



AS BHC Industrial Standard



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1. INTRODUCTION

AS BHC Industrial hydraulic cylinders are developed for customers that place high demands on quality but **without** the need for high level of traceability and documentation of applied materials and manufacturing process procedures used in their products.

1.1. Scope

This specification describes requirements for Fabrication, Assembly and Completion of BHC hydraulic equipment, if nothing else is stated on drawings or Purchase Order. Those requirements apply to all products.

1.2. Abbreviations

ITP	Inspection and test plan
IFC	IFC means drawing/ document issued for construction
PO	Purchase order
MRB	Manufacturing Record Book
WPQR	Welding procedure qualification record
WPS	Welding procedure specification
NDT	Non-destructive testing

1.3. References

1.3.1. Standards

Below are listed some of codes, standards and specifications referred to in this specification.

EN-ISO 9606	Qualification testing of welders - Fusion welding
EN ISO 17637	Non-Destructive Examination of welds - Visual Examination
EN 1011	Welding - Recommendations for welding metallic materials
EN 10025	Hot rolled products of structural steels
EN 10204	Metallic products - Types of inspection documents
EN ISO 9000	Quality Systems - Model for quality assurance
ISO 2768	Tolerances for linear and angular dimensions without individual tolerance Indications
EN ISO 8503	Preparation of steel substrates before application of paints and related products
EN ISO 9712	Non-destructive testing - Qualification and certification of personnel



1.3.2. Procedures

Additionally to this internal fabrication standard, BHC has various selections of procedures for how to design and fabricate different equipment. These are company procedures and shall be followed independently of type products/components. Deviation from these standards is allowed only if specified so in the purchase order.

2. QUALITY ASSURANCE

2.1. General

All the work performed by BHC are in compliance with an implemented quality assurance system, based on the requirements of the EN-ISO 9001:2015 standard.

2.2. Review of technical requirements

All technical specifications are reviewed upon order receipt. All deviations in technical conditions or technical queries shall be coordinated with the contracting authority. No work is to be started before a solution has been found. Contracting authority shall give a written response to the deviation/query.

2.3. Quality Assurance, Inspection and Test Plan (QA&ITP)

To assure the product quality every order shall have a Quality Assurance, Inspection and test plan (ITP).

2.4. Progress plan

Production and progress plans are established for all deliveries.

3. MATERIALS

3.1. General

All structural materials delivered at site are checked against valid specifications and certificates and are recorded in accordance.

The minimum design temperature is -20°C on all steel elements.

The surface roughness of the tube (Ra) must not be more than 0.4micron for H8 tube and not be more than 0.8micron for H9 tube.

The steel specified in drawings and specifications are delivered in accordance with the requirements in the relevant material standard, normally EN 10025.

All outsourcing details must conform to BHC drawings.

Requirements for chemical properties of steels:

Carbon	C ≤0,20%
Carbon equivalent	CEQ≤0,45
Sulfur	S ≥0,20%

Formula for Carbon equivalent (CEQ):

$$Ceq = C + \frac{Mn}{6} + \frac{Mo + V + Cr}{5} + \frac{Ni + Cu}{15}$$

3.2. Marking and Identification

All materials are identified according to the identification system. This system is to ensure that only controlled materials of correct grade are installed.

3.3. Certificates

All purchased materials (base materials) shall be supplied with certificates according to 3.1 EN-10204. 2.2 EN 10204 materials are used according to customer order requirements. All subcontracted purchased parts must meet the material quality requirements shown in the drawing and have a marking h9 - calibrated material (unless otherwise indicated).

BHC will keep material certificates record files for the historical traceability.

3.4. Substitute Materials

Substitute materials may be used as long as material properties (yield, tensile, Charpy-V, and elongation) complies as minimum to original specified materials.

If the substitute material is welded shall verify that weldability remains equivalent and have a valid welding procedure.

4. DIMENSIONAL CONTROL

4.1. General

All dimensional control in accordance with:

- ISO 2768-1, tolerance class Medium - for machined products (unless otherwise indicated in the drawings).
- EN ISO 13920 Class A and E for welded products to ensure that dimension tolerances are met.

Tolerances for overall dimensions, special components, and interface points to equipment, or to other structures, will be specified on IFC drawings. All these dimensions shall be verified and recorded and be a part of the final fabrication documentation (if so specified in order).

4.2. Measuring equipment

All measuring equipment shall be calibrated and certified with traceability to international standards. Calibration certificates are available for review by purchaser of certifying authority.

Calibration certificates may be a part of final documentation if so specified in purchase order.

5. WELDING

5.1. General

All welding works are based on the recommendations given in EN 1011.

Welding devices including instruments are maintained and calibrated according to BHC quality system.

All welding works take place according to established WPS's based on qualified procedures (WPQR's).

The welding quality control is carried out in accordance with the requirements of the drawing (or if so specified in purchase order).

5.2. Qualification of welders

Welders and welding operators are qualified in accordance with the relevant part of EN ISO 9606.

Each welder is assigned an identity code which allows traceability of welders in the Weld & NDT records.

BHC keeps a continuously updated record of all welder's qualifications, listing their approval categories and expiration dates.

5.3. Procedures

All welding procedures are prepared in accordance with EN ISO 15614 series.

5.4. Consumables

All welding consumables are stored in a proper manner and according to established instruction/ routines in a dry and safe storage area.

5.5. Repairs

All repair work shall be carried out according to the repair procedures. The welding coordinator prepares the appropriate procedure and monitors its execution. After repair additional NDT is required.



6. NON-DESTRUCTIVE TESTING (NDT)

6.1. General

All NDT shall be performed in accordance with visual inspection procedure. The general responsibility for coordination and supervision of welding works and NDT falls into welding coordinator responsibility.

6.2. Extent

All the products pass the visual inspection, which is regulated by visual inspection procedure.

Depending on the order, additional non-destructive testing may also be required. These tests are carried out using appropriately qualified subcontractors.

6.3. Reports

All NDT work is recorded in the Weld & NDT log, and the necessary reports are maintained for traceability purposes if specified in Purchase Order. NDT reports can also be part of the MRB.

7. ASSEMBLING AND TESTING

7.1. Assembling

All assembly work shall be executed in a clean area separated from steelwork such as grinding, welding etc.

Assembly of components shall be carried out in accordance with instructions given in assembly drawings, part lists and assembly instruction.

7.2. Marking

All products are marked in accordance with the rules of procedure "BHC_Silindrite Markeering_EST". The compilation is carried out in accordance with the drawings, partial instructions and instructions provided for this purpose.

7.3. Testing

All industrial BHC products are tested accordance to ISO 10100.

This report is part of the final documentation (MRB) when specified in PO.

8. SURFACE TREATMENT

8.1. General

All painting works are based on the company's painting procedure.

8.2. Storage of Paints and Chemicals

All coatings and thinners shall be stored in such a way that the materials will be protected from the elements. The temperature inside the paint store shall be between +10 - + 20 °C.

8.3. Painting

Typical pretreatment and DFT are (unless otherwise specified in the order):

BHC System IND-1.

Pretreatment:	All areas to be cleaned thoroughly with strong detergents and high-pressure fresh water to remove oil, grease, salt and contaminations.	
Then Apply:	Mean Dry Film Thickness (DFT)	120 <u>µm DFT</u>

8.3.1. Inspection and testing

The quality control includes:

- Daily log of environmental conditions (temperature, humidity etc.).
- Inspection of pre-treatment.
- Thickness measurement.
- Visual inspection.

For all orders, the Inspection Report (Dry Film Thickness) is issued, which is issued upon request of the customer.



9. PACKAGING AND SUBMISSION DOCUMENTATION

9.1. Packaging

All products pass through the visual and drawings inspection before packing. Packaged products must be stored in the pallets and surrounded by bases in such a way as to preclude their physical deterioration. The bases are covered with a special film, which is fastened with a special BHC strap. Larger products from the pallet are covered with packaging rolls in excess of the bases and are fastened with a special BHC wrapper.

10. MANUFACTURING RECORD BOOK (MRB)

During the production are collected a variety of records, which are issued to the customer together with the product. Depending on the order, the MRB may contain different records. Minimally each MRB contains:

- Certificate of Compliance
- Welding procedure qualification report (WPQR)
- Welding procedure specification (WPS)
- Welder's certificates
- Paint Inspection Report
- Pressure and Acceptance test (leakage) report
- "As-Built" drawing

Version history

Date	Made by	Approved by	Description
31.01.18	JJ	KL	New document
11.04.2023	Rait Mutle	Rait Mutle	Improved layout, new logo and simplified and updated text.