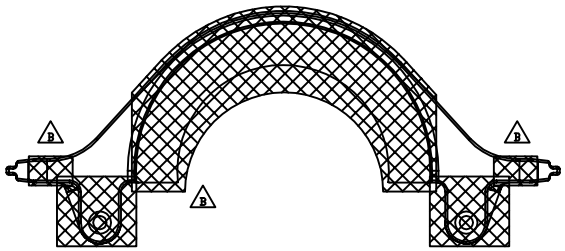
ACAD FILE NO. :

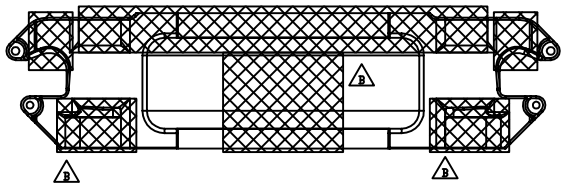
TITLE: CRITICAL AREAS DOOR
A - TYPE ELEVATOR MACHINING

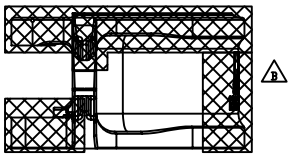
SIZE B | DRAWING NO. CA-305-M | SHEET 1 OF 1

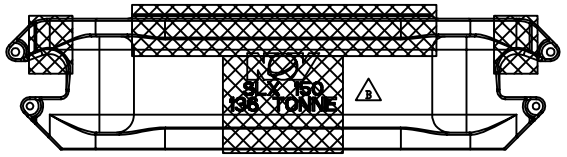
REDRAWN / REPLACED BY:

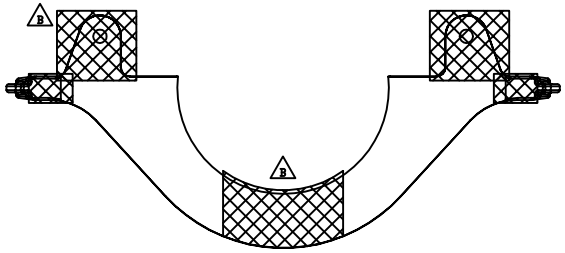
REPLACES: CA202.DWG









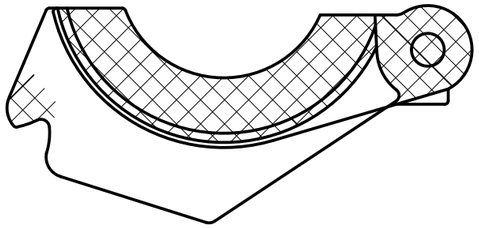


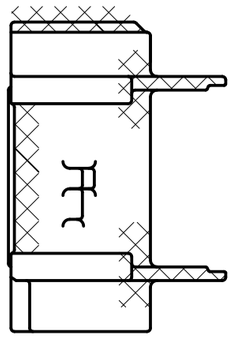
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.
4. MATERIAL: CMS-01 GRADE 120-110.

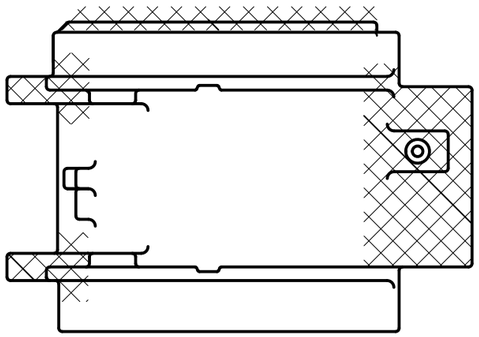
PARTNUMBER	–		UNLESS OTHERWISE SPECIFIED TOLERANCES PER ANSI Y 14.5	NATIONAL OILWELL VARCO	
MATERIAL			3 PLACE DECIMAL .XXX ± .010		
SURF. FINISH/ PAINT SPEC			2 PLACE DECIMAL .XX ± .03		
COLOR			1 PLACE DECIMAL .X ± .1		
WEIGHT	LBS/	KG	ANGLES ± .5 DEGREE		
CREATED BY	C. Dekkers		BREAK SHARP CORNERS .005-.045		
CREATED ON	01-02-98	REV.	MACHINED SURFACES 125	DO NOT SCALE DOCUMENT	SCALE 1:10
REVISED BY	L.S.		TORCHCUT SURFACES 1000		PROJ.
REVISED ON	10 Jan 2013	B	ALL WELD SYMBOLS ACC. TO ISO	THIS DOCUMENT IS TEAMCENTER CONTROLLED	UNITS INCH (MM)
TC-ECR	00009812	INF	ALL WELD DIMENSIONS ARE ± 10%		

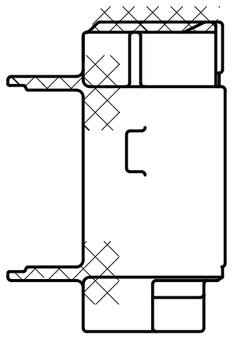
TITLE	SIZE	DRAWING NO.	SHEET
CA BODY SIDE DOOR COLLAR TYPES MACHINIING	C	CA-306-M	1 OF 1

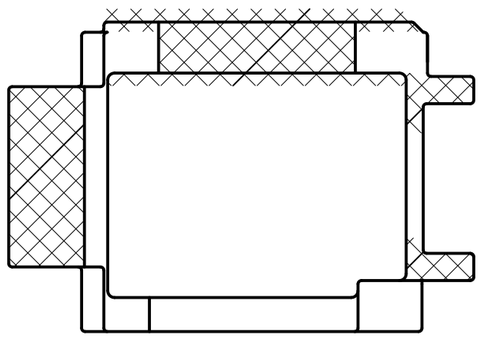
NOTES:
1. HATCHED AREAS ARE CONSIDERED CRITICAL
2. AREAS NOT HATCHED ARE CONSIDERED NON CRITICAL
3. THE ACCEPTANCE CRITERIA TO BE APPLIED ARE GIVEN IN THE VARCO BJ QUALITY ASSURANCE DOCUMENT.



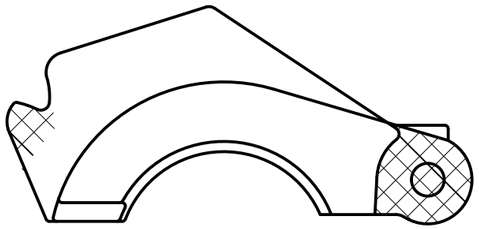








B



	1	—	
PART NO.	QTY.	NEXT ASS'Y	FINAL ASS'Y

Varco BJ™
OIL TOOLS
ETTEN-LEUR, THE NETHERLANDS

UNLESS OTHERWISE SPECIFIED

TOLERANCES (PER ANSI Y 14.5)
3 PLACE DECIMAL .XXX ± .010
2 PLACE DECIMAL .XX ± .03
1 PLACE DECIMAL .X ± .1
ANGLES ± .5 DEGREE

BREAK SHARP CORNERS .010 ± .005

MACHINED SURFACES 250

	NAME	DATE	PROJ.	MATERIAL
PREPARED	C.Dekkers	01-22-'98		
CHECKED	A.d.Pont	01-22-'98	SCALE 1 : 5	
APPROVED	H.Tiebout	01-22-'98	UNITS INCH (MM)	WEIGHT LBS/ KG

REV.	E.C.N.	NAME	DATE	CHECKED
M				
L				
K				
J				
H				
G				
F				
E				
D				
C				
B	559001	A.v.T	08-14-'98	C.D.
A	554301	C.D.	01-22-'98	H.T.

ACAD FILE NO. :

TITLE CRITICAL AREAS DOOR
SIDE DOOR COLLAR TYPES MACHINING

SIZE B | DRAWING NO. CA-307-M | SHEET 1 OF 1

REDRAWN / REPLACED BY:

REPLACES: CA230.DWG