

EXQUIP-EXQUIP-EXQUIP-EXQUIP-EXQUIP-EXQUIP-EXQUIP

# EXQUIP

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## THREAD PROTECTORS

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Protector Testing according to  
"Performance Evaluation of Commercially  
Available Thread Protectors" (IADC/SPE 17209)

Exquip Reu-GmbH  
Auf dem Knuf 10  
D-59073 HAMM, Germany  
Telephone (0)2381-62266 // Telefax (0)2381-66787

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- 1. Impact resistance***
- 2. Salt-water spray test***
- 3. Thread-stripping resistance***
- 4. Vibration resistance***
- 5. Chemical resistance***
- 6. Internal pressure test***

May 23rd.1995

## **CERTIFICATE**

This has to be certify that the signatory of the test report,  
Mr. Nehring , has been authorised by SHELL International ,  
for supervision and approval of the protector test .

Exquip Reu GmbH

A handwritten signature in black ink, appearing to read 'P. Kroll', written over a horizontal line.

Peter Kroll  
Manager Engineering

## ***Summary***

Using Exquip protectors means application of advanced technology without recycling problems for the customer .

To achieve the high performance required by the Shell test specification , Exquip only had to slightly increase the bumper zone of the protector as well as marginally to improve the composition of the material .

Exquip is able and willing to meet almost any protector design change and material compositions alteration which might be required by future developments .

Exquip protectors are green products; and the positive result of the Salt-water spray test showed also their good performance in combination with the green dope of Shell (STC 1 dope) .

## **Test results**

### **1. Impact resistance**

To achieve the requirements of the specifications only a small change of the design geometry and of the material composition were necessary .

### **2. Salt-water spray test**

This test was performed in the chemistry laboratorium of Mannesmann Hoesch Pipemill (MHP) in Hamm , Germany .

The test medium was very aggressive so that pipes and couplings were heavily attacked, but without harming the thread areas covered by the protector .

Test report of MHP is included .

### **3. Thread stripping resistance**

#### **3 1/2"NEW VAM**

The Exquip protector has a very high resistance to thread stripping .

The specifications call for an axial applied load of 2,76 kN for a 3 1/2"NEW VAM connection .

The actual stripping resistance was 35 kN.

#### **7"NEW VAM**

The axial load required by the specifications is 2,85 kN .

No stripping accured at 36 kN which is the maximum capability of the stripping apparatus .

#### **4. Vibration resistance**

No decrease was observed of installation torque ( 35 Nm on a 3 1/2" NEW VAM connection) after the 96 hours test .

#### **5. Chemical resistance**

Equip material is compatible with diesel oil , paraffin , acetone , Shellsol D70 , and hydrochloric acid .

In trichloroethylene a change of more than 10 % in weight and volume was experienced during the test at a temperature of 50 deg C (122 deg F) for the material composition of polypropylene / elastomer / chalk and polypropylene / elastomer / glassfiber .

At room temperature only, a volume change of 11,1 % was observed in trichloroethylene for the material polypropylene / elastomer / chalk .

The test report from MHP is included .

#### **6. Internal pressure test**

The test took place with a internal pressure of 200kPa ( 28psi) .

No pressure decrease was observed either after five internal pressure cycles and maintaining at pressure for five minutes, according to the Shell test procedure, or after a period of five days .

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# Exquip

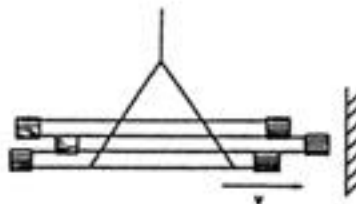
## THREAD PROTECTORS

Date: 13.06.1994

### PROTECTOR TEST

#### DATA SHEET AXIAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 3 1/2" NEW VAM, pin end, closed  
nominal weight of joint = 10,20 lb/ft

Requirements: Axial impact, 1 1/2" dia. bar, E = 1777,7J (1304,2 ft-lb)

Results: Actual height: 1,13m (3,7 ft)

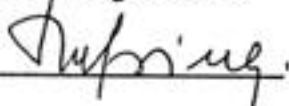
Hammer weight: 160kg (352,74 lb)

Impact energy: 1779J (1305,14 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

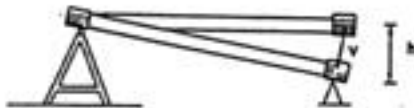
Test engineer signature



Date: 13.06.1994

PROTECTOR TEST  
DATA SHEET  
LATERAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 3 1/2" NEW VAM, pin end, closed  
nominal weight of joint = 10,20 lb/ft

Requirements: Radial impact, 1 1/2" dia. bar, E = 679,32J (501 ft-lb)

Results: Actual height: 0,44m (1,44 ft)

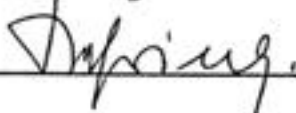
Hammer weight: 160kg (352,74 lb)

Impact energy: 692,74J (507,94 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature

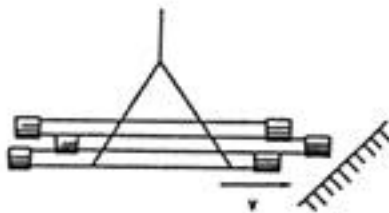


Date: 13.06.1994

PROTECTOR TEST

DATA SHEET  
45° IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 3 1/2" NEW VAM, pin end, closed  
nominal weight of joint = 10,20 lb/ft

Requirements: Radial impact, flat steel bar, E=888,9J (655,41ft-lb)

Results: Actual height: 0,57m (1,87 ft)

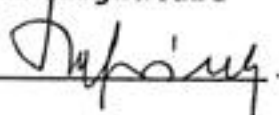
Hammer weight: 160kg (352,74 lb)

Impact energy: 897,4J (659,62 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature

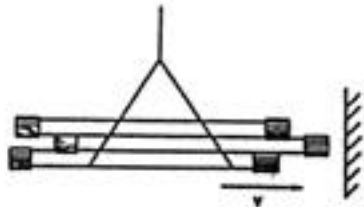




Date: 23.05.1995

PROTECTOR TEST  
DATA SHEET  
AXIAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 3 1/2" NEW VAM, pin end, open end  
nominal weight of joint = 10,20 lb/ft

Requirements: Axial impact, 1 1/2" dia. bar, E = 1777,7 J (1304,2 ft-lb)

Results: Actual height: 1,13 m (3,7 ft)

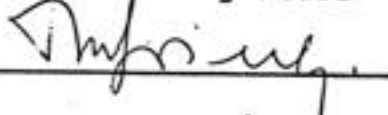
Hammer weight: 160 kg (352,74 lb)

Impact energy: 1779 J (1305,14 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature



Exquip Reu-GmbH, Auf dem Knuf 10

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# Exquip

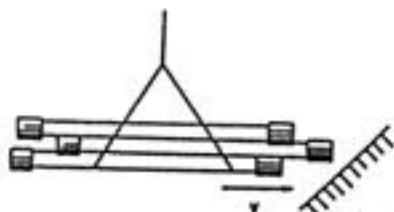
## THREAD PROTECTORS

Date: 23.05.1995

### PROTECTOR TEST

DATA SHEET  
45° IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 3 1/2" NEW VAM, pin end, open end  
nominal weight of joint = 10,20 lb/ft

Requirements: 45° radial impact, 1 1/2" dia. bar,  
E = 888,9 J (655,41 ft-lb)

Results: Actual height: 0,57 m (1,87 ft)

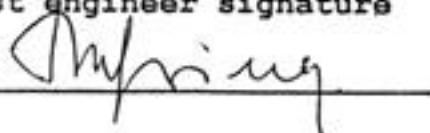
Hammer weight: 160 kg (352,74 lb)

Impact energy: 897,4 J (659,62 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature



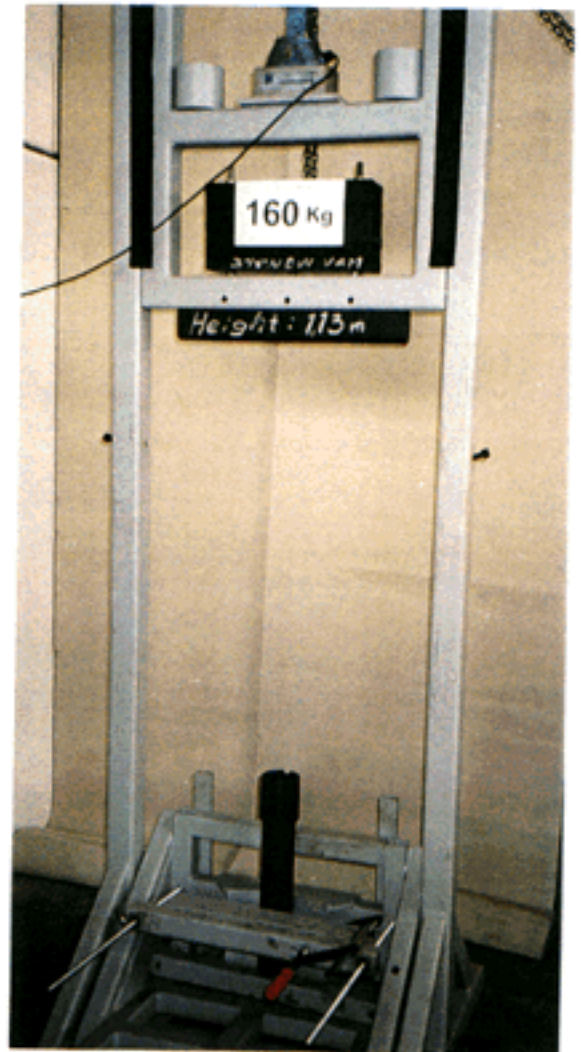
# Impact Test

**3 1/2" NEW VAM**

*Axial Impact*

Height : 1,13m (3,7 ft)

Hammer weight : 160 kg (352,74 lb)



# Impact Test



**3 1/2"  
NEW VAM**



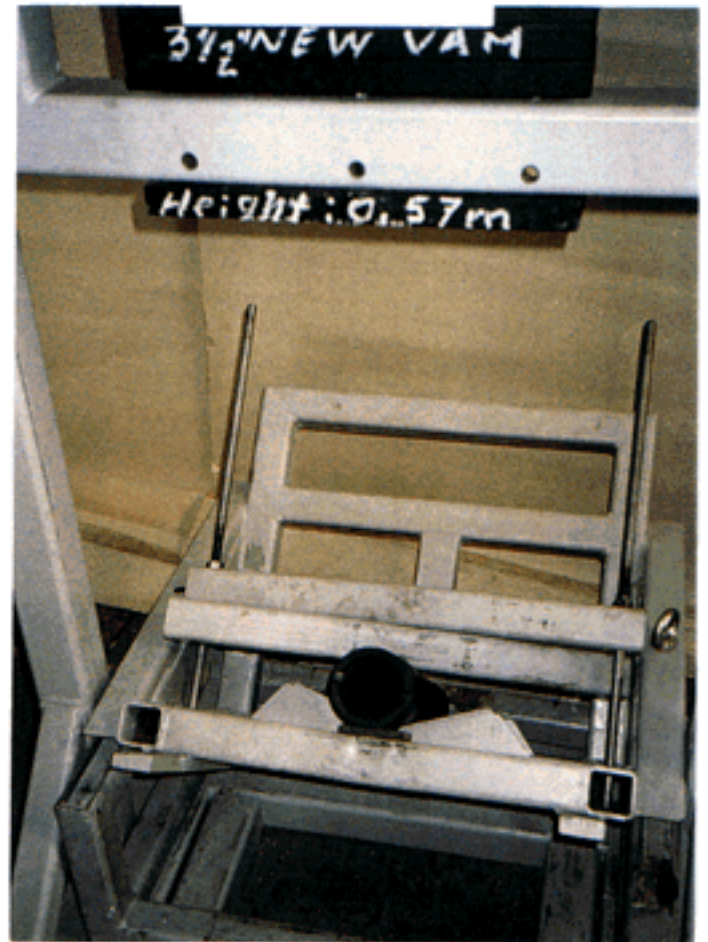
*Axial Impact*

Height : 1,13m (3,7 ft)

Hammer weight : 160 kg (352,74 lb)

# Impact Test

**3 1/2" NEW VAM**



*45° Impact*

Height : 0,57m (1,87 ft)

Hammer weight : 160 kg (352,74 lb)

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# Exquip

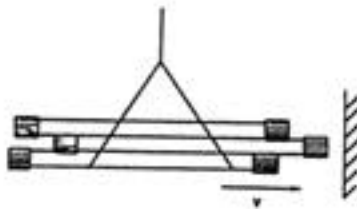
THREAD PROTECTORS

Date: 13.06.1994

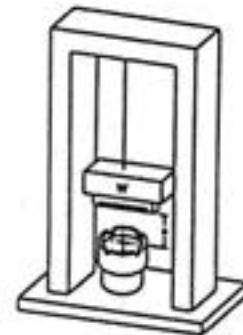
## PROTECTOR TEST

### DATA SHEET AXIAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 7" NEW VAM, pin end, closed  
nominal weight of joint = 29,00 lb/ft

Requirements: Axial impact, 1 1/2" dia. bar,  $E = 2527,14 \text{ J}$  (1863,34 ft-lb)

Results: Actual height: 1,64m (5,38 ft)

Hammer weight: 160kg (352,74 lb)

Impact energy: 2582,00J (1897,74 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature

D. Prinsly

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# Exquip

THREAD PROTECTORS

Date: 13.06.1994

## PROTECTOR TEST DATA SHEET LATERAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 7" NEW VAM, pin end, closed  
nominal weight of joint = 29,00 lb/ft

Requirements: Radial impact, 1 1/2" dia. bar, E = 1931,4J (1424,1 ft-lb)

Results: Actual height: 1,23m (4,04 ft)

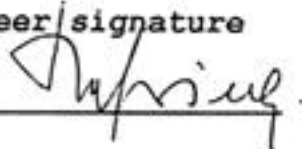
Hammer weight: 160kg (352,74 lb)

Impact energy: 1936,5J (1425,07 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer/signature

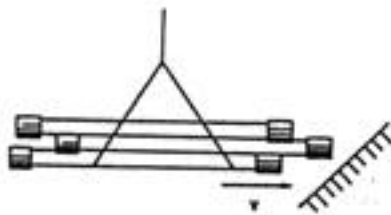


Date: 13.06.1994

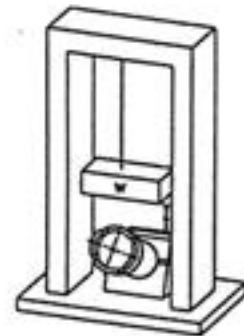
PROTECTOR TEST

DATA SHEET  
45° IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 7" NEW VAM, pin end, closed  
nominal weight of joint = 29,00 lb/ft

Requirements: Radial impact, flat steel bar, E = 1263,57J (931,67 ft-lb)

Results: Actual height: 0,81m (2,66 ft)

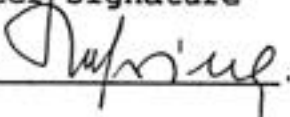
Hammer weight: 160kg (352,74 lb)

Impact energy: 1275,3J (938,30 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature





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# Exquip

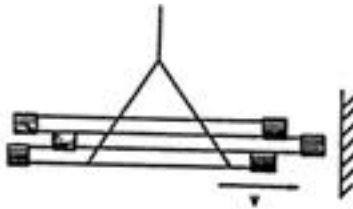
THREAD PROTECTORS

Date: 23.05.1995

## PROTECTOR TEST

### DATA SHEET AXIAL IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 7" NEW VAM, pin end, open end  
nominal weight of joint = 29,00 lb/ft

Requirements: Axial impact, 1 1/2" dia. bar,  $E = 2527,14 \text{ J} (1863,34 \text{ ft-lb})$

Results: Actual height: 1,64 m (5,38 ft)

Hammer weight: 160 kg (352,74 lb)

Impact energy: 2582,00 J (1897,74 ft-lb)

Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature

Shapiro

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# Exquip

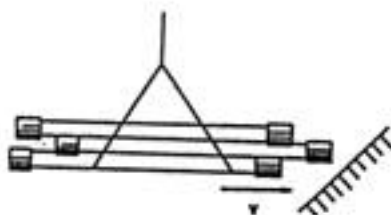
## THREAD PROTECTORS

Date: 23.05.1995

### PROTECTOR TEST

#### DATA SHEET 45° IMPACT

Field



Laboratory



$$E = m \times g \times h$$

Type of protector: 7" NEW VAM, pin end, open end  
nominal weight of joint = 29,00 lb/ft

Requirements: 45° radial impact, flat steel bar,  
E = 1263,57 J (931,67 ft-lb)

Results: Actual height: 0,81 m (2,66 ft)

Hammer weight: 160 kg (352,74 lb)

Impact energy: 1275,3 J (938,30 ft-lb)

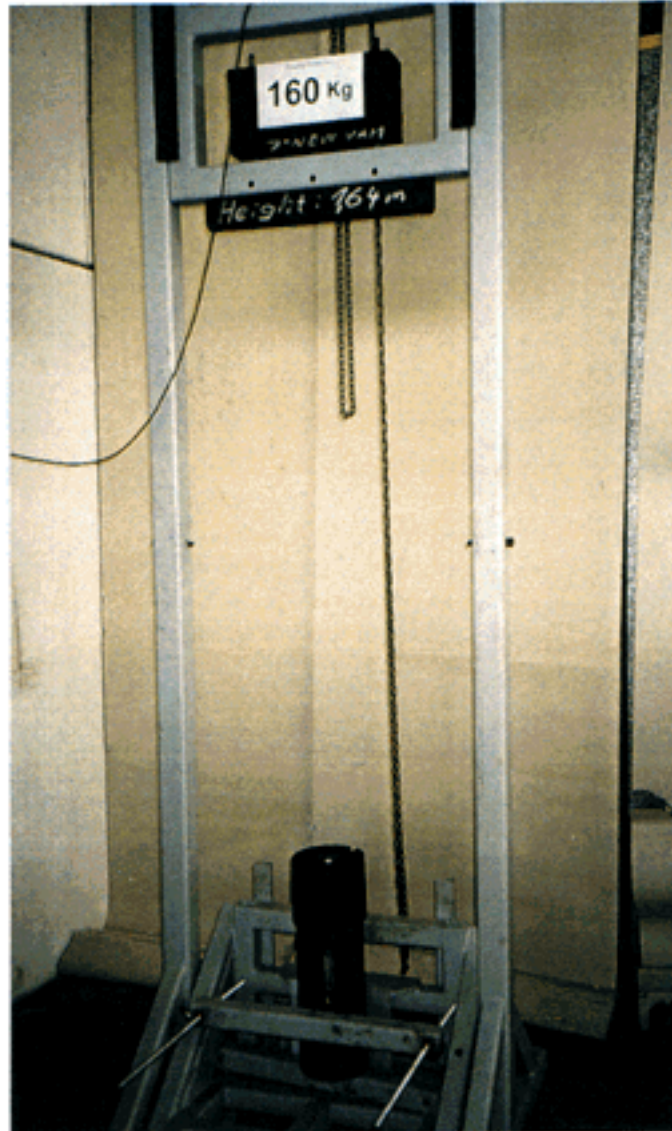
Condition of Protector:  
Dent at point of impact.

Condition of pipe end:  
No damage on pipe-end.  
No damage on thread.

Test engineer signature

# Impact Test

## 7" NEW VAM



*Axial Impact*

Height : 1,64m (5,38 ft)

Hammer weight : 160 kg (352,74 lb)

# Impact Test

7" NEW VAM



*Axial Impact*

Height : 1,64m (5,38 ft)

Hammer weight : 160 kg (352,74 lb)



# Impact Test

## 7" NEW VAM

*Axial Impact*

Height : 1,64m (5,38 ft)

Hammer weight : 160 kg (352,74 lb)



# Impact Test

## 7" NEW VAM

*45° Impact*

Height : 0,81m (2,66 ft)

Hammer weight : 160 kg (352,74 lb)

