CERTIFICATE OF TYPE APPROVAL

This is to certify that the design methodology and the manufacturing processes for the product identified below was found to be in compliance with the stated Regulations and Standards

Product: **Distributed Buoyancy Module & Internal Clamp**

Manufactured by: **Balmoral Comtec Limited**
Balmoral Park
Loirston
Aberdeen
AB12 3GY
Scotland

Specified regulations and standards: API Specification 17L1: 2nd Edition: June 2021
(Specification for Ancillary Equipment for Flexible Pipes and Subsea Umbilicals)

We further certify that the manufacturer's arrangements for consistently manufacturing the product in accordance with the approved type have been assessed and found to be satisfactory.

This Type Approval Certificate is valid until: 29/05/2030

Issued by:	Author: Callum MacLennan Position: Senior Engineer	Approver: Rahul Gopal Position: Senior Engineer
Bureau Veritas UK Limited The Quadrant, Poynernook Road, Aberdeen AB11 5QX	Signature & Stamp:	Signature & Stamp: PP
	Date: 17th December 2025	Date: 17th December 2025

Certificate Revision History

Revision	Reason for Revision
0	Recertification of Type Approval Certificate 15ABD10457 Rev. G

Schedule of Approval

1 Product Description:

Modules consist of an internal clamp and syntactic buoyancy module (or an integral clamp, embodied to syntactic buoyancy module) which are spaced along a required length of the flexible/umbilical to achieve a certain configuration including lazy, steep, pliant and W-wave. These distributed buoyancy modules and clamps are developed on a project specific basis, Bureau Veritas' scope of work was to provide Type Approval Certification to verify the design methodology, manufacturing process and testing of these elements with regards to design code API Specification 17L1: 2nd Edition along with other applicable referenced codes specified in this certificate.

2 Application/Limitations:

Typical application parameters to be considered project specific:

- Nominal Flow line OD (for buoyancy module to be secured to a flow line)
- Max. Operating Depth
- Max. and Min. Calculated assembly weight in Air
- Buoyancy based on sea water density
- Max. and Min. Initial buoyancy at atmospheric pressure
- Max. and Min. Short-term buoyancy
- Max .and Min. Long-term buoyancy

The design of the Buoyancy Modules and Clamps verified by Bureau Veritas under this certificate are subject to the following limitation:

Limitations	Value
Maximum Internal Shell Volume	4555.2 l
Maximum Initial Buoyancy at Atmospheric Pressure	4639.1 kg

Bureau Veritas has assessed the Buoyancy Modules which are documented by the Independent Appraisal Report for which this Certificate of Type shall always be read in conjunction with:

25ABD10886 Rev. 0 Independent Appraisal Report

3 Design Calculations, Design Methodology, Drawings, Documentation and Specifications:

Historic Table of Document References

Title	Reference No.	Rev.
Buoyancy Module General Arrangement	XXXXX-GA-01	03
Buoyancy Module and Premium Clamp BOD	DBM-DB-2	03
Buoyancy Module and Symmetrically Loaded Clamp BOD	DBM-DB-6	01
Slip Load Calculation for Alpha Factor Verification	CLP-DC-2	01
Slip Load Calculation for Alpha Factor Verification (Sym.)	CLP-DC-8	01
Premium Clamp Assembly	XXXXX-SA-01	03
Symmetrically Loaded Clamp Assembly	XXXXX-SA-02	02
ITP Distributed Buoyancy with Premium Clamp	14382-PD-002-001	02
Test Report Distributed Buoyancy with Premium Clamp	14382-PD-011-001	01
Buoyancy Module General Arrangement	XXXXX-GA-01	03
Three Piece Clamp Assembly	XXXXX-SA-XX	03
Buoyancy Module & Clamp Design Basis (3 Piece)	DBM-DB-6	01
Buoyancy and Component Stress Calculation (3 Piece)	DBM-DC-7	01
Slip Load Calculation for Alpha Factor Verification (3 Piece)	DBM-DC-8	01
Clamp Load Calculation (3 Piece)	CLP-DC-4	01
ITP Distributed Buoyancy with Premium Clamp (3 Piece)	14484-PD-002-001	01
Production Test Report	13766-PD-011	01
Buoyancy Module General Assembly	70101-DEV-V5	02
Integral Buoyancy Module Element	70101-DEV-V1	02
Integral Buoyancy Module Qualification Design	70101-DC-30	-
Integral Module Clamp Rubber Spring FEA Report	70101-DR-2	02
Integral Buoyancy Module Design Reference Appendices	70101-REF-1	01
Input Reference Document	70101-REF-2	-
ITP Integral Clamp Distributed Buoyancy	70101-PD-002-001	01
Pre-Production Test Report	14436-PD-009-001	01
General Assembly	14259-GA-1	01
Integral Clamped Buoyancy Module Design Basis	DBM-DB-4	02
Integral Clamped Distributed Buoyancy Ref. Documentation	DBM-DB-6	01
Slip Load Calculation for Alpha Factor Verification	DBM-DC-5	01
ITP Integral Clamp Distributed Buoyancy	14436-PD-002-001	03
Buoyancy Module Production Test Report	14283-PD-011-001	01
Certificate of Type Approval Distributed Buoyancy Module & Internal Clamp	15ABD10457	G

Note: Documentation with reference numbers "XXXXX" denotes document templates that will be customised with a specific project contract number.

Addition of Documentation References

Title	Reference No.	Rev.
Buoyancy and Component Stress Calculation	DBM-DC-10	04
Integral Plus Buoyancy Module Design Calculation	DBM-DC-40	03
Clamping Load Calculation	CLP-DC-10	05
Symmetrically Loaded Clamp Design Calculation	CLP-DC-50	03
Buoyancy Module and Premium Clamp Design Basis	DBM-DB-2	03
Buoyancy Module and Premium Clamp Design Basis	DBM-DB-10	01
Premium Clamp Distributed Buoyancy Reference Documentation	DBM-DB-11	01
Tolerance Calculation on First Pull Stiffness for Roblon Multi Straps	DBM-DB-22	01
Buoyancy Module General Arrangement	DBM-GA-10	03
Integral Plus Buoyancy Module General Arrangement - Cold Cure	DBM-GA-40	01
Buoyancy Module General Arrangement	DBM-GA-50	02
Premium Clamp Assembly	DBM-SA-10	02
Buoyancy Module Symmetrical Clamp Assembly	DBM-SA-50	01
Integral Clamped Buoyancy Module Design Basis	DBM-DB-20	01
Integral Clamped Distributed Buoyancy Module – Reference Documentation	DBM-DB-21	01
Integral Clamped Buoyancy Module Design Calculation – Curved Rubber	DBM-DC-20	04
Integral Clamped Buoyancy Module General Arrangement Curved Rubber – Cold Cure	DBM-GA-21	01
Integral Clamped Buoyancy Module General Arrangement Curved Rubber – Hot Cure	DBM-GA-20	01
Integral Clamped Buoyancy Module Design Calculation – Cuboid Rubber	DBM-DC-30	04
Integral Clamped Buoyancy Module General Arrangement Cuboid Rubber – Cold Cure	DBM-GA-30	01
Integral Clamped Buoyancy Module General Arrangement Cuboid Rubber – Hot Cure	DBM-GA-31	01
General Arrangement Drawing	15231-GA-01	04
Inspection and Test Plan	15231-PD-002-001	05
Pre-Production Test Report	15231-PD-008-001	03

Bureau Veritas' approval of the above documents are detailed in the Independent Appraisal Report 25ABD10886 Rev. 0.

4 Material Specifications:

Balmoral Comtec Limited shall produce records of tests demonstrating that the material selected for a specific application meet the functional requirements specified for the ancillary equipment, for the service life for storage, transport, installation, and operation conditions.

Materials detailed below have been reviewed against the requirements of API Specification 17L1: 2nd Edition.

Buoyancy Module:

Component	Material
Foam Core:	Hot and Cold Cure Syntactic Foam [Ref. Note 1, below]
Shell:	Polyurethane (BC-PU-140 / BC-PU-103) Polyethylene (BC-PE-501 / BC-PE-506) GRP (Glass Reinforced Plastic)
Tensioning Assembly:	Super Duplex (UNS 32760/UNS 32750)
	or Inconel (UNS N06625)
	or Titanium (Grade 5, UNS R56400)
Cap:	Low Density Polyethylene (BC-PE-506)

Buoyancy Module (with Integral and Integral Plus Clamp):

Component	Material
Foam Core:	Hot and Cold Cure Syntactic Foam [Ref. Note 1, below]
Shell:	Polyurethane (BC-PU-140 / BC-PU-103) Polyethylene (BC-PE-501 / BC-PE-506) GRP (Glass Reinforced Plastic)
Tensioning Assembly:	Super Duplex (UNS 32760/UNS 32750)
	or Inconel (UNS N06625)
	or Titanium (Grade 5, UNS R56400)
Cap:	Low Density Polyethylene (BC-PE-506)
Radial Springs:	Natural Rubber (EM67 formulated to EDS6)

Premium Clamp:

Component	Material
Clamp Body:	High Performance Pure Syntactic Foam (BC-CS-750)
Radial Springs:	Natural Rubber (EM67 / EDS 6)
Tensioning Assembly:	Titanium (Grade 5, UNS R56400)
Elastomer Hinge Coating:	Polyurethane (BC-PU-140 / BC-PU-103)

Three Piece Clamp:

Component	Material
Clamp Body:	Polyurethane (BC-PU-135/BC-PU-164)
Axis Bar:	Super Duplex (UNS 32760/UNS 32750)
	or Inconel (UNS N06625)
	or Titanium (Grade 5, UNS R56400)
Bolt:	Super Duplex (UNS 32760/UNS 32750)
	or Inconel (UNS N06625)
	or Titanium (Grade 5, UNS R56400)
Washer:	Super Duplex (UNS 32760/UNS 32750)
	or Inconel (UNS N06625)
	or Titanium (Grade 5, UNS R56400)
Washer:	PTFE (6/6)
Nuts:	Super Duplex (UNS S32750/ASTM A276M)

Clamp Lifting Eye Assembly:

Component	Material
Lifting Eye Nut:	Forged Steel (G-400)
Dual Threaded Rod:	Super Duplex (UNS S32760)
Additional Nut:	Super Duplex (UNS S32760)

Note 1: The buoyancy module foam core material qualification testing is carried out on a case-by-case basis, depending on the project parameters.

Test Procedures for Polymer materials to be according to standards specified in Table 5 API Specification 17L1: 2nd Edition.

Balmoral Comtec Ltd. shall produce the qualification test records to prove the compliance of material selected for Buoyancy module and clamp to the requirement specified in Sections 4.4, 8.5 and 12.4 of API Specification 17L1: 2nd Edition.

5 Fabrication/Testing Procedures/QMS Audit Procedures:

API Specification 17L1: 2nd Edition, provides detailed procedures for performing factory acceptance tests (FATs). Balmoral Comtec Ltd specifies the production test procedures for Buoyancy Module assemblies as detailed in section 3. Bureau Veritas have reviewed these documents and found them to be in accordance with the requirement.

Bureau Veritas conducted an audit to assess the quality management system (QMS) arrangements, and practices in place for design and manufacturing process of Buoyancy Modules (and Clamps) at Balmoral Comtec Ltd. The audit was carried out on 16th & 17th of June 2025 and is detailed in Type Approval Audit Report No. 25ABD10479 Rev. 03.

As a result of the Type Approval Audit, it was concluded by the Auditor that Balmoral Comtec Limited have adequate systems in place which are in compliance with the specified regulations and standards.

6 Type Test reports/Laboratory Reports/Certificates:

Balmoral Comtec Ltd shall notify Bureau Veritas regarding Integral Plus Buoyancy Module testing activities to enable Bureau Veritas to conduct a complete witness inspection in accordance with the Inspection and Test Procedure.

7 Marking of Product:

Marking of product shall comply with minimum requirements of section 4.8.1 of API Specification 17L1: 2nd Edition.

8 Certificate Retention:

The retention of the type approval certificate is subjected to satisfactory annual surveillance according to the plan provided in Appendix A.

9 Documentation to accompany each product:

The following Project Specific documentation shall accompany each product:

a) Design Premise
b) Design Report
c) Manufacturing Quality Plan
d) Installation Procedures
e) As-built documentation – with supplied ancillary equipment
f) Detailed engineering drawings

10 Comments:

10.1 Balmoral Comtec Ltd shall demonstrate all relevant documents including design reports, calculations, manufacturing and test documentation as applicable on a case-by-case basis for each project specific product.

10.2 This type approval certifies that the design methodology and the manufacturing processes for the Approved Type were found to be in compliance with the stated regulations and standards. When in-service this product shall be subject to Verification and Examination and comply with the applicable shelf state requirements.

10.3 Balmoral Comtec Ltd are currently performing aged shear testing of clamp rubber springs. The results of the ongoing test, once completed, shall be presented to Bureau Veritas for review.

10.4 Balmoral Comtec Ltd shall notify Bureau Veritas to witness the first production batch of the Integral Plus Buoyancy Module.

End of certificate

Appendix A – Surveillance Plan

Part (A) - Implementation of Quality Management System

* Mandatory Elements all Visits		**SURVEILLANCE** All activities & Processes must be audited at least once over each **5** year period				
S.No.	**ELEMENTS TO BE EXAMINED**	**Recertification**	**Surv. 1**	**Surv. 2**	**Surv. 3**	**Surv. 4**
		2025	*2026*	*2027*	*2028*	*2029*
1*	*QMS / Manual / Policy / Objectives (4.4, 5.2, 6.2)	✓	✓	✓	✓	✓
2*	*Management Review (9.3)	✓	✓	✓	✓	✓
3*	*Internal Audit (9.2)	✓	✓	✓	✓	✓
4*	*Improvement / Internal NCR Process (10)	✓	✓	✓	✓	✓
5*	*Customer Satisfaction /Requirements (9.1.2)	✓	✓	✓	✓	✓
6*	*Roles, Responsibilities Competency, & Training (5.3, 7.2)	✓	✓	✓	✓	✓
7	Resource Management (7.1.1, 7.1.2, 7.1.3, 7.1.4)	✓				
8	Design & Development (8.3)	✓				
9	Control of Documents (7.5)	✓				
10	Control of Records (7.5)	✓				
11	Customer Property (8.5.3)	✓				
12	Identification & Traceability (8.5.2)	✓				
13	Control of Product & Service Provision (8.5.1) (Process Control)	✓				
14	Inspection and Testing (8.3.4) #	✓				
15	Control of Monitoring & Measuring Equipment (7.1.5) (Calibration)	✓				
16	Operational Planning & Control (8.1, 8.2)	✓				
17	Control of Non-Conforming Product (8.7)	✓				
18	Preservation of Product (8.5.4)	✓				
19	Control of externally provided processes, products and services (8.4)	✓				
20	Responsibilities, Authority & Communication (5.3, 7.4)	✓				
	Assessor's initials	CM/GR				

1. In the Initial Assessment column, confirm by the use of a (✓) that all specified clauses have been audited.
2. In the Surveillance Audit columns, indicate by the use of a (✓), all of the clauses that have been audited during that Surveillance Audit and get agreement by the Client on the day of the Audit.
3. In both Initial Assessment and Surveillance Audit columns, when Non-Conformance, Opportunity for Improvement or Best Practice has been raised, identify by marking with abbreviated Serial Number accordingly.
4. S.No. 7 to 20 to be agreed with the Client for the respective surveillance visits.
5. # check Part (B) for Additional Elements

Part (B) - Additional elements (Witness Manufacturing Tests)

Design: Distributed Buoyancy Module (and Clamps)

Activity	Status of ITP Activities	Witness Inspection Report
Witness Manufacturing Tests for Distributed Buoyancy Module – Recertification 2025 Integral Plus Buoyancy Module ITP (TBC)	TBC	TBC

To maintain the validity of this Certificate of Type Approval, quality management surveillance and endorsements of the witness manufacturing tests to be performed annually by a Bureau Veritas Surveyor.

End of Appendix