# Confirmation of Product Type Approval

**Company Name:** TRANSFLUID S.P.A.

**Address:** VIA GUIDO ROSSA, 4 GALLARATE 21013 Italy

**Product:** Battery

**Model(s):** Transfluid TF-Lithium Battery System

**Endorsements:**

| Certificate Type | Certificate Number | Issue Date | Expiry Date |
|---|---|---|---|
| Product Design Assessment (PDA) | 25-0182459-PDA | 19-FEB-2025 | 18-FEB-2030 |
| Manufacturing Assessment (MA) | 25-6875876 | 27-FEB-2025 | 26-FEB-2030 |
| Product Quality Assurance (PQA) | NA | NA | NA |

**Tier**
2 - PDA Issued

**Intended Service**
Marine and Offshore Applications: hybrid and all-electric power systems for marine vessels (e.g., ferries, tugs, ships, superyachts) and offshore vessels/units

**Description**
Lithium-Iron Phosphate LFP (LiFePO4) based modular and scalable solution.

Three basic battery modules 51.2V-210Ah, 102.4V-105Ah and 102.4V- 210Ah that can be connected in series to form a string obtaining up to 409,6 VDC and/or paralleled up to 32 parallels to increase the total capacity.

All modules are equipped with integrated Battery Management System (BMS) that monitors relevant parameters, the modules are interconnected electrically and by means of a communication bus that provides an interface with external systems/control devices.

See the attachment for details about Cells, Battery System, Battery Modules, Battery Management System (BMS), Master Controller (MCR) and Expander (KBI).

**Ratings**
Cell chemistry: Lithium-Iron Phosphate LFP (LiFePO4)

Nominal Voltage/Capacity: 102.4 V 105Ah or 210Ah

Cut-off Voltage: Charge = 115.2 V - Discharge = 88 V

Max charge/discharge current 105Ah module: Charge = 84A (0,8C) - Discharge= 210A (2C)

Max charge/discharge current 210Ah module: Charge = 168A (0,8C) - Discharge= 420A (2C)

Nominal Voltage/Capacity: 51,2 V 210Ah

Cut-off Voltage: Charge = 57.6 V- Discharge = 44 V

Max charge/discharge current 210Ah module: Charge = 168A (0,8C) - Discharge= 420A (2C)

Hardware version for all battery modules is: 1

Operating temperature: -10/+ 45°C

Enclosure housing: Stainless Steel

IP protection: IP65

Interlock: HVIL

Weight 51.2V 210 Ah: 112 kg

Weight 102.4V 105 Ah: 112 kg

Weight 102.4V 210 Ah: 200 kg

Weight MCR: 7 kg

Weight EXP: 6 kg

Internal cells connection: up to 32 cells in series per 102.4V modules or up to 16 cells per 51.2V modules (depends upon requested final target voltage).

**Service Restrictions**
1. Unit Certification is required for this product based on intended applications, such as electric propulsion and essential services, or for the charging/discharging of battery systems of capacity greater than 25 kW as per 4-8-3/5.11.1 (a) of the ABS Marine Vessels Rules (MVR) and ABS Requirements for Use of Lithium Batteries in the Marine and Offshore Industries.

2. To be installed only in the general power distribution zone (not in the bridge and deck zone).

3. The scope of Type Approval is to comply with MSC.1/Circ.1221 dated 11 December 2006.

**Comments**
The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.

**Notes, Drawings and Documentation**
Product Specification No.PBRI-LF105-D06-01 Ver.E dated May 2023

Drawing No.TF7227A Rev.3 Material Safety Data Sheet

LiFePO4 Batteries Use, Installation and Maintenance Manual No.TF7380DA

Li-Ion Batteries FMEA

Drawing No.TA.01.01 Rev.12 Type Approval Document List dated 06-11-2023

Drawing No.TA.01.02 Rev.2 Glossary and Definitions dated 60-11-2023

Drawing No.TA.02.00 Rev.9 Product List and Specification dated 06-11-2023

Mechanical Drawing No.TA.02.01 Rev.6 dated 06-11-2023

Mechanical Drawing No.TA.02.01 Rev.7 dated 16-03-2023

  

Drawing No.TA.02.02 Rev.8 Electrical Drawing dated 06-11-2023

Drawing No.TA.02.03 Rev.6 Functional description of the battery architecture dated 06-11-2023

Drawing No.TA.02.04 Rev.9 Battery connection dated 06-11-2023

Drawing No.TA.02.05 Rev.8 Safety Description dated 06-11-2023

Drawing No.TA.02.06 Rev.5 Battery control signal format dated 06-11-2023

Drawing No.TA.02.07 Rev.5 Data communication protocol dated 06-11-2023

Drawing No.TA.02.08 Rev.5 Hardware and firmware revision information dated 06-11-2023

Drawing No.TA.02.09 Rev.5 Product marking information dated 06-11-2023

Drawing No.TA.02.10 Rev.5 Operating characteristics and condition dated 06-11-2023

Drawing No.TA.03.01 Rev.5 Functional description dated 06-11-2023

Drawing No.TA.03.02 Rev.5 Block diagram dated 07-11-2023

Drawing No.TA.03.03 Rev.6 Power Supply arrangement dated 07-11-2023

Drawing No.TA.03.04 Rev.4 List of controlled and monitored points dated 07-11-2023

Drawing No.TA.03.05 Rev.4 Documentation of SOH and SOC calculation dated 07-11-2023

Drawing No.TA.03.06 Rev.5 Safety function implementation dated 07-11-2023

Drawing No.TA.03.07 Rev.5 Sensors failures detection dated 07-11-2023

Drawing No.TA.03.08_Rev.5 Cell balancing dated 07-11-2023

Drawing No.TA.04.00 Rev.10 Test Plan dated 07-11-2023

Drawing No.TA.04.01 Rev.2 Battery Production Routine Test dated 08-03-2023

Drawing No.TA.04.02 Rev.1Independent Safety Function test dated 02-08-2019

Drawing No.TA.04.03 Rev.3 Undervoltage protection dated 27-04-2023

Drawing No.TA.04.04 Rev.3 BMS Cell balancing dated 24-07-2023

Drawing No.TA.04.06 Rev.2 SOC validation dated 18-10-2023

Drawing No.TA.04.07 Rev.02 Capacity validation dated 18-10-2023

Drawing No.TA.04.08 Rev.1 Sensor Failure dated 01-08-2019

Drawing No.TA.04.09 Rev.1 Alarms nd Shutdowns dated 01-08-2019

Drawing No.TA.04.10 Rev.1 Communication Failure dated 01-08-2019

Drawing No.TA.04.13 Rev.1 Mechanical tests dated 18-06-2024

Drawing No.I.10.10 Rev.0 Quality Plan Firmware Development dated 21-10-2024

Drawing No.15296 dated 10-05-2024 Test Checksheet

FWrelease_BBSMaster_v4.0.26.xx_YYMMDD Rev.3 dated 01-07-2022

FIRMWARE 6 Version CHANGE LOG

  

TRANSFLUID Test Report No.TF7158 Rev.4 and TF7159 Rev.3 dated 2023 Insulation Resistance and High Voltage

GUANGZHOU MCM Test Report No.ZJ20160425U01 dated 26-05-2016

GUANGZHOU MCM Test Report No.ZJ20160425U02 dated 26-05-2016

GUANGZHOU TECHNOLOGY CENTER (UN38.3) Test Summary No.01052000000319-2(E) dated 16-03-2020 for LF105

NEMKO Test Report No.362776-2TRFEMC Rev.2 dated 007-02-2019

NEMKO Test Report No.362776-3TRFEMC Rev.2 dated 007-02-2019

NEMKO Test Report No.404051-3TRFEMC Rev.3 dated 01-12-2020

NEMKO EMC Test Report No.REP013388 dated 07-07-2023

Vkan Certification & Testing Co. Ltd. TEST SUMMARY No.RZUN2020-3412-TS dated 07-12-2020 for G03075 UN38.3

Vkan Certification & Testing Co. Ltd. TEST SUMMARY No.RZUN2020-3413-TS dated 07-12-2020 for G03072 UN38.3

ICEPI Test Report No.20AMB09671 r01 dated 01-09-2020 for IP

ICEPI Test Report No.20AMB09675 r01 dated 01-09-2020 for IP

ICEPI Test Report No.20AMB09679 r01 dated 01-09-2020 for IP

ICEPI Test Report No.20AMB11496 r01 dated 01-09-2020 for IP

ICEPI Test Report Climatic No.19AMB05258 Rev.00 dated 21-06-2019

ICEPI Test Report Climatic No.19AMB05275 Rev.00 dated 21-06-2019

BPS Test Report No.2019RT009A Rev.00 dated 03-04-2019 for Vibrations

BPS Test Report No.2019RT010 Rev.00 dated 29-03-2019 for Vibrations

BPS Test Report No.2019RT017 Rev.00 dated 10-05-2019 for Vibrations

BPS Test Report No.2020RT032 Rev.0 dated 17-11-2020 for Vibrations

TUV Test Report No.23AMB05070 r01 dated 26-05-2023 for IP Box

TUV Test Report No.23AMB05074 r01 dated 26-05-2023 for IP Box

Flash Battery Srl Test Report No.TA.04.12 Rev.2 dated 18-10-2023 for Propagation Test Thermal Runaway

Kaitek Test Report No.TA.04.12 Rev.1 dated 25-09-2019 for Overheating Control

Kaitek Test Report No.TA.04.11 Rev.1 dated 01-08-2019 for Overheating Control

Flash Battery Srl Test Report No.TA.04.05 Rev.2 dated 24-07-2023 for Overcharge with Voltage

INTERTEK Test Report No.210403016SHA-001 dated 30-06-2020 for LF105 (UL9540A Gas Analysis)

TUV Certificate No.Z2 18 04 98952 003 dated 09-04-2018 for LF105 (IEC62619)

UL1642 Certificate of Compliance No.20190204-MH62190 dated 04-02-2019 for LF105

**Term of Validity**

  

This Product Design Assessment (PDA) Certificate remains valid until 18/Feb/2030 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

**ABS Rules**
2025 Rules for Conditions of Classification, 1-1-4/7.7, 1-1-A3, 1-1-A4, which covers the following:

2025 Marine Vessels Rules 4-8-3/5.9, 4-9-9/Table 1

2025 Steel Vessels for Service on Rivers and Intracoastal Waterways 4-5-1/17

2025 Rules for Conditions of Classification – Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3, which covers the following:

2025 Mobile Offshore Units 6-1-7/9.17

2025 (September) ABS Guide for Use of Lithium Batteries in the Marine and Offshore Industries Section 2 and Section 3/2 & 3/5

**International Standards**
NA

**EU-MED Standards**
NA

**National Standards**
NA

**Government Standards**
NA

**Other Standards**
NA

Corporate ABS Programs
American Bureau of Shipping
Print Date and Time: 05-Mar-2025 9:12

ABS has used due diligence in the preparation of this certificate, and it represents the information on the product in the ABS Records as of the date and time the certificate is printed.

If the Rules and/or standards used in the PDA evaluation are revised or if there is a design modification (whichever occurs first), a PDA revalidation may be necessary.

The continued validity of the MA is dependent on completion of satisfactory audits as required by the ABS Rules. The validity of both PDA and MA entitles the product to receive a **Confirmation of Product Type Approval**.

Acceptance of product is limited to the “Intended Service” details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or prior to the effective date of the ABS Rules and standards applied at the time of PDA issuance. ABS makes no representations regarding Type Approval of the Product for use on vessels, MODUs or facilities built after the date of the ABS Rules used for this evaluation.

Type Approval requires Drawing Assessment, Prototype Testing and assessment of the manufacturer's quality assurance and quality control arrangements. The manufacturer is responsible to maintain compliance with all specifications applicable to the product design assessment. Unless specifically indicated in the description of the product, certification under type approval does not waive requirements for witnessed inspection or additional survey for product use on a vessel, MODU or facility intended to be ABS classed or that is presently in class with ABS.

Due to wide variety of specifications used in the products ABS has evaluated for Type Approval, it is part of our contract that; whether the standard is an ABS Rule or a non-ABS Rule, the Client has full responsibility for continued compliance with the standard.

Questions regarding the validity of ABS Rules or the need for supplemental testing or inspection of such products should, in all cases, be addressed to ABS.