ITS Intertek Testing Services
ETL SEMKO

Certificate of Compliance

Issued to:	HAWKE CABLE GLANDS
Certificate No:	C01003968-1
Dated	9th July 2001
Apparatus:	RANGES OF CABLE GLANDS AND CONDUIT CONNECTORS

This is to certify that the equipment identified in the attached schedule have been assessed and where necessary tested and is considered to comply with the relevant requirements of DTS01 as Amended August 1991 "Test Schedule For Electrical Equipment To Be Installed In Areas Subject to Water Deluge Systems".

ITS references: 00002347, 00003121 and 01003968

Signed:.....

A T Austin
Principal Engineer

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Certificate of Compliance

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Dated 9th July 2001

Schedule

Gland Reference	Cable type	Deluge protected with respect to enclosure	Deluge protected with respect to cable armour area, when outer seal is fitted
501/421	Non-armoured	Yes	Optional
501/423	Non-armoured	Yes	Optional
501/453 Universal	Armoured	Yes	Always fitted
501/453 RAC	Armoured	Yes	Optional
501/453 Dedicated	Armoured	Yes	Optional
ICG653 Universal	Armoured	Yes	Always fitted
ICG623 Universal	Armoured	Yes	Optional
ICG653 Dedicated	Armoured	Yes	Optional
PSG553 Dedicated	Armoured	Yes	Optional
PSG553 RAC	Armoured	Yes	Optional
753	Armoured	Yes	Optional
755	Armoured	Yes	Optional
N711	Armoured	Yes	Always fitted
710	Non-armoured	Yes	Optional
N701	Armoured Yes	Yes	Optional
SB474	Stopper box	Yes	N/A
501/414	Stopper box	Yes	N/A

The fitting of an outer deluge seal on glands shown above is optional, where the seal is fitted the gland will prevent water entry into the armour clamp area

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Drawings

Number	Issue	Date	Description
501/421	A	02/05/01	GA 501/421
501/423	A	02/05/01	GA 501/423
501/453 Universal	A	02/05/01	GA 501/453 Universal
501/453 RAC	A	02/05/01	GA 501/453 RAC
501/453 Dedicated	A	02/05/01	GA 501/453 Dedicated
ICG653 Universal	A	02/05/01	GA ICG653 Universal
ICG623 Universal	A	02/05/01	GA ICG623 Universal
ICG653 Dedicated	A	02/05/01	GA ICG653 Dedicated
PSG553 Dedicated	A	02/05/01	GA PSG553 Dedicated
PSG553 RAC	A	02/05/01	GA PSG553 RAC
753	A	02/05/01	GA 753
755	A	02/05/01	GA 755
N711	A	02/05/01	GA N711
710	A	02/05/01	GA 710
N701	A	02/05/01	GA N701
SB474	A	02/05/01	GA SB474
501/414	A	02/05/01	GA 501/414

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ITS Intertek Testing Services
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INDUSTRIAL PRODUCTS DEPARTMENT

Test Report:	**CONFIDENTIAL REPORT OF WATER DELUGE TESTS CARRIED OUT ON A RANGE OF CABLE GLANDS**
Report Number:	01003968/B
Report Date:	July 2001
Items Tested:	Future (FG) Type Range of Cable Glands
Tested on behalf of:	Hawke Cable Glands Limited Oxford Street West Aston-Under-Lyne Lancashire OL7 0NA
Client Contact:	Mr A Ogden

Prepared by:

L J Clark
Engineer

Reviewed by:

A T Austin
Principal Engineer

SUMMARY

The Future (FG) range of cable glands consisting of the sizes shown below has been subjected to water deluge tests detailed in Deluge test specification DTS01.

Standard Range: Os, O, A, B, C, C2, D E and F

No water entered the test enclosures to which the cable glands were mounted or the armour clamp area as a result of the tests.

CONFIDENTIAL REPORT OF A WATER DELUGE TESTS CARRIED OUT ON A RANGE OF CABLE GLANDS

1 APPARATUS

Future (FG) type range of cable glands as described on Hawke drawings listed below:

Drawings

Number	Issue	Date	Description
501/421	A	02/05/01	GA 501/421
501/423	A	02/05/01	GA 501/423
501/453 Universal	A	02/05/01	GA 501/453 Universal
501/453 RAC	A	02/05/01	GA 501/453 RAC
501/453 Dedicated	A	02/05/01	GA 501/453 Dedicated
ICG653 Universal	A	02/05/01	GA ICG653 Universal
ICG623 Universal	A	02/05/01	GA ICG623 Universal
ICG653 Dedicated	A	02/05/01	GA ICG653 Dedicated
PSG553 Dedicated	A	02/05/01	GA PSG553 Dedicated
PSG553 RAC	A	02/05/01	GA PSG553 RAC
753	A	02/05/01	GA 753
755	A	02/05/01	GA 755
N711	A	02/05/01	GA N711
710	A	02/05/01	GA 710
N701	A	02/05/01	GA N701
SB474	A	02/05/01	GA SB474
501/414	A	02/05/01	GA 501/414

2 TESTS

The samples were received for testing on 20th March 2001.

The future gland assemblies were stored for 2 weeks at 95°C, 90% RH for to weeks followed by two weeks at 100°C and then 24 hours at –65/70°C.

The assemblies were then fitted into sealed test enclosures and subjected to the water tests detailed in Deluge test specification DTS01.

3 RESULTS

Date of test: 20th and 21st March 2001.

Future type range of cable glands: no water entered the test enclosures via the cable glands or into the armour clamping area between the inner and outer gland seals as a result of the tests.

4 CONCLUSIONS

The range of cable glands identified in Section 1 above were subjected to the deluge tests identified in Deluge test specification DTS01.

Gland Reference	Cable type	Deluge protected with respect to enclosure	Deluge protected with respect to cable armour area, when outer seal is fitted
501/421	Non-armoured	Yes	Optional
501/423	Non-armoured	Yes	Optional
501/453 Universal	Armoured	Yes	Always fitted
501/453 RAC	Armoured	Yes	Optional
501/453 Dedicated	Armoured	Yes	Optional
ICG653 Universal	Armoured	Yes	Always fitted
ICG623 Universal	Armoured	Yes	Optional
ICG653 Dedicated	Armoured	Yes	Optional
PSG553 Dedicated	Armoured	Yes	Optional
PSG553 RAC	Armoured	Yes	Optional
753	Armoured	Yes	Optional
755	Armoured	Yes	Optional
N711	Armoured	Yes	Always fitted
710	Non-armoured	Yes	Optional
N701	Armoured Yes	Yes	Optional
SB474	Stopper box	Yes	N/A
501/414	Stopper box	Yes	N/A

The fitting of an outer deluge seal on glands is optional as indicated above, where the seal is fitted the gland will prevent water entry into the armour clamp area.

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EXPLOSION AND FIRE
HAZARDS GROUP

TEST SCHEDULE FOR ELECTRICAL EQUIPMENT TO BE INSTALLED IN AREAS SUBJECT TO WATER DELUGE SYSTEMS

Prepared by the Explosion and Fire Hazards Group of ERA Technology Limited in collaboration with Shell UK Exploration and Production Limited

ERA Reference DTS01:1991

Dated July 1991

TEST SCHEDULE FOR ELECTRICAL EQUIPMENT. STANDARD TEST METHOD FOR THE EVALUATION OF PROTECTION FROM WATER INGRESS IN THE EVENT OF WATER DELUGE

1 INTRODUCTION

Electrical equipment on offshore installations may be located in areas which are equipped with emergency deluge facilities. Exposure of such equipment must not lead to water ingress in quantities which could cause the equipment to become a potential source of ignition when exposed to a flammable atmosphere.

2 SCOPE

This standard method specifies tests to be carried out on electrical equipment, components, devices and motors (from hereon referred to as samples) to simulate their exposure to realistic water deluge conditions and establish their potential hazard. Satisfactory completion of the tests does not imply suitability for offshore use in respect of other criteria.

3 GENERAL CONDITIONS FOR EACH TEST

3.1 Number of samples

The samples submitted shall be identical to each other and the number of samples as indicated in the table 1 below

Table 1

Type of equipment	Number of samples
Fluorescent luminaires	6
Floodlight and wellglass luminaires	3
Control, Fuse, Isolation and Junction Boxes	
≤ 10 litre enclosed volume	3
> 10 litre enclosed volume	6
Motors	
below 1kW	2
above 1kW	1

3.2 Mounting

Each sample shall be rigidly mounted in its normal orientation, in such a manner that the water spray onto the sample is not impeded.

3.3 Electrical connections

The sample shall be connected where appropriate (see 3.4 below) to a remote electrical supply using a suitable cable gland. Any unused cable entry on the samples shall be sealed off with a suitable blanking plug.

3.4 Sample Internal Heating

The sample may be divided into two categories:-

Sample enclosures category a)	where thermal cycling during operation of the equipment will result in a reduction in air pressure within the enclosure below that of the surrounding atmosphere.
Sample enclosures category b)	where reductions in pressure below the surrounding atmospheric pressure are not present.

For enclosures under category a) the equipment will be energised in accordance with 4.4.

For enclosures under category b) the equipment will remain unenergised throughout the deluge exposure.

Note: Enclosure category selection is based on BS 5490.

3.5 Deluge application

Water deluge shall be applied using K80 medium velocity deluge nozzles. The water pressure at each nozzle shall be within the range 3.5 bar to 4.5 bar.

3.6 Deluge water

Water shall be supplied to the deluge nozzles at a temperature in the range 5°C to 10°C. A salt solution of 35g of sodium chloride (NaCl) per litre of water shall be used.

3.7 Deluge nozzle position

Tests shall be carried out simultaneously with the deluge nozzles in two positions relative to the sample.

Position 'A' - Base of nozzle at a height of 1 metre from the top of the sample (not including mounting brackets), directly over the centre of the sample.

Position 'B' - Base of nozzle at the same height but displaced 1 metre from position A on a line at right angles to the samples longest seal.

4 SEQUENCE OF TESTS

Each of the samples supplied shall be subjected to the tests specified below. The tests are to be carried out in the sequence given below.

4.1 Insulation Resistance Test

An insulation resistance test of 500V d.c. shall be applied between all circuits and earth. The reading is to be noted.

4.2 Preconditioning

Where required, the sample seals shall be pre-conditioned by exposure to vibration or heat ageing as defined in Section 6 below.

4.3 Insulation Resistance Test

The insulation test of 4.1 shall be repeated and the results noted.

4.4 Deluge Test

Electrical power shall where appropriate (see table 1 above) be applied to the sample for 60 minutes prior to the commencement of the deluge. The samples shall be exposed to the deluge spray for a period of 3 hours. The electrical power to the samples shall be interrupted at the start of the exposure to deluge, resumed after 60 minutes, and remain on for the remaining 120 minutes.

Note:- Where it is not practical to achieve full dissipation within the deluge facility with the samples normal full exitation (for example a loaded motor), other means of internally heating the sample by the equivalent of its full continuous load dissipation may be used ie. d.c. on an inductive component or internal heater or etc.

4.5 Insulation Resistance Test

The insulation test of 4.1 shall be repeated and the results noted.

5 RESULTS OF TESTS

An individual sample shall be deemed to have met the requirements of this standard if it continues to operate satisfactorily after the deluge test, and satisfies the criteria in Section 5.1 and 5.2

5.1 Insulation resistance

The test voltage in all cases shall be 500V d.c. The test shall be applied between all leads (all circuits) connected together and earth and where appropriate, between poles.

The insulation resistance shall be not less than 10MΩ.

5.2 Examination

The sample shall be opened and visually examined for the presence of water.

5.2.1 Inspection

If water is present inside the sample it shall be decanted into a measuring container and its volume recorded. An individual sample with an internal volume of greater than 0.1 litre shall be deemed

to have met the requirements of this standard if less than 5ml of water is present inside the sample, for samples with an internal volume of 0.1 litre or less the acceptance limit for water entry shall be up to 5% of the internal volume.

If, subsequent to deluge exposure, the insulation fails to meet the requirements of Section 4.1, the condition of the sample shall be investigated to diagnose the probable cause of the failure including, if appropriate, the identification of the likely water ingress path.

6 PRE-CONDITIONING (AGEING) TESTS

If it is appropriate, and any seals could be expected to age, then one of the following pre-conditioning procedures may be instigated at the discretion of the test authorities.

6.1 Vibration exposure sequence

Each sample shall be tested to determine its resonant vibration frequencies in the frequency range 0.5Hz to 100Hz.

It shall then be exposed to vibration at selected frequencies, with a specified amplitude or acceleration, for 8 hours in each mutually perpendicular axis at each selected frequency.

6.1.1 Resonant frequency determination

The sample shall be rigidly mounted, in its normal orientation, to a vibration test apparatus. Testing shall be carried out in three mutually perpendicular directions, one of which shall be vertical in respect to the normal orientation of the sample. The sample shall be subjected to vibration with a frequency swept between 0.5Hz and 100Hz at a rate sufficiently slow to enable external resonances to be clearly observed. At frequencies between 0.5Hz and 13.2Hz, the vibration amplitude shall be ± 1mm. At frequencies between 13.2Hz and 100Hz, the vibration acceleration shall be ± 0.7g. During each determination the resonance amplification factor Q shall be measured. The frequency and Q factor shall be recorded whenever the Q factor exceeds 2 but is less than 5.

In addition, attention shall be paid to relative movement between the body and cover (end plates) of the sample. The frequencies and sample orientation at which movement occurred shall be noted.

6.1.2 Vibration exposure

The sample shall be mounted as Section 6.1.1 above. It shall be exposed to vibration for a period of 8 hours at each of two frequencies noted for maximum body to cover movement. If only one body to cover resonance was noted, the two 8 hour exposures shall consist of that body to cover resonance and the highest (but between a Q and 2 and 5) fitting resonance noted at Section 6.1.1.

If no resonances between body and cover were noted, then the two 8 hour exposure runs shall consist of the two maximum sample resonances noted in Section 6.1.1. with a 'Q' of between 2 and 5. If only one sample resonance with a Q of between 2 and 5 was noted, the exposure shall consist of that frequency and 30Hz (± 0.7g). If no resonances of the sample of a 'Q' between 2 and 5 and no body to cover resonances were found, the exposure shall consist of one 8 hour exposure at 30Hz (± 0.7g).

This procedure shall be repeated for each mutually perpendicular direction.

Note:- The vibration exposure sequence is based on Vibration Test 1 of the Lloyd's Register Type Approval Scheme, and apparatus suitable for the Lloyd's test will normally also be suitable for this sequence.

6.2 Thermal ageing

The following temperature and humidity exposures are designed to prematurely age any non-metallic seals by exposure to a combination of high temperature with high humidity and low temperature.

6.2.1 Thermal ageing by heat

The sample shall be subjected to continuous storage for four weeks in an ambient of 90% relative humidity and at a temperature of 20K above the maximum service temperature specified by the manufacturer and at least 80°C.

In the case of a maximum service temperature above 80°C the period of four weeks provided above will be replaced by a period of two weeks at (95 ± 2) °C and 90% relative humidity followed by a period of two weeks at a temperature of 20K higher than the maximum service temperature specified by the manufacturer and at normal ambient humidity.

6.2.2 Thermal ageing by cold

The sample shall be subjected to storage for 24 hours in an ambient temperature specified by the manufacturer corresponding to between 5 and 10K below the minimum service temperature.

Note:- The Thermal ageing sequence is based on CENELEC Standard EN50 014.