



CERTIFICATE NUMBER

07-LD257374/1-PDA

DATE

24 June 2008

ABS TECHNICAL OFFICE

London Engineering Department

CERTIFICATE OF Design Assessment

This is to Certify that a representative of this Bureau did, at the request of
ABB Oy, Drives

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate. It will remain valid as noted below or until the Rules or specifications used in the assessment are revised (whichever occurs first).

PRODUCT: Frequency Converter

MODEL: ACS800LC Series

ABS RULE: 2008 Steel Vessel Rules 1-1-4/7.7, 4-8-3/7.5, 4-8-5/5 and 4-9-7/Table 9 and Table 10.

OTHER STANDARD: IEC60092, IEC60146, IEC60664, IEC60947, IEC60529, IEC60533, IEC61800 (relevant sections);

AMERICAN BUREAU OF SHIPPING


Wing F. Cheung
Engineering Type Approval Co-ordinator

TERMS & CONDITIONS OF ABS Design Assessment

1. AGREEMENT

The issuance and interpretation of this certificate is subject to the terms and conditions of the Request for Product Type Approval and Agreement which are hereby incorporated by reference.

2. REPRESENTATIONS AS TO DESIGN ASSESSMENT

Design Assessment is representation by ABS as to the structural and mechanical fitness for a particular use or service in accordance with its Rules and standards. The Rules of American Bureau of Shipping are not meant as a substitute for the independent judgment of professional designers, naval architects and marine engineers nor as a substitute for the quality control procedures of shipbuilders, engine builders, steel makers, suppliers, manufacturers and sellers of marine vessels, materials, machinery or equipment. ABS being a technical society can only act through Surveyors or others who are believed by it to be skilled and competent. ABS represents solely to the vessel Owner or other client (hereinafter "Client") of ABS that when assigning class it will use due diligence in the development of Rules, Guides, and standards and in using normally applied testing standards, procedures and techniques as called for by the Rules, Guides, standards or other criteria of ABS for the purpose of assigning and maintaining class. ABS further represents to the Client of ABS that its certificates and reports evidence compliance only with one or more of the Rules, Guides, standards or other criteria of ABS in accordance with the terms of such certificate or report. Under no circumstances whatsoever are these representations to be deemed to relate to any third party.

3. SUSPENSION OF CERTIFICATION

Any of the following events will cause immediate suspension of the certificate of design assessment unless the change is submitted to ABS for a new review

- a) Redesign of the product or products covered by this certificate.
- b) Substantial change in management organization;
- c) Failure to pay ABS fees.

4. RESPONSIBILITY AND LIABILITY

It is understood and agreed that the Certificate of Design Review (hereinafter referred to as "certificate") issued as part of the services rendered under the Agreement is a representation only that the vessel, structure, item of material, equipment or machinery or any other item covered by a certificate has met one or more of the Rules or Standards of American Bureau of

Shipping and is issued solely for the use of ABS, its committees, clients or other authorized entities. The validity, applicability and interpretation of a certificate issued under the terms of or in contemplation of the Agreement is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this certificate or any report issued in contemplation of this certificate shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied nor to create any interest, right, claim or benefit in any third party. It is understood and agreed that nothing expressed herein is intended or shall be construed to give any person, firm or corporation, other than the parties hereto, any right, remedy or claim hereunder or any provisions herein contained; all provisions hereof are for the sole and exclusive benefit of the parties hereto.

5. LIMITATION

ABS makes no representations beyond those contained herein and in the provisions of the Agreement regarding its reports, statements, plan review, surveys, certificates or other services.

6. HOLD HARMLESS

The party to whom this certificate is issued, and his assignee and successor in interest, agree to indemnify and hold harmless ABS from and against any and all claims, demands, lawsuits, or actions for damages, including legal fees, to persons or other legal entities and property, tangible, intangible, or otherwise which may be brought against ABS incidental to, arising out of or in connection with the work done, services performed or material to be furnished under this certificate, except for those claims caused solely and completely by the negligence of ABS, its agents, employees, officers, directors or subcontractors.

7. ARBITRATION

Any and all differences and disputes of whatsoever nature arising out of this agreement shall be put to arbitration in the City of New York pursuant to the laws relating to the arbitration there in force, before a board of three persons, consisting of one arbitrator to be appointed by ABS, one by Client, and one by the two so chosen. The decision of any two of the three on any point or points shall be final. Until such time as the arbitrators finally close the hearings either party shall have the right by written notice served on the arbitrators and on an officer of the other party to specify further disputes or difference under this Agreement for hearing and determination. The arbitration is to be conducted in accordance with

the rules of the Society of Maritime Arbitrators, Inc. The arbitrators may grant any relief, other than punitive damages, which they, or a majority of them, deem just and equitable and within the scope of the agreement of the parties, including, but not limited to, specific performance. Awards made in pursuance to this clause may include costs including a reasonable allowance for attorney's fees and judgment may be entered upon any award made hereunder in any court having jurisdiction. ABS and client hereby mutually waive any and all claims to punitive damages in any forum.

Client shall be required to notify ABS within thirty (30) days of the commencement of any arbitration between it and third parties which may concern ABS' work in connection with this Agreement and shall afford ABS an opportunity, at ABS' sole option, to participate in the arbitration.

8. TIME BAR TO LEGAL ACTION

Any statutes of limitation notwithstanding, Client expressly agrees for itself and its affiliated companies that its right to bring or to assert against ABS any and all claims, demands or proceedings whether in arbitration or otherwise shall be waived unless (a) notice is received by ABS within thirty (30) days after Client or its affiliates had notice of or should reasonably have been expected to have had notice of the basis for such claims; and (b) arbitration or legal proceedings, if any, based on such claims or demands of whatever nature are commenced within one (1) year of the date of such notice to ABS.

9. LIMITATION OF LIABILITY

The combined liability of American Bureau of Shipping, its officers, employees, agents or subcontractors for any loss, claim, or damage arising from negligent performance or non-performance of any services under this Agreement, of from breach of any implied or express warranty of workmanlike performance in connection with the services, or from any other reason, to any person, corporation, partnership, business entity, sovereign, country or nation, shall be limited to the greater of a) \$100,000 or b) an amount equal to ten (10) times the sum actually paid for the services alleged to be deficient.

The limitation of liability may be increased up to an amount twenty-five (25) times that sum paid for services upon receipt of Client's written request at or before the time of performance of service and upon payment by Client of an additional fee of \$10.00 for every \$1,000.00 increase in the limitation.

ABB Oy, Drives

P.O. Box 184

Hiomotie 13

Helsinki

FIN-00381

Finland

Telephone: 358 10 222 000

Fax: 358 10 222 2287

MA Certificate No. 04-TU524591-X**Product:** Frequency Converter**Model:** ACS800LC Series**Intended Service:**

Electrical drives for Ships and Offshore Units.

**Description:**

ACS800LC is based on the control algorithm of DTC resulting ultimate torque and speed performance. The drive can be configured in multi drive or single drive modes to control synchronous as well as induction motors from 1.5KVA to 6000KVA (400V to 690V supply voltage). ACS800LC series can be configured from Diode Supply Units (DSU) or IGBT Supply Units (ISU), IGBT Inverter Units (INU), active LCL filter units, Braking Chopper Units (BRC), Dynamic Braking Unit (DBU), System Control Units and Liquid Cooling Units. These modules are arranged according to the customer requirement such as out put power and motor configurations etc. A number of converter modules (rectifier or inverter) can be linked to a common DC bus, thus enabling multiple machine operation with parallel driving and braking.

The following illustrates the available modules and their configurations.

Supply Modules:

ACS800-204LC: IGBT supply module similar to INU module

ACS800-207LC: 1 - 10 IGBT supply modules with 1 to 5 LCL filter unites with power ranges from 240-5450KVA

ACS800-304LC (D3): One 6 pulse diode bridge with two types of 3 branch chokes

ACS800-704LC (D4): Two 6 pulse diode bridges with two types of 3 branch chokes

ACS800-307/507/1107/1207LC: 1-3 DSU modules up to 5700KVA (380 to 690V)

Inverter Modules:

ACS800-104LC: Direct liquid cooled IGBT inverter modules with frame sizes R7i and R8i

ACS800-104: Indirect liquid cooled or air cool IGBT inverter modules with frame sizes from R2i to R5i

ACS800-107LC: Up to 10 direct/indirect liquid cooled IGBT inverter modules from 1.5 to 5600KVA

Optional Modules:

ALCL-XXLC: Filter Module used only with IGBT supply units to reduce harmonics

ACS800-604LC: Dynamic braking module

ACS800-607LC DBU: Up to 5 ACS800-604LC modules from 250KW - 6500KW

NBRW 669: Braking Module 119KVA

ACS800-607LC BRC: Upto 6 NBRW669 modules

Drive Configurations:

ACS800-04LC: Single drive module consisting of DSUs, INUs and optional BRC/DBUs, LCUs - assembled in customer's own cabinet

ACS800-07LC: Single drive of DSU and INU with optional BRC/DBU and LCU delivered with cabinet

ACS800-14LC: Regenerative drive modular package consisting of ISU, LCL and INU with optional BRC/DBU, LCU and system control unit - assembled in customer's own cabinet

ACS800-17LC: Regenerative drive modular package consisting of ISU, LCL and INU with optional BRC/DBU, LCU and system control unit

ACS800-34LC: Low harmonic Module similar to ACS800-14LC without regeneration

ACS800-37LC: Low harmonic Module similar to ACS800-17LC without regeneration.

Ratings:

Nominal 3-phase supply voltage: range 400V, 500V and 690V. Power Rating: 1.5KVA - 6000KVA,

IP Ratings; IP42/IP54 (fully closed), IP20 with open door

Service Restrictions:

Unit Certification is required for drive units where required for essential services as per 4-8-3/5.11 and 4-8-5/5.17.9 of the Rules.

Comments:

ABB Oy, Drives

P.O. Box 184

Hiomotie 13

Helsinki

FIN-00381

Finland

Telephone: 358 10 222 000

Fax: 358 10 222 2287

MA Certificate No. 04-TU524591-X

Not Applicable

Notes/Documentation:

ACS800LC Marine Approval Documents - 00543623, BINDER 3-5 PART 1, BINDER 3/5 PART 2, BINDER 5/5 PART 1, BINDER 5/5 PART 2, FIRMWARE MANUAL, ACS800-07LC, ACS800-1007LC, ACS800-107LC, ACS800-204LC, ACS800-207LC, ACS800-304LC, ACS800-307LC and ACS800-607LC

Term of Validity:

This Design Assessment Certificate number 07-LD257374/1-PDA, dated 24/Jun/2008 will expire on 23/Jun/2013 or at an earlier date should there be alterations to the product's design or changes to the referenced ABS Rules and other specifications, which affect the product. Product use on or after 1 January 2009, will be subject to compliance with the ABS Rules or specifications in effect when the vessel, MODU or facility is contracted. The product's acceptability on board ABS-classed vessels or facilities is defined in the service restrictions of this certificate.

STANDARDS**ABS Rules:**

2008 Steel Vessel Rules 1-1-4/7.7, 4-8-3/7.5, 4-8-5/5 and 4-9-7/Table 9 and Table 10.

International:

IEC60092, IEC60146, IEC60664, IEC60947, IEC60529, IEC60533, IEC61800 (relevant sections)





ABB OY, BAU DRIVES
PO BOX 601,
SALO,
FIN 24101,
FINLAND

Reference: SPA/WFC/347129
Project Number: 1706283
CID: 004531

ATTN: Mr. Ilpo Kangas

Review Activity: Type Approval Design Assessment
Variable Speed Drive – ACS800LC – 2nd Phase

We have the application letter requesting revision of the subject frequency drive systems dated 25 April 2008 submitting three (3) copies of the subject document. We are pleased to advise that the certificate number 07-LD257374-PDA has been revised to include the additional modules described in the document and the revised certificate bears the number 07-LD257374/1-PDA. The document has been endorsed to type approved status and manufacturing audit certificate number 04-TU524591-X refers.

Enclosed is your original copy of the **Certificate of Design Assessment** covering the product. Please read the pages attached to the certificate to be sure that you understand the scope and conditions of the validity of the certificate. Since the original certificate is multi colored, we have no objections to unlimited black and white photocopies of the certificate being distributed.

Please find enclosed our invoice to cover the cost of the work involved.

Two (2) copies of each submission stamped appropriately are being returned.

Very Truly Yours

By

Wing Fo Cheung
Senior Engineer,
London Engineering Department

Enc;
CC: ABS Helsinki/P

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Drawing List

Engineering Office:	London Engineering Department	
Submitter:	ABB OY, BAU DRIVES	
Drawing No	Revision No	Drawing Title
BINDER 3-5 PART 1	0	TECHNICAL CONSTRUCTION FILE FOR CLASSIFICATION BODIES
BINDER 3/5 PART 2	0	TECHNICAL CONSTRUCTION FILE FOR CLASSIFICATION BODIES
ACS800-207LC	0	HARDWARE MANUAL
ACS800-204LC	0	HARDWARE MANUAL
ACS800-107LC	0	HARDWARE MANUAL
ACS800-304LC	0	HARDWARE MANUAL
ACS800-307LC	0	HARDWARE MANUAL
ACS800-1007LC	0	LIQUID COOLING UNIT
ACS800-07LC	0	HARDWARE MANUAL
ACS800-607LC	0	HARDWARE MANUAL
FIRMWARE MANUAL	0	BRAKE CONTROL PROGRAM
BINDER 5/5 PART 1	0	TECHNICAL FILE FOR CLASSIFICATION BODIES
BINDER 5/5 PART 2	0	TECHNICAL FILE FOR CLASSIFICATION BODIES