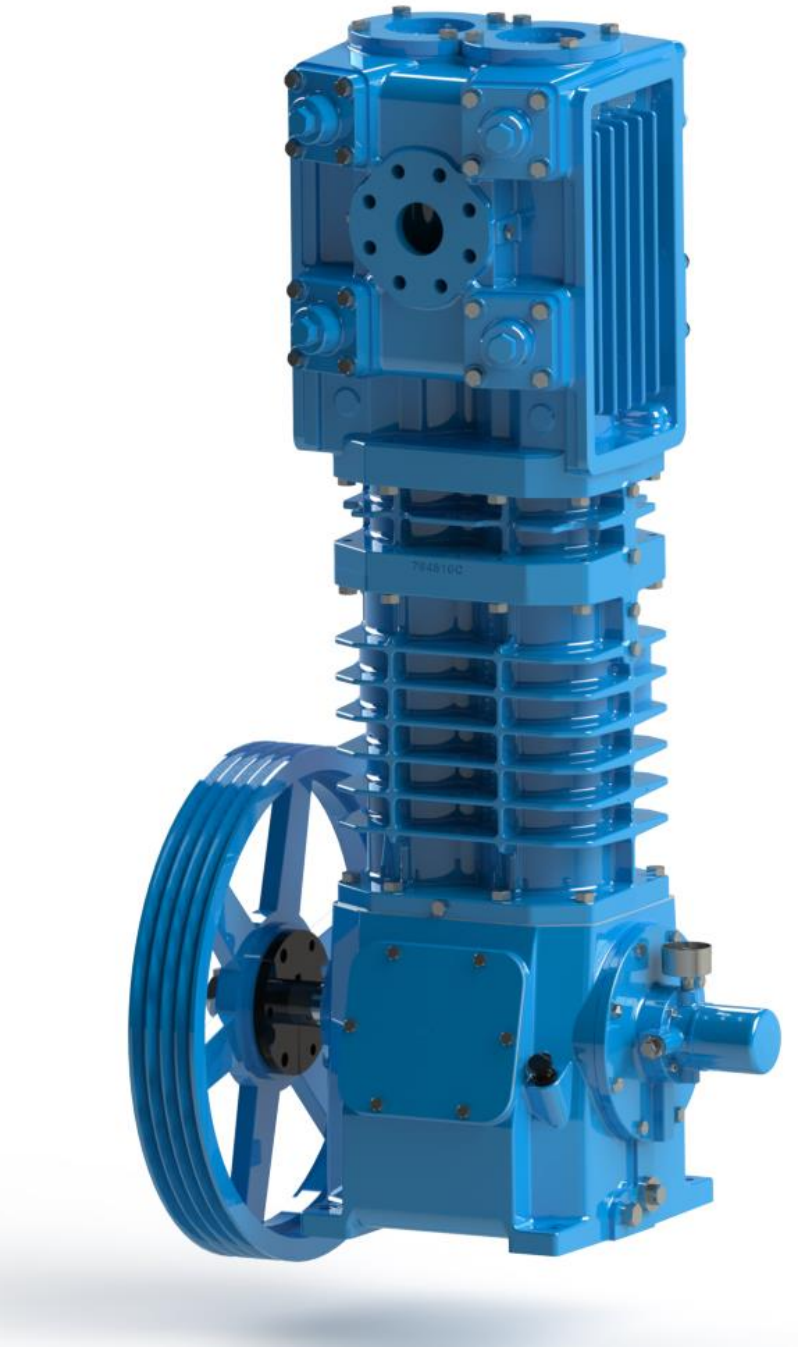

*Model HD943

Blackmer

Addendum to Blackmer Compressor IOM's for EU & UK Compliance

cb5a-021
cb5a-031
cb5a-040
cb6a-012
cb6a-050
cb9a-021
cb9a-031
cb9a-041
cb9a-081
cb6a-210

Directive 2014/34/EU on Equipment and protective Systems Intended For Use in Potentially Explosive Atmospheres (ATEX)

SI 2016 No. 1107 The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016

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List of Harmonized/Designated Standards and Other Technical Standards Applied

Directive 2014/34/EU on Equipment and protective Systems Intended For Use in Potentially Explosive Atmospheres (ATEX)
SI 2016 No. 1107 The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmosphere Regulations 2016

Directive 2006/42/EC on Machinery (The Machinery Directive)
The Supply of Machinery (Safety) Regulations 2008 No. 1597

EN ISO 14120:2015 Safety of machinery-Guards- General requirements for the design and construction of fixed and movable guards

EN 1012-1:2010 Compressors and vacuum pumps-Safety requirements-Part 1: Air compressor

EN 1012-3:2013 Compressors and vacuum pumps-Safety requirements-Part 3: Process compressors

EN ISO 12100:2010 Safety of machinery-General principles for design-Risk assessment and risk reduction (ISO 12100:2010)

EN 1127-1:2019 Explosive Atmospheres-Explosion prevention and protection-Part 1: Basic concepts and methodology

EN 13445-5:2021 Unfired pressure vessels-Part 5: Inspection and testing

EN ISO 80079-36:2016 Non-electrical equipment for use in potentially explosive atmospheres-Part 36: Basic method and requirements

EN ISO 80079-37:2016 Non-electrical equipment for use in potentially explosive atmospheres-Part 37: Protection by constructional safety ‘c’, control of ignition sources “b”, liquid immersion “k”

EN ISO 13857:2019 Safety of machinery-Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)

ISO 1813 Belt drives-V-ribbed, joined V-belts and V-belts including wide section belts and hexagonal belts-Electrical conductivity of antistatic belts: Characteristics and methods of test

VDI 2440 Emission Control Mineral oil refineries

EFRC-Guidelines for Vibrations in Reciprocating Compressors-3rd Edition

ASTM A536 Standard Specification for Ductile Iron Castings

ASTM A48 Standard Specification for Gray Iron Castings

Note: Any reference to ATEX, ATEX Directive, or EU 2014/34/EU is also a reference to SI 2016 No. 1107.
Any reference to The Machinery Directive or Directive 2006/42/EC is also a reference to The Supply of Machinery (Safety) Regulations 2008 No. 1597

General Description

Blackmer reciprocating gas compressors are oil free vertical (except horizontal NGH100 model) , inline (parallel), twin cylinder (except the single cylinder LB081 model) compressors designed for use with a variety of industrial, fuel or other gases. These compressors come in a variety of configurations for gas transfer, bulk or transit tank loading or unloading and for various industrial or energy production applications. They can be ordered in single or 2 stage configurations, the 900 series is available only in a double acting single stage design. The compressors are heavy, before they are permanently mounted consideration for the safe lifting or movement is required. Portable machinery incorporating Blackmer Compressor must be designed with this
mass considered.

All two cylinder inline (parallel) reciprocating machines have inherent force modes that require special consideration when designing mountings. The design of the mounting and installation of these compressors must be performed by qualified individuals familiar with reciprocating compressors to ensure ATEX and Machinery Directive compliance. Further Blackmer IOM and Technical Bulletins must be followed whenever they are not in conflict with local codes or regulations.

When installed properly and used within the established limits of design Blackmer vertical compressors should not exceed 85dBa when measured at 1 meter from the compressor or 1.6 meter from the foundation and vibration levels are below the EFRC guidelines. However sound and vibration levels can vary greatly based on mounting/foundation design and piping configuration. Proper installation by qualified personnel in reciprocating compressor foundation design is critical to provide operation within limits. It is the final user’s responsibility to ensure that the compressor is properly mounted and that the operational limits are not exceeded. Blackmer compressors are not rotation specific, they may rotate in any direction without damage or other considerations.

All Blackmer gas compressors have been designed using sound engineering practices and with consideration to the prior listed standards. They are manufactured in ISO certified facilities in the USA or in India. Both manufacturing locations abide by the same strict quality and supplier standards as established by Blackmer engineering. The manufacturing location is clearly marked on the ID plate of the compressor.

Blackmer gas compressors (all models) have a wide variety of optional configurations that may be selected. This amount of flexibility may at times make it difficult to distinguish one model series from another. For instance an HD compressor could be optioned to be similar to a LB compressor, for those reasons Blackmer compressors have a unique ID number coding string for each compressor on the identification tag.

Listed below is an example listing of some (but not all) of the available options on Blackmer gas compressors.

• Valve options	• Inter stage coolers for 2 stage models
• Seal material options	• Cooling jackets for liquid cooling (HDL series)
• Piston ring material options	• Sour gas options including coatings
• Packing variations in number of packing boxes, orientation of packing rings, purge type and materials	

Blackmer Model Numbers – Vertical Compressors

The first 2 letters indicates the compressor family of the design, HD, LB, etc. and the next letter if present signifies a specific trim level (L for liquid cooled, S for sour gas). The first 2 numbers in a Blackmer model number indicates the Blackmer series. The next digit represents the number of packing seals that it is designed for (1, 2 or 3). The last letter designates the model derivative, A, B, C etc. Model derivatives have no impact on ATEX rating as the basic design remains the same. It is a signifier that some part has changed that is no-longer interchangeable with the prior derivative. Major changes that would affect the ATEX rating will have an entirely new model number and will be tagged accordingly.

Blackmer Model Numbers – Horizontal Compressors

The first 2 letters indicates the compressor family of the design, HD, NG, etc. and the next letter if present signifies a specific trim level (H for Horizontal). The first 2 numbers in a Blackmer model number indicates the Blackmer series. The next digit represents a single or two stage compressor design. The Last digit represents the number of packing seals that it is designed for (1, 2 or 3). The last letter designates the model derivative, A, B, C etc. Model derivatives have no impact on ATEX rating as the basic design remains the same. It is a signifier that some part has changed that is no-longer interchangeable with the prior derivative. Major changes that would affect the ATEX rating will have an entirely new model number and will be tagged accordingly.

All Blackmer compressors regardless of model or configuration are Blackmer self-certified in accordance with Directive 2014/34/EU/SI 2016 No. 1107, The ATEX Directive/ The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, Annex VIII and in accordance with Directive 2006/42/EC, The Machinery Directive/The Supply of Machinery (Safety) Regulations 2008 No. 1597, using Internal Control of Production per Annex VIII. As such they are marked CE/UKCA and the technical file is held by:

European Union
LCIE Testing & Certification Limited
LCIE 33 avenue du general Leclerc
92260 Fontenay aux roses, France
Registered No 0081
File Number: 154087-717414

United Kingdom
Element Materials Technology Ltd
Pendle Place
Skelmersdale
West Lancashire
WN8 9PN
Approved Body No: 0891

All compressors are protected by ‘c’ constructional safety and are classified Equipment Group II Category 2 equipment for G gas environment IIB and temperature class between T3 & T4 and are marked “ Ex II 2 G Ex h IIB T100°C-T176°C Gb IP55 X”. The compressor is not intended to act as a safety accessory.

Incorporation instructions

It is the responsibility for the person incorporating Blackmer compressors or the end user to ensure that placarding complies with the ATEX Directive, the Machinery Directive and all local codes and regulations.

General Danger Warning
Blackmer gas compressors are designed for industrial applications. They should only be installed and operated by properly trained personnel.

Hot surface warning
Blackmer compressors have surfaces that can approach the maximum allowable gas temperature, such as the discharge flange, head and cylinder. In addition other surfaces may exceed a temperature that is hazardous to contact such as the crosshead guide and the crankcase.

Read operators manual
Blackmer compressors must only be installed and operated by properly trained personnel. They should never be started or operated before reading and fully understanding the instructions in the Installation, Operation and Maintenance Manual (IOM) and this addendum that was provided with this equipment. If the IOM is not provided or has been misplaced copies are available on the Blackmer website or the local Blackmer distributor.

Lifting point warning
Blackmer compressors are heavy. They should only be lifted in accordance with the IOM instructions provided for that machine. Blackmer compressors should never be used as a lifting point for the machinery that they are incorporated into.

Compressor drive warning

All Blackmer compressors require a customer supplied drive system. Blackmer does not provide complete ATEX rated drive systems. Proper placarding for the drive choosing is the responsibility of the end user

Other warnings and information

1. Blackmer compressors are considered incomplete machinery and as such must be properly incorporated into the finished machinery. **It is the end users responsibility to insure that the completed machinery complies with all applicable directives for its intended use.**
2. Blackmer compressors are designed for and intended only for compressing gasses, they are not to be used for pumping liquids. If there is a risk of liquids in the inlet line of the compressor a suitable liquid trap must be installed. Failure to prevent liquid entry in to the compressor suction could result in a liquid slug and damage to the compressor. Blackmer compressors should not be used in trans-critical operation, operating the compressor above the process fluids critical pressure is forbidden. Blackmer gas compressors are not to be used with gasses that
    a. are above the lower explosive limit of concentration
    b. are below the upper explosive limit of concentration
    c. that will self-ignite without an addition of an oxidizer or catalyst
    d. are reactive with the materials of construction.
3. The end user must take all necessary precautions in the calculation of the LEL, UEL, ignition impact energy and auto ignition point of the process fluid and any explosive gasses in the vicinity of the installation. Consideration must be given to the energy value of any such mixture.
4. The end user is responsible for the necessary precautions regarding the process gas as it relates to hazards such as but not limited to:
    - Flammability-the upper and lower levels and ease of ignition
    - Toxicity-the acceptable concentration levels
    - Explosive behavior-the upper and lower level and the energy produced
    - Corrosion potential and material compatibility
    - Personal Protective Gear requirement
    - Placarding and signage requirements for compliance with European Standards and local codes
5. Blackmer compressors are designed to operate within an ambient temperature range of -20°C to 40°C.
6. Blackmer compressors are available with a variety of O-ring materials. Each material has a temperature rating that is unique to that material. Materials must be selected that have a temperature rating that is at least 20°C higher than the anticipated operating temperature of the compressor. The maximum temperature rating is for a properly equipped compressor any deviation from this material will result in a lower temperature rating. Blackmer recommends temperature limiting devices be installed to ensure the required temperature rating for the applicable ATEX zone. The proper selection of O-ring materials is the responsibility of the end user. See Table 1.
7. An inlet suction screen must be installed with a minimum mesh size to prevent damage from debris in the system. This is especially critical during the initial commissioning of the compressor into the final machinery. The Category 2 rating of this machinery is only valid with a properly sized suction screen otherwise this machinery is Category 3 equipment.
8. Blackmer compressors are heavy-proper rigging and lifting techniques are needed to avoid personal injury or damage to property. After incorporation the compressor must not be used to lift the finished

machinery. Since compressor configurations can vary please consult the factory for the mass of your machine

9. Proper packing vent or purge design must be employed to provide the desired level of hazard reduction. It is the end users responsibility to ensure that the packing vent/purge system is properly designed for the process fluid, operating conditions and installation zone. If a non-pressurized packing system is incorporated the compressor crankcase must be vented to a safe area or a proper ATEX venting system for the Zone must be used. ***Failure to comply with this instruction results in a Category 3 machine.***
10. Blackmer compressors are supplied without oil. Only Blackmer approved oils have been considered in assessing the ATEX category rating of this equipment. ***Any deviation from the Blackmer approved oils without consideration of the risks associated with the lubricating oil will result in a Category 3 rating of this equipment.***
11. Blackmer does not issue recommendations for coolant for use in liquid cooled compressors. Any fluid that is non-reactive to ductile iron and has a flash point above 176°C is required for a Category 2 rating. ***It is the responsibility of the end user to ensure that the cooling system is properly designed for the required equipment category.***
12. Only trained operators and maintenance personnel should be allowed to work on the system. All maintenance must be performed in accordance with the IOM and this Addendum.
13. Compressors generate forces that must be accounted for. Failure to provide a foundation or mounting of sufficient mass and/or stiffness could result in vibration levels that exceed EFRC guidelines for this type of equipment. Unbalance forces are available from Blackmer applications. Recommendations for mounting are available in bulletin cb220. It is the responsibility of the end user to properly design the mounting for these forces.
14. Compressors generate noise. Blackmer vertical compressors under normal use and with a proper mounting should not exceed 85 dBA, it is the end users responsibility to ensure that the compressor is incorporated in a manner that will not generate excessive noise. **If the compressor is to be used outdoors than the installation must comply with the noise directive.**
15. Suitable pressure relief devices must be employed with the system. The maximum operating pressure is available in the specific IOM for the compressor model. Pressure control devices should be used if there is a risk of over or under pressure operation. **Failure to provide pressure control devices may result in a lower ATEX category rating.**
16. Blackmer compressors are limited to 176°C. Temperature activated control or shutdown devices must be employed on the discharge of each stage. ***For Category 2 equipment discharge temperature controls are required otherwise Blackmer compressors are only suitable for Category 3 operation.*** Pressure control devices are recommended to further enhance the thermal control of the compressor. Blackmer control devices are suitably ATEX rated by the manufacturer of the device. Any non-Blackmer supplied protection device must be properly rated for the ATEX category and zone of intended use or the compressor rating is no longer valid.
17. ***Blackmer compressors are not intended for use in a potentially explosive dust atmosphere.*** However dust is naturally occurring in the environment that this equipment will be installed in. Proper care and/or protection against dust accumulation on the outside of the compressor is crucial to maintaining the compressors ATEX rating. Periodic inspection and cleaning are required to maintain the ATEX rating. ***Do not use high temperature steam or high pressure water to clean the compressor.*** Proper routing or venting of the compressor crankcase is also recommended to minimize dust ingress into the compressor. Blackmer compressors carry an IP55 ingress protection rating.

18. Blackmer compressors are not normally supplied with a drive system beyond the combination sheave/flywheel provided. However Blackmer does offer belt drive components that comply to ISO 1813. Blackmer guards are electrically conductive, however Blackmer guards constructed of steel may generate sparks if improperly installed due to mechanical contact. It is the end users responsibility to insure compliance with all applicable European Normals regarding the installation of belt drive systems. This includes, but is not limited to the use of ATEX compliant materials and belt anti-static brushes.
19. **The end user is responsible for compliance of the incorporated compressor to all applicable directives and standards. This includes the category rating of the final equipment.**

Table 1: O-ring temperature limits

O-ring Material	Material Temperature Limit (°C)	Fluid Temperature Limit (°C)
Nitrile	120	100
FKM	175	155
EPDM	150	130
PTFE	260	176*
Neoprene	105	85

*Temperature limited by equipment design. Temperature limiting equipment required.

Language

1. The original declaration of conformity/incorporation for the machinery described in this document is in English. Any copy in a language other than English is a copy of the original.
2. All instructions, bulletins and Installation, Operation & Maintenance instructions are in English. Any copy in a language other than English is a copy of the original. Blackmer has not approved any translation of these documents as “Original Instructions” any translation of these documents should be considered unofficial documents.

EU/UK DECLARATION OF CONFORMITY

Herewith we declare that all Blackmer LB, HD, HDL, HDS, NG, NGH and NGS compressor product lines to which this declaration relates are in conformity with the provisions of Directive 2014/34/EU (The ATEX Directive) and SI 2016 No. 1107 The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations. This equipment is a reciprocating compressor for liquefied gas transfer or gas compression applications. This device is not intended to act as a safety accessory.

Applied Harmonized/Designated Standards:

Directive 2014/34/EU (The ATEX Directive
SI 2016 No. 1107 The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations
EN1127-1:2019, EN ISO 80079-36:2016, and
EN ISO 80079-37:2016

Other applied standards:
ISO 1813:1998 and VDI 2440

Method of Compliance: Manufacturer's self-declaration according to Annex VIII.

Ex Classification: Group II Category 2G Gas Group IIB T100°C-T176°C Max Protection "c" and is marked
Ⓔx II 2 G Ex h IIB T-100°C-T176°C Gb IP55 X

Technical file is held by:
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92260 Fontenay aux roses
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Notified Body No: 0081

File number: 154087-717414

United Kingdom
Unit 1, Pendle Place
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West Lancashire WN8 9PN
United Kingdom
Approved Body No: 0891

File number 0891-013

Date: 21 December 2022
Robert Lauson
General Manager

DECLARATION OF INCORPORATION

As defined by the Machinery Directive 2006/42/EC and The Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex IIA.

Herewith we declare that all Blackmer LB, HD, HDL, HDS, NG, NGH and NGS compressor product lines to which this declaration relates are in conformity with the provisions of 2006/42/EC the Machinery Directive and The Supply of Machinery (Safety) Regulations 2008 No. 1597

Applied Harmonized/Designated Standards:

2006/42/EC the Machinery Directive and The Supply of Machinery (Safety) Regulations 2008 No. 1597
EN ISO 14120:2015, EN1012-1, & 3, EN 12100:2010, EN 1127-1:2019, EN 13445-5:2021, EN ISO 80079-37:2016, EN ISO 13857:2019

Other Standards: ISO 1813:1998 and VDI 2440

Method of Compliance Internal checks on the manufacturer of the machinery according to Annex VIII.

The above equipment is a reciprocating compressor designed for liquefied gas transfer or gas compression applications. This device is not intended to act as a safety accessory.

This component must not be operated until the machine into which it is incorporated has been declared in conformity with the provision of the Directive/SI.

Blackmer further declares that the above listed compressors are designed using sound engineering practices and are assembled in ISO registered facilities. These compressors are in compliance with all applicable harmonized/designated standards and therefore all compressors carry the CE/UKCA marking.

Date: 21 December 2022
Robert Lauson
General Manager

The partially completed machinery described above must not be put into service until the machinery into which it is incorporated has been assessed and determined to be in conformity with the provisions of Directive 2014/34/EU, SI 2016 No. 1107 and 2006/42/EC, The Supply of Machinery (Safety) Regulations 2008 No. 1597. All operating and installation instruction must be read and understood before operation.

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