
Translator's Statement

For the reference and convenience of foreign manufacturers who manufacture and export their Special Equipment products to China, the International Division of CSEI has made this English translation of the TSG 07-2019 *Regulation for Production and Filling Licensing of Special Equipment*.

TSG 07-2019 is applicable to pressure equipment and electromechanical equipment covering the phases of design, manufacture, filling and installation. As this translation's main purpose is to help foreign manufactures of pressure equipment to understand the licensing requirements for the phase of manufacture, we selected parts related to pressure equipment of the TSG 07-2019 for translation. The translation on electromechanical equipment and requirements on design, filling, installation of pressure equipment are not provided.

The Chinese version of the TSG 07-2019 is the legal version and shall prevail for implementation. There is no legal implication for the English translation.

International Division, CSEI

July 19th, 2019

Regulation for Production and Filling Licensing of Special Equipment

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1 General Requirement

1.1 Purpose and basis

In order to regulate the production (design, manufacture, installation, alteration and repair) and filling licensing of special equipments, this Regulation is formulated in accordance with the relevant laws and regulations such as *Law on Safety of Special Equipment of the People's Republic of China*, *Administrative Licensing Law of the People's Republic of China* and *Regulations on Safety Supervision of Special Equipment*.

1.2 Applicable scope

This Regulation is applicable to the licensing of design, manufacture, installation, alteration, repair and filling of special equipments which are used inside the territory of P.R China.

1.3 Implementer of licensing

The departments which implement the production and filling licensing of special equipments are the State Administration for Market Regulation (hereinafter referred to as SAMR) and the departments in charge of special equipment safety supervision and administration of local people's governments at provincial level (hereinafter referred to as provincial special equipment safety supervision and administration departments). SAMR and the provincial special equipment safety supervision and administration department are hereinafter referred to as the license issue organ.

1.4 Licensing catalog

The licensing categories, items and sub-items, licensing parameters and level (hereinafter referred to as licensing scope) as well as the license issue organ shall conform to the requirements of Licensing Catalog of Special Equipment Manufacturers issued by SAMR. The equipment category, type and variety of licensing items and sub-items shall conform to the requirements of Special Equipment Catalog.

1.5 License and its valid period

The special equipment license includes Production License for Special Equipment of the People's Republic of China and Filling License for Transportable Pressure Vessel (Gas Cylinder) of the People's Republic of China (hereinafter referred to as license, see Annex for the sample). The valid period of the license is four years.

2 Licensing Requirements

2.1 General requirement

The applicant who applies for production and filling licensing of special equipments (hereinafter referred to as the applicant) shall have the legal qualifications, the resource conditions suitable for the licensing scope, have established and effectively implemented the quality assurance system and safety management system, etc. and have the technical ability to guarantee the safety performance of special equipments.

2.1.1 Resource requirements

The applicant shall meet the following resource requirements which are suitable to the licensing scope and satisfy the production:

- (1) Staff, including management staff, technical staff, inspection staff and operators, etc.;
- (2) Working places, including plant sites, workshops, offices, warehouses, etc.;
- (3) Equipments and facilities, including production (filling) equipments, process equipments, inspection instruments, testing devices, etc.;
- (4) Technical data, including design documents, process documents, construction plans, inspection procedures, etc.;

(5) Codes and standards, including laws, regulations, provisions, safety technical codes and standards.

The specific resource conditions and requirements can be found in Annex B to L of this Regulation.

2.1.2 Quality assurance system

The applicant shall establish and effectively implement the quality assurance system which is suitable to the licensing scope according to the requirements of this Regulation. The quality assurance system of the special equipment manufacture, installation, alteration and repair unit shall conform to Annex M of this Regulation -- Essential Requirements for Quality Assurance System of Special Equipment Manufacturers. The quality assurance system of the pressure vessel and pressure pipeline design unit shall conform to the requirements of C1.4 and E1.4 of this Regulation. The quality assurance system of the transportable pressure vessel and gas cylinder filling unit shall conform to the requirements of C3.7 and D2.7 of this Regulation.

2.1.3 Technical ability to guarantee the safety performance and safety filling of special equipments

The applicant shall have the technical ability to guarantee the safety performance and safety filling of special equipments and conduct design, manufacture, installation, alteration, repair and filling according to the requirements of special equipment safety technical codes and standards.

2.2 General requirements of resources conditions

2.2.1 Staff

The technical staff shall have the educational background of science and technology major, obtain the relevant professional technical titles and have the relevant working experience.

Where the safety management staff, inspection staff and operators are included in the administrative license of special equipment personnel, the corresponding special equipment personnel qualification certificate shall be obtained.

When engineering technical titles are required for the personnel, he/she shall have the corresponding science and technology educational background and technical working experience if he/she has no corresponding engineering technical titles. The reference table for the engineering technical titles and educational background & technical working experience see Table 2-1.

Table 2-1 Reference Table for Engineering Technical Titles and Educational Background & Technical Working Experience

| Engineering Technical Titles | Educational Background & Technical Working Years | | | |
|------------------------------|--|---|---|---|
| | Doctoral graduates | Master graduates | College graduates | Junior college graduates |
| Senior engineer | No less than 4 years' working experience | No less than 10 years' working experience | No less than 13 years' working experience | No less than 15 years' working experience |
| Engineer | No less than 1 year's working experience | No less than 4 years' working experience | No less than 7 years' working experience | No less than 9 years' working experience |
| Assistant engineer | -- | No less than 1 year's working experience | No less than 2 years' working experience | No less than 3 years' working experience |

Note 1: Technical work refers to the work related to corresponding special equipment manufacture, filling,

inspection, testing and service management, etc. Senior technicians and technicians may be equivalent to engineers and assistant engineers respectively. The requirement on technical working experience of technical secondary school graduates can refer to that of college graduates.

2.2.2 Working places and renting of equipments and facilities

2.2.2.1 Working places

The plant sites, workshops, offices, warehouses of the production and filling units are allowed to rent. If the working place is rented, both parties shall sign a lease contract, and the lease term shall cover the validity period of the license, and the leaser's land use certificate, house property certificate or other valid certificates issued by the land administration department shall be provided.

2.2.2 Equipments and facilities

The production (filling) equipments (except hoisting equipments affiliated to workshops), process equipments, testing instruments and testing devices required by the resource conditions of production and filling units are generally not allowed to rent. Where there are other provisions in Annex B to L of this Regulation, such provisions shall be complied with.

2.2.3 Subcontract

(1) The subcontract of design, material preparation, heat treatment, NDT, physical and chemical inspection, etc. shall meet the requirements of Annex B to L of this Regulation;

(2) Where subcontract is allowed, the subcontractor shall have the corresponding capacity. NDT, pressure vessel and pressure pipeline design shall be subcontracted to the unit (institution) which has obtained the corresponding qualification of special equipments, but shall not be subcontracted to the inspection institution which carries out the supervisory inspection and type test for the subcontracting unit. The subcontracting unit shall sign a contract (agreement) with the subcontractor to determine specific items and detailed requirements of the subcontract. The quality control of subcontracted work shall be the responsibility of the subcontracting unit and brought into the control scope of its quality assurance system;

(3) In case of subcontract, there will be no requirements on the subcontracted personnel and equipment resources. Where there are other provisions in Annex B to L of this Regulation, such provisions shall be complied with.

2.2.4 Condition sharing

2.2.4.1 The same unit

(1) When the same applicant applies for different licensing items, the corresponding licensing requirements stipulated in Annex B to L of this Regulation are allowed to share;

(2) When multiple manufacturing addresses (Note 2) of the same applicant jointly complete the production of the same licensed sub-item, the sum of the resource conditions of all manufacturing addresses shall meet the licensing requirements stipulated in Annex B to L of this Regulation (as otherwise stipulated in Annex B to L of this Regulation), and a unified quality assurance system shall be established.

Note 2: Multiple manufacturing addresses shall meet the requirements of article 3.2.2 of this Regulation.

2.2.4.2 Company and subsidiary (company and branch)

(1) When a company applies for a license, with the consent of its subsidiary, the subsidiary can be listed in the license as a manufacturing address, but in this case the subsidiary is not allowed to apply for a license separately, and the license requirements stipulated in Annex B to L of this Regulation are allowed to share; when a company and its subsidiary apply for a license

separately, the license requirements stipulated in Annex B to L of this Regulation are not allowed to share;

(2) Where a company or its branch engages in licensing activities, either the company or the branch can apply for licensing in their respective names; where an application for licensing is made in the name of a branch, the branch shall obtain the legal person's authorization of the company; where a company applies for a license and the branch is served as resource conditions, the address of the branch shall be specified in the license, and the license requirements stipulated in Annex B to L of this Regulation are allowed to share; when a company and its branch applies for a license separately, the license requirements stipulated in Annex B to L of this Regulation are not allowed to share.

(3) Where the circumstances mentioned in item (1) and (2) of this article which involves multiple manufacturing addresses, the requirements of article 2.2.4.1(2) of this Regulation shall also be satisfied.

3 Licensing procedures

3.1 Licensing procedures

The licensing procedures include application, acceptance, appraisal and assessment, review and license issuing.

3.2 Application

3.2.1 General requirements

The application shall be filled online. The applicant shall fill in and submit the Application Form for the Production and Filling Licensing of Special Equipment (hereinafter referred to as the Application Form), and attach the following scanned data (the original document is not required), and apply to the corresponding license issue organ:

- (1) Business license of the applicant (when online verification is not available);
- (2) The Form of Category of Licensing Applied shall be signed by the legal representative (or the principal responsible person) and stamped with the official seal;
- (3) Former license (only for application of licensing item addition, change of licensing level or renewal and the online verification is not available);
- (4) Written authorization of the company legal person (when the branch applies separately).

Where an online application cannot be conducted due to special circumstances, a written application shall be submitted (the Applicant Form in triplicate) with the above mentioned documents (each copy shall be stamped with the official seal).

3.2.2 Multiple manufacturing addresses application

Where the licensing is implemented by the provincial special equipment safety supervision and administration department, if the residence and manufacturing address or multiple manufacturing addresses of the applicant are not in the same province (autonomous region or municipality), the applicant shall apply to the provincial special equipment safety supervision and administration department where the manufacturing address is located.

3.3 Acceptance

3.3.1 Accept the application

After receiving the application documents, the license issue organ shall accept the application within 5 working days if the documents are complete and in compliance with the legal form, and issue an Acceptance Decision of Special Equipment Administrative Licensing Application (hereinafter referred to as the Acceptance Decision) in electronic (or written) form. The

Acceptance Decision shall indicate the name and contact information of the entrusted appraisal and appraisal institution (Note 3).The license issue organ shall notify the entrusted appraisal and assessment institution of the relevant acceptance information when issuing the Acceptance Decision.

Note 3: The appraisal and assessment institution refers to a technical institution or social organization which is entrusted by the license issue organ to undertake appraisal and appraisal work in accordance with the relevant regulations of the state.

3.3.2 Supplement and correction

After receiving the application documents, the license issue organ shall inform the applicant of all the contents that need to be supplemented and corrected in one time within 5 working days if the application documents are not complete or do not conform to the legal form, and issue the Notification of Supplement and Correction of Application Documents for Special Equipment Administrative Licensing (hereinafter referred to as the Notification of Supplement and Correction).

3.3.3 Reject the application

After receiving the application documents, the license issue organ shall issue a Decision of Refusal to Accept the Special Equipment Administrative Licensing Application (hereinafter referred to as the Decision of Refusal) to the applicant within 5 working days under any of the following circumstances:

- (1) The applied item does not fall within the scope of special equipment licensing;
- (2) Concealing relevant information or providing false application documents;
- (3) Whose license having been suspended (revoked) according to the law, and the suspension (revoking) period is less than 3 years.

3.3.4 Change the application information

When the applicant's application has been accepted and before the appraisal and assessment is conducted, where the production unit changes the name, residence, manufacturing address, office address, licensing sub-item or the filling unit changes the name, residence, filling address, equipment variety, filling medium category, the applicant shall apply again or the former license issue (acceptance) organ shall issue a changed Acceptance Decision.

3.4 Appraisal and assessment

3.4.1 General requirements

(1) When the applicant applies for a new application, licensing item addition (except adding the manufacturing address) or raise the level of licensing parameters for the first time, it shall prepare trial design documents, prototypes (samples) of trial manufacture or installation (Note 4) in accordance with the requirements of Annex B to L of this Regulation prior to the appraisal and assessment. The prototype (sample) shall be qualified by the self-inspection and have complete data;

(2) After receiving the authorization from the license issue organ, the appraisal and assessment institution shall discuss with the applicant regarding the date of appraisal and assessment, and inform the applicant in writing of the appraisal and assessment date, procedures and requirements within 10 working days; the appraisal and assessment institution shall dispatch an appraisal and assessment team to conduct the on-site appraisal and assessment on the appraisal and assessment date. If the appraisal and assessment institution cannot complete the appraisal and assessment work within the time limit for any reason, it shall report to the license issue organ;

(3) The applicant shall submit the Application Form and quality assurance manual (which may be an electronic document) to the appraisal and assessment institution prior to the appraisal and assessment.

Note 4: Where the trial installation is allowed on the site of service, the installation unit shall inform the safety supervision and administration department of special equipments at the place where the installation is to be conducted with the Acceptance Decision prior to the trial installation. The department which received the notification of trial installation shall take back the Acceptance Decision and file it. Only one trial installation can be conducted for the Acceptance Decision.

3.4.2 Procedures and requirements of on-site appraisal and assessment

(1) The procedures of on-site appraisal and assessment generally include the initial meeting, shop tour, group review, records summary, exchange of views, and final meeting, etc.;

(2) During the on-site appraisal and assessment, where the actual resource conditions or products of the applicant cannot meet the corresponding requirements of accepted licensing scope, the appraisal and assessment shall be carried out in accordance with the scope after the reduction of the licensing sub-items or the degrade of the licensing level with a written application of the applicant and confirmation of the appraisal and assessment team, and the related situation shall be explained in the appraisal and assessment report; where the applicant proposes to increase the licensing sub-items, raise the level of licensing parameters or other circumstances to change the license issue organ, the applicant shall apply for a new application in accordance with the requirements of article 3.2 of this Regulation;

(3) When the on-site appraisal and assessment is finished, the appraisal and assessment team shall notify the applicant of the problems found; where rectification cannot be completed on site, the two parties shall sign a Memorandum of Comments on the Appraisal and Assessment of Special Equipment (hereinafter referred to as the Memorandum). The appraisal and assessment team shall put forward rectification requirements in the memorandum, and the rectification time shall not exceed six months;

(4) The appraisal and assessment team shall record the situation of appraisal and assessment.

3.4.3 Conclusion and report of the appraisal and assessment

The conclusion opinion of the appraisal and assessment is classified as “qualified”, “qualified after rectification” and “unqualified” according to the following requirements:

(1) When all the licensing requirements are met, the appraisal and assessment conclusion opinion shall be “qualified”;

(2) When all the licensing requirements are met after rectification, the appraisal and assessment conclusion opinion shall be “qualified after rectification”;

(3) Except for item (1) and (2) of this article, the appraisal and assessment conclusion opinion shall be “unqualified”.

The appraisal and assessment institution shall issue and submit the appraisal and assessment report to the license issue organ in time in accordance with the provisions of authorization.

The appraisal and assessment work (including the time for rectification) shall be completed within one year from the date of issuance of the Acceptance Decision.

3.5 Review and license issuing

After receiving the appraisal and assessment report and relevant data submitted by the appraisal and assessment institution, the license issuing organ shall review the report and relevant data within 20 working days and issue the corresponding license to the applicant where the license

issuing requirements are met; where the license issuing requirements are not met, it shall issue a Decision of not Granting Special Equipment Administrative Licensing (hereinafter referred to as the Decision of not Granting).

The following information shall be specified in the license:

(1) Production License for Special Equipment of the People's Republic of China shall specify the license number, company name, residence, office address, manufacturing address, licensing items, licensing sub-items, licensing parameters, license issue organ, licensing date and validity period, etc.;

(2) Filling License for Transportable Pressure Vessel (Gas Cylinder) of the People's Republic of China shall specify the license number, company name, residence, filling address, equipment variety, category of the filling medium, name of the filling medium, license issue organ, licensing date and validity period, etc.

3.6 Licensing item addition, license change and license extension

3.6.1 Licensing item addition

3.6.1.1 Definition of licensing item addition

Licensing item addition refers to one of the following situations occurs within the validity of the license:

(1) Increase manufacturing addresses or licensing sub-items (including changing the product limit scope);

(2) Increase filling addresses, equipment variety or filling medium category.

3.6.1.2 Procedures and requirements of licensing item addition

(1) The license holder shall apply to the license issue organ for license items addition if needed; the procedures and requirements for it shall be in accordance with Article 3.2 to 3.5 of this Regulation;

(2) The license issue organ shall determine whether it is necessary to conduct appraisal and assessment if the license holder only applies for changes on limited product scope;

(3) The appraisal and assessment shall mainly focus on applicant's resources and quality assurance system if the license holder only applies for address addition;

(4) The license issue organ shall withdraw the original license and issue a new license after the licensing item addition. The validity period of the new license shall be in accordance with the former license.

3.6.2 License change

3.6.2.1 Definition of license change

License change refers to one of the following situations within the validity of the license.

(1) Change on company name;

(2) Change on residence, manufacturing address, office address and filling address (hereinafter referred to as address renaming);

(3) Relocation of residence, manufacturing address, office address and filling address (hereinafter referred to as address relocation)

(4) The cancellation of multiple manufacturing addressees (filling addresses) in multiple manufacturing addresses (hereinafter referred to as manufacturing or filling addresses cancellation);

(5) Change on licensing level;

(6) Others.

3.6.2.2 License change on company name and address name

The license holder shall apply to the license issue organ for license change on company name or address within 30 working days after the change and submit the following application documents:

- (1) Application Form on Special Equipment License Change (hereinafter referred to as “Application Form on License Change”)
- (2) Former license (which shall be original if it cannot be verified online);
- (3) Business license and approval materials before and after the change (If it cannot be verified online)

The license issue organ shall make a decision within 20 working days since the date of receiving the application documents. If the license change is approved, the license issue organ shall issue a new license and withdraw the former license. If not, the license issue organ shall notify the applicant and explain the reasons.

3.6.2.3 Address Relocation

(1) In accordance with the provisions of Article 3.6.2.2 of this Regulation, the license holder shall apply to the former license issue organ for the license change and submit relevant application documents after address relocation. If the production or filling address is relocated, an appraisal and assessment shall be conducted, but a trial manufactured prototype (sample) is not required. The appraisal and assessment shall mainly focus on applicant’s resources and quality assurance system.

(2) Where the licensing is implemented by the provincial special equipment safety supervision and administration department, if the relocation address is out of the former license issue organ’s jurisdiction, the applicant shall submit a license cancellation application to the former license issue organ and submit a license application to the license issue organ in the jurisdiction of the new location. The relevant procedures and requirements shall be in accordance with the provisions of Article 3.2 to 3.5 of this Regulation.

3.6.2.4 Manufacturing or filling addresses cancellation

Where the manufacturing or filling address is cancelled, an application for license change shall be submitted to the former license issue organ in accordance with Article 3.6.2.2 of this Regulation; and an appraisal and assessment shall be conducted if the license issue organ deems it is necessary.

3.6.2.5 Change on licensing level

The license holder shall apply to the corresponding license issue organ if it needs to change the licensing level of the licensed sub-item. The relevant procedures and requirements (Note 5) shall be in accordance with Article 3.2 to 3.5 of this Regulation.

Note 5: For the change of licensing level other than the raise of licensing parameter level, the license issue organ shall decide whether an appraisal and assessment is necessary according to the change of licensing level.

3.6.2.6 The scope and validity period of new license

After the license is changed, the scope and validity of the new license shall be in accordance with that of the former license, but in the case specified in Article 3.6.2.3(2) and Article 3.6.2.5 of this Regulation, the new license shall be effective since the license issue date. The former license shall be withdrawn by the former license issue organ.

3.6.3 License renewal

3.6.3.1 General requirements

(1) If the license holder prefers to conduct relevant activities after the license expiration, it shall apply to the license issue organ for license renewal 6 months (and not exceeding 12 months) ahead of the license expiration. If it fails to apply license renewal in time, it shall explain the reasons officially when applying for license renewal.

(2) The procedures and requirements for license renewal shall be in accordance with Article 3.2 to 3.5 and corresponding annexes of this Regulation; the prototype (sample) is not required if the production performance meets the requirements of this Regulation during the license validity.

3.6.3.2 License renewal by self-declaration

No administrative penalties, liability accidents, safety performance problems and unsolved quality complaints related to special equipments during the licensing period prior to the license renewal, and the license holder with corresponding production performance (Note 6) specified in Annex B to Annex L of this Regulation could apply to the license issue organ for license renewal by submitting self-declaration commitment to meet the licensing requirements continuously, etc.

The self-declaration commitment shall include at least the following contents:

(1) The resources, production performance and product safety performance can continuously meet the corresponding licensing requirements of the licensing cope.

(2) The quality assurance system of the applicant can be implemented continuously and effectively.

(3) No administrative penalties, liability accidents, safety performance problems and unsolved quality complaints related to special equipments during the licensing period prior to the license renewal.

The license holder can not apply for license renewal by self-declaration twice in a row.

Note 6: For the products counted into the production performance, their parameters shall fall into the parameter scope in the Licensing Catalogue for Special Equipment Manufacturers.

3.6.3.3 License validity

(1) For the renewal applicants who complete the license renewal before the license expiration, the renewal license shall be effective since the license expiration date of the former license.

(2) For the renewal applicants who fail to complete the license renewal before the license expiration, the former license shall be invalid and the corresponding production and filling of special equipment is not allowed. The renewal license shall be effective since the license issue date.

3.6.3.4 License extension

If the production and filling unit needs to extend license validity due to restructuring or approved relocation of production and filling field, it shall apply for license extension to the license issue organ 6 months ahead of the license expiration and fill in the Application Form for License Extension. Restructuring or relocation documents approved by relevant government departments (or superior) shall be submitted as an appendix when applying.

After the approval of license extension, the license issue organ shall extend the license validity and the license extension shall be less than one year. If the license is renewed before the expiration of license extension, the extended period shall be deducted from the validity period of the renewal license

3.7 License reissue

3.7.1 Reissue application

Where the license reissue is needed due to license lost or damaged, the license holder shall

apply for license reissue to license issue organ and submit the following documents:

(1) Application Form on Special Equipment License Reissue (hereinafter referred to as Application Form on License Reissue);

(2) Business License (When it is not available to be verified online).

3.7.2 Reissue decision

The license issue organ shall make a decision within 10 working days since the date of receiving the application documents for license reissue. If the license reissue is approved, the license issue organ shall issue a new license to the applicant. If not, the license issue organ shall notify the applicant and explain the reasons.

4 Supplements

4.1 Administration of license

(1) The license holder shall keep the license properly. Any alteration, reselling, lending of the license is forbidden.

(2) The license suspension (revocation) and cancellation shall be carried out in accordance with relevant state laws, administrative regulations and rules. When the company and its subsidiary (branch) jointly obtain the license and its' license is revoked or cancelled, the company shall be the responsible subject and its subsidiary shall be jointly and severally liable.

(3) Where the applicant obtains the license by false documents, the company which provides assistance on the counterfeit documents shall be jointly and severally liable.

(4) For manufacturers which apply license renewal by self-declaration, the license issue organ will revoke its' license if counterfeit documents were found.

4.2 Document templates

The Application Form, Acceptance Decision, Notification of Supplement and Correction, Decision of Refusal, Decision on not granting, Application Form on License Change and Application Form on License Reissue shall be applied in accordance with the templates published on the special equipment administrative licensing website of State Administration for Market Regulation (SAMR).

4.3 Meaning of numerical expression

The fixed number given to the technical titles or NDT qualification requirements in this Regulation is the lowest requirement. The expression of the numbers and requirements like "above", "no less than" include the number and the requirement itself.

4.4 Interpretation authority

SAMR is responsible for the interpretation of this Regulation.

4.5 Implementation date

This Regulation will come into force since June 1st, 2019.

4.6 Regulations Abolishment

The following documents and safety technical codes are annulled simultaneously since June 1st, 2019.

(1) *Requirements for Boiler and Pressure Vessel Manufacture Licensing* (SESA Document No. 194/2003);

(2) *Mechanical and Electrical Special Equipment Manufacture Appraisal Regulation* (Trial Implementation) (SESA Document No. 174/2003);

(3) *Mechanical and Electrical Special Equipment Installation, Alteration and Repair Licensing Regulation* (Trial Implementation) (SESA Document No. 251/2003);

(4) *Boiler Installation and Alteration Enterprises Supervision Administration Regulation* (TSG G3001—2004);

(5) *Pressure Vessel Installation, Alteration and Repair Licensing Regulation* (TSG R3001—2006);

(6) *Gas Cylinder Filling Licensing Regulation* (TSG R4001—2006);

(7) *Pressure Piping Unit Manufacture Appraisal Regulation* (TSG D2001—2006);

(8) *Basic Requirements of Quality Assurance System for Manufacture, Installation, Alteration and Repair of Special Equipment* (TSG Z0004—2007);

(9) *Appraisal and Assessment Rules for Special Equipment Licensing on Manufacture, Installation, Alteration and Repair* (TSG Z0005—2007);

(10) *Design Appraisal Regulations for Pressure Vessel & Pressure Piping* (TSG R1001—2008);

(11) *Pressure Piping Installation Licensing Regulation* (TSG D3001—2009);

(12) *Transportable Pressure Vessel Filling Licensing Regulation* (TSG R4002—2011).

The contents of the licensing procedures, conditions and requirements in *Safety Technical Supervision Regulations for Safety Valves* (TSG ZF001—2006) and *Safety Technical Supervision Regulation for Bursting Disc Devices* (TSG ZF003—2011) shall be annulled simultaneously.

If the requirements on other notices and documents relevant to the production and filling of special equipment which issued before the implementation of this Regulation are not in consistent with this Regulation, this Regulation shall prevail

Templates for Production License of Special Equipment People's Republic of China

Notes for Filling in the Production License of Special Equipment

1. The office address is only for the applicants applying for design, installation and repair licensing, “/manufacturing address” is not required to provide.

2. Manufacturing address is only for the applicants applying for manufacture licensing, “/office address” is not required to provide.

3. It shall be stated in the notes where there is a corresponding relationship between the license sub-item and the manufacturing address.

4. According to different design capabilities, remarks on limit range shall be specified in the notes of production license for pressure vessel manufacturer, such as pressure vessel design subcontract, subcontract of stationary (transportable) pressure vessel design by rules, stationary non-metallic pressure vessels design subcontract, separate design license. No notes are required to add on the production license of manufacturer if the manufacturer has the corresponding design capabilities.

5. According to requirements on different licensing sub-items, the license scope can be limited in the notes, including limited products varieties or components, materials, manufacturing methods, uses, etc.

6. “Specific product range shall refer to the type test certificate” shall be stated in the notes if type test is required.

7. The coverage of the licensed sub-items shall be indicated in the notes.

8. For elevators, only the elevator parameters shall be filled in, not the license level.

9. In the license template, the remarks with specified color are printed in advance on the original license and the remarks with font and font size, but no color will be printed by the computer after licensing (black).

Licensing Requirements for Boiler Manufacturers

B1 Licensing Requirements for Boiler Manufacture

B1.1 Basic Requirements

B1.1.1 Personnel

B1.1.1.1 Quality assurance system personnel

The manufacturer shall manning and appoint quality assurance engineer according to the requirements for manufacturing processes and shall have quality control system responsible personnel including design, technology, material, welding, heat treatment, NDT, product inspection and testing, physical and chemical inspection ,etc.

The requirements for quality assurance system personnel are as follows:

(1)Quality assurance engineer shall have work experience of boiler manufacturing quality management or inspection, education background of science and technology and engineer title;

(2)Quality control system responsible personnel for design shall have boiler design experience and related education background in boiler. For level A boiler manufacturers, the responsible person for design shall have engineer title;

(3)Quality control system responsible personnel for welding shall have welding experiences and welding or relevant education background in welding (material and machinery). For level A boiler manufacturers, the responsible personnel for welding shall have engineer title;

(4)Quality control system responsible personnel for inspection and testing shall have inspection experience of boiler product and education background of science and technology;

(5)Quality control system responsible personnel for others shall have working experience and education background of science and technology;

(6)Quality control system responsible personnel for material and physics and chemistry, welding and NDT shall not hold concurrent positions.

B1.1.1.2 Technical staff

Technical staff of the manufacturer shall meet requirements of Table B-1.

Table B-1 Technical staff requirements

| Licensing level | Related major of boiler(people) | Related major of welding(people) | Total number of technical staff (people) |
|-----------------|---------------------------------|----------------------------------|--|
| A | 5 | 3 | 20 |
| B | 2 | 1 | 5 |

B1.1.1.3 Welding operator

The manufacturer shall be equipped with qualified welding personnel (hereinafter referred to as welder), whose licensed items and quantities shall meet requirements of product manufacturing. If welding robot is adopted, its welding items can be counted as welding items of welder's.

B1.1.1.4 Nondestructive testing personnel

Nondestructive testing personnel shall have special equipment nondestructive testing qualification and register with the employer (the same below). The certificate items and quantities of NDT personnel shall meet testing requirements of the actual products and conform to Table B-2.The manufacturer shall be equipped with no less than 2 TOFD II people when ultrasonic time-of-flight diffraction(TOFD) is used.

Table B-2 The certificate items and quantities of NDT personnel

| Licensing | Quality control system | NDT personnel |
|-----------|------------------------|---------------|
|-----------|------------------------|---------------|

| level | responsible personnel for NDT (Note B-1) | Certificate items | Quantity (people)(Note B-2) |
|-------|---|-------------------|--------------------------------|
| A | RT III and UT III qualification; or RT II and UT II qualification with 4 years' experience in nondestructive testing | RT II | 3 |
| | | UT II | 3 |
| | | MT II | 2 |
| | | PT II | 2 |
| B | RT II and UT II qualification | RT II | 2 |
| | | UT II | 2 |

Note B-1: For NDT subcontract, the manufacturer only needs to be equipped with quality control system responsible personnel for NDT as required in table B-2.

Note B-2: Quality control system responsible personnel for NDT shall be counted in the number of NDT personnel.

B1.1.2 Workplace

(1)The area and height of the boiler manufacturing workshop shall meet requirements of product manufacture, and the welding of boiler pressure-containing parts shall be done indoors.

(2)There shall be protective measures for storage of pipes, plates, welding materials and semi-finished products;

(3)There shall be radiographic testing site or special testing place that can meet both product inspection and protection requirements, and there shall be special places that can ensure the quality of developed negative films as well as the storage of the radiographs and can also meet the storage requirements of nondestructive testing instrument and equipment;

(4)There shall be pressure testing site that can meet requirements of safety protection.

B1.1.3 Production and process equipment

The manufacturer shall have cutting equipment, forming equipment, machining equipment, drilling equipment, welding equipment, welding materials drying and insulation equipment, lifting equipment, and necessary tooling, needed for the manufacture production. In addition, the equipment shall be the reasonably laid out according to production process.

B1.1.4 Inspection instruments and testing devices

(1)The manufacturer shall have testing platforms, non-destructive testing instruments, physical and chemical testing instruments, pressure testing devices, etc. needed for product manufacturing; If nondestructive testing and physical and chemical testing are subcontracted, the corresponding instruments are not required;

(2) There shall be suitable measuring devices for manufacturing products, and shall be verified and calibrated according to regulations.

B1.1.5 Work subcontract

The manufacturer must have ability to manufacture the main body of the boiler products. It is not allowed to subcontract all the pressurized parts of the boiler products. But it is allowed to be subcontracted as follows: Non-destructive testing, physical and chemical testing, heat treatment and boiler furnace, underfoot and head (pipe sheet). Supervision and inspection of the manufacturing process shall be carried out for the welded boiler furnace and head (pipe sheet). The special requirements are not allowed to be subcontracted.

B1.1.6 Technological documents

The manufacturer shall formulate the technological documents that are related to the boiler manufacture including welding, heat treatment, non-destructive testing, inspection and test and

other technological documents in accordance with the relevant safety technical specifications and standards. In regard to welding process, the manufacturer shall establish and improve welding procedure specification covering all products of the units. The welding procedure specification based on welding procedure qualification shall be carried out at the manufacturer, whose skilled welders can use equipment and facility of the manufacturer to weld specimens.

B1.1.7 Trial manufacture

- (1) The trial manufactured sample shall verify the abilities of manufacture and inspection in the scope of application, and the sample parameters shall conform to the relevant standards;
- (2) The design drawings of the sample for trial manufacture shall be appraised (Note B-3);
- (3) The boiler sample for trial manufacture shall meet the requirements of Table B-3.

Note B-3: If the trial production sample is used for selling, the trial production process shall be subject to supervision and inspection.

Table B-3 Sample quantity for boiler trial manufacture

| No. | Licensing level | Sample quantity for trial manufacture | |
|-----|----------------------|--|--|
| 1 | A | (1) 1 Boiler drum (Pressure testing and pipe joint end groove machining have been completed); (2) 2 pieces of membrane wall (One piece is flat plate type, and the other piece is lined curved type. During the survey and assessment, one piece shall finish the pressure testing); (3) 2 group of spiral pipe (One group is alloy steel material, and the other group is carbon steel material. During the survey and assessment, one group shall finish the pressure testing); (4) 2 Headers with girth weld (One is alloy steel material, which has completed pressure testing and pipe joint end groove machining; another is carbon steel material, which will have the pressure testing during the survey and assessment). | |
| 2 | Level A boiler parts | Boiler drum | 1 boiler drum, the specific requirements are the same as item (1) of No. 1 in this Table |
| | | Membrane wall | 2 pieces of membrane wall, the specific requirements are the same as item (2) of number 1 in this table |
| | | Spiral pipe | 2 group of spiral pipe, the specific requirements are the same as item (3) of No. 1 in this Table |
| | | Header | 2 headers with girth weld, the specific requirements are the same as item (4) of No.1 in this Table |
| | | Boiler external piping | 1 straight pipe with girth weld, 2 elbows with a diameter not less than 133mm (One is alloy steel material, and the other is carbon steel material, one of them will have the pressure testing during the survey and assessment) |
| | | Fin-type economical boiler | 1 group of fin-type economical boiler, which will have the pressure testing during the survey and assessment; 2 fin pipes |
| 3 | B | 1 set of finished product and 1 set of in-process product, the in-process product will be subject to the product structure; (1) One section drum, one head (tube plate), one lower ankle, one furnace and other parts; (2) If the product has header, there shall be 2 headers with holes; | |

| | | |
|--|--|--|
| | | <p>(3)If the product has elbow pipes, there shall be 5 curved pipes with different diameters;</p> <p>(4)If the product is coil type, there shall be 2 sets of inner (or outer)ring coil;</p> <p>(5)The casting boiler shall have representative boiler pieces.</p> |
|--|--|--|

Note B-4: No painting, insulation and packaging for the trial manufactured sample; For level A boilers manufacturer, no corresponding trial manufactured products required if the manufacturer has no production equipment for boiler drum, membrane wall or spiral pipe.

The design parameters for the trial manufactured sample shall be representative; the manufacturing process shall cover the product scope that applied for. The manufacturing process of the welded boiler shall include forming, welding, non-destructive testing, physical and chemical testing and pressure testing, and heat treatment process for level A boiler.

If one trial manufactured product and one in-process product cannot fully cover the manufacturing processes required in the preceding paragraph, the coverage of all manufacturing processes may be achieved by adding trial samples.

The manufacturing processes of casting and other non-welding boiler shall be included in casting assembly, pressure testing and other necessary manufacturing processes.

B1.2 Special Requirements

B1.2.1 Boiler (A)

B1.2.1.1 Personnel

- (1) There shall be personnel for product design and development, who have complete experience in level A boiler product design, including structure design, strength calculation, thermodynamic calculation and hydrodynamic calculation, etc.;
- (2) There shall be ability to design and develop new products, and enough personnel to convert drawings into actual manufacturing technology;
- (3) The granted items of qualified welder shall at least include submerged arc automatic welding, gas shielded welding and electrode arc welding, etc., and it shall be not less than 50 person-items in general;
- (4) There shall be not less than 5 full-time inspectors required for the manufacture of level A boiler products;
- (5) There shall be metallographic and physical & chemical inspectors required for the manufacture of level A boiler products.

B1.2.1.2 Design Ability

There shall be ability of product design & development and process conversion which is suitable for level A boiler products.

B1.2.1.3 Production Equipment and Process Equipment

There shall be preheating equipment and fixture suitable for welding technology of level A boiler products.

There shall be following equipments suitable for the manufacture of level A boiler products, and the manufacturing unit shall have two of these equipments, namely boiler drum manufacturing equipment, membrane wall production line and spiral pipe production line:

- (1) Boiler drum manufacturing equipments, including rolling machine with cold rolling thickness not less than 46 mm, groove processing equipment, boiler drum heat treatment furnace (not required if subcontracted);
- (2) Membrane wall production line, including flat steel finishing, pipe rust removal

equipment, multi-head automatic welding equipment, leveling equipment and row bending equipment;

- (3) Spiral pipe production line, including pipe end forming equipments such as cutting and groove processing, pipe butt welding equipment such as automatic hot wire TIG or TIG plus MIG, on-line weld seam X-ray detection instrument, pipe bender, pipe rack and other manufacturing equipment, as well as fixture and testing platform;
- (4) Header manufacturing equipment, including cutting equipment, groove processing equipment, argon arc welding, submerged arc automatic welding and electrode arc welding equipment, on-line preheating equipment, header heat treatment furnace (not required if subcontracted).

B1.2.1.4 Inspection Instrument and Testing Device

- (1) There shall be metallographic and physicochemical performance laboratories suitable for product manufacturing, with metallographic inspection device, chemical analysis device, mechanical property testing device, impact specimen inspection device (not required if subcontracted);
- (2) There shall be radiographic testing instrument and recordable ultrasonic testing instrument required for product manufacturing (not required if subcontracted);
- (3) There shall be not less than 3 sets of pressure test devices required for product manufacturing;
- (4) There shall be on-site spectroscopic detection device required for the inspection of alloy steel products.

B1.2.2 Boiler (B)

B1.2.2.1 Personnel

- (1) The granted items of qualified welder shall at least include submerged arc automatic welding, gas shielded welding and electrode arc welding, etc., and it shall be not less than 30 people-items in general;
- (2) There shall be not less than 2 full-time inspectors.

B1.2.2.2 Production Equipment and Process Equipment

- (1) There shall be lifting equipment required for product manufacturing in boiler manufacturing workshop, and lifting capacity shall be not less than 10t in general;
- (2) There shall be rolling machine required for product manufacturing, and the cold rolling thickness shall be not less than 20 mm in general;
- (3) There shall be bending and drilling equipments required for product manufacturing;
- (4) There shall be submerged arc automatic welding, gas shielded welding and electrode arc welding equipment suitable for product manufacturing.

B1.2.2.3 Inspection Instrument and Testing Device

- (1) There shall be chemical analysis device and mechanical property testing device required for product manufacturing (not required if subcontracted);
- (2) There shall be radiographic and ultrasonic testing instruments required for product manufacturing (not required if subcontracted);
- (3) There shall be not less than 2 sets of pressure test devices required for product manufacturing;
- (4) There shall be elbow lofting and testing platform required for product manufacturing.

B1.2.3 Level A Boiler Components

B1.2.3.1 Personnel

- (1) The number of technical personnel shall meet the requirements of Table B-4;
- (2) The granted items and quantities of NDT personnel shall meet the requirements of Table B-5, and the personnel working at the manufacturer that produces more than 3 level A components shall meet the requirements of "level A boiler" in Table B-2;
- (3) The granted items of qualified welder shall be not less than 20 people-items in general; the granted items of welder working at the manufacturer that manufactures more than 3 level A components shall be not less than 50 people-items in general;
- (4) There shall be metallographic and physical & chemical inspectors required for the manufacturing of level A boiler components;
- (5) There shall be not less than 3 full-time inspectors.

Table B-4 Number of Technical Personnel

| Specialty related to boiler (people) | Specialty related to welding (people) | Total number of technicians (people) |
|---|--|---|
| 1 | 1 | 5 |

Table B-5 Granted Items and Number of Non-destructive Testing Personnel

| Scope of Manufacturing License | Quality Control System responsible personnel for NDT (Note B-5) | NDT personnel | |
|---|---|---------------|-------------------------------|
| | | Granted Items | Number (person) (Note B-6) |
| Boiler drum, header or boiler external piping | RTIII and UTIII qualifications; or RTII and UTII qualified and licensed for more than 4 years | RT II | 2 |
| | | UT II | 2 |
| | | MT II | 2 |
| | | PT II | 2 |
| Membrane wall, spiral pipe or fin economizer | | RT II | 2 |

Note B-5: When NDT is subcontracted, the manufacturing unit only needs to be staffed with the quality control system responsible personnel for NDT in accordance with the requirements of Table B-5.

Note B-6: The responsible personnel for the quality control system of NDT are included in the number of NDT testing personnel.

B1.2.3.2 Production Equipment and Process Equipment

Manufacturing equipments for boiler drum, membrane wall, spiral pipe and header shall meet the corresponding requirements of Article B1.2.1.3 of this Annex.

Boiler external piping manufacturing equipments shall include cutting equipment, bending equipment, groove processing equipment, argon arc welding, submerged arc automatic welding and electrode arc welding equipment, on-line preheating equipment, and heat treatment furnace meeting manufacturing needs (not required if subcontracted).

Manufacturing equipment of fin economizer shall meet the production needs.

B1.2.3.3 Inspection Instrument and Testing Device

There shall be ability to inspect and test the corresponding level A boiler components, which shall meet the requirements of Article B1.2.1.4 of this Annex.

B1.2.4 Waste Heat Boiler

The licensing requirements of waste heat boiler shall reference the requirements for boiler manufacture licensing of corresponding level. The waste heat boiler with special structure can

appropriately reduce the requirements according to the product structure characteristics, but the specific product scope shall be clearly defined in the manufacture license.

B1.2.5 Other Boiler

Manufacturing unit that only manufactures tubular boiler, organic fluid boiler, coil boiler or casting boiler may apply for special manufacture licensing and clearly define the specific product scope in the manufacture license. Resource conditions refer to the requirements for boiler manufacture licensing of corresponding level, and can appropriately reduce the requirements, but there shall be process equipment required for special structure construction(such as coiling pipe bender of coil boiler, etc.).

B1.3 Production Requirement for License Renewal

During the validity of the license, the unit shall have production of the corresponding licensing level; otherwise the unit shall prepare the demo product according to Article B1.1.7 of this Annex.

If apply for "license renewal by self-declaration" in Article 3.6.3.2 of this Regulation, the unit shall have not less than 4 productions of the corresponding licensing level during the validity of the license.

CSEEL

Licensing Requirements for Pressure Vessel Manufacturers and Transportable Pressure Vessel Filling Manufacturers

C2 Requirements for pressure vessel manufacture licensing

C2.1 Basic requirements

C2.1.1 Personnel

C2.1.1.1 Quality assurance system staff

The manufacturing unit shall, in accordance with the needs of the product manufacturing process, appoint quality assurance engineer and personnel responsible for design, materials, processes, welding (bonding), heat treatment, non-destructive testing, physical and chemical testing, inspection and testing, etc. If the special requirements have other provisions on the responsible personnel of the quality control system, they shall also follow. Responsible personnel of the quality control system shall have no less than the qualifications of academic and engineering technical titles related to the science and engineering related majors listed in Table C-2 of this Annex.

The requirements for the quality assurance system personnel are as follows:

- (1) Quality assurance engineer shall have experience in quality management or inspection of pressure vessel manufacturing;
- (2) Quality control system responsible personnel for design shall have experience in pressure vessel product inspection;
- (3) Quality control system responsible personnel for inspection and testing shall have pressure vessel design experience and process equipment manufacturing (chemical machinery), machinery manufacturing, mechanical design and other mechanical professional education background;
- (4) Quality control system responsible personnel for metallic pressure vessel welding, graphite pressure vessel bonding and impregnation or fiber reinforced plastic pressure vessel (including thermoplastic lining fiber reinforced plastic pressure vessel) bonding (hand paste) and winding (including thermoplastic welding) shall have metallic pressure vessel welding related work, graphite pressure vessel manufacturing or fiber reinforced plastic pressure vessel (including thermoplastic lining fiber reinforced plastic pressure vessel) manufacture work experience. Quality control system responsible personnel for metallic pressure vessel welding shall have welding or welding related professional (material, mechanical majors) educational background;
- (5) Responsible personnel of other quality control systems shall have experience in the work they are responsible for;
- (6) Responsible personnel of the quality control system shall be familiar with the tasks and requirements of the position, and be able to perform their duties through job training.

Table C-2 Requirements for the personnel of the quality assurance system

| | | | | |
|------------------------------------|---------------------|----------------|----------|----------|
| Quality Assurance System personnel | A1、A6 | A2、A3 C1、C2 | A5、C3 | A4、D |
| Quality assurance engineer | Bachelor and Senior | Bachelor and | Engineer | Engineer |

| | | | | |
|--|------------------------------|-----------------------|--------------------|--------------------|
| | Engineer | Engineer | | |
| Design quality control system responsible person | Bachelor and Engineer | Bachelor and Engineer | Engineer | Engineer |
| Material quality control system responsible person | Engineer | Engineer | Engineer | Assistant Engineer |
| Process quality control system responsible person | Bachelor and Engineer | Bachelor and Engineer | Engineer | Assistant Engineer |
| Welding, bonding and impregnation, bonding (hand paste) and winding responsible personnel of quantity control system | Bachelor and Senior Engineer | Bachelor and Engineer | Engineer | Assistant Engineer |
| Heat treatment quality control system responsible person | Engineer | Engineer | Engineer | Assistant Engineer |
| Nondestructive testing quality control system responsible person | Junior College and Engineer | Engineer | Assistant Engineer | Assistant Engineer |
| Physical and chemical inspection quality control system responsible person | Junior College and Engineer | Engineer | Engineer | Assistant Engineer |
| Inspection and test quality control system responsible person | Junior College and Engineer | Engineer | Assistant Engineer | Assistant Engineer |

Note C-3: When the product manufacturing process in Table C-2 has no welding, heat treatment, non-destructive testing, etc., it is not necessary to equip the person responsible for the quality control system.

C2.1.1.2 Technical staff

The manufacturing unit shall have the technicians required for manufacture of the product. Where the manufacturing unit designs the pressure vessel manufactured by the unit at the same time, it shall meet the personnel requirements specified in C1.2 of this Annex, and the total number of full-time design personnel shall generally be not less than 5, of which no less than 2 persons shall be responsible for approving. The number of full-time designers in the level A4 pressure vessel manufacturing unit can be appropriately reduced according to the actual workload. The number of technicians at all levels of manufacturing units is shown in Table C-3.

Table C-3 Number of technicians

| License level | mechanical related majors (person) | Welding (sticking) related majors (person) | Technical staff total (person) |
|---------------|------------------------------------|--|--------------------------------|
| A1 | 5 | 3 | 12 |
| A2、A3 | 3 | 2 | 8 |
| C1、C2、C3 | 5 | 3 | 12 |
| A4、A5 | 3 | 1 | 5 |

| | | | |
|----|---|---|----|
| A6 | 5 | - | 10 |
| D | 1 | 1 | 5 |

C2.1.1.3 Welders and welding operators

The pressure vessel manufacturing unit shall have qualified welders and welding operators to meet the welding demand of products. The welder's granted items shall meet the product manufacturing needs. The requirements for the number of certified welders are shown in Table C-4. With welding robots, the number of certified welders at the corresponding license level can be reduced by one person.

Table C-4 Number of certified welders

| License level | Certified welder (person) |
|----------------|---------------------------|
| A1、A2、A3、C1、C2 | 10 |
| A5、C3 | 4 |
| D | 6 |

C2.1.1.4 Non-destructive testing personnel

- (1) If the manufacturers themselves perform the NDT, the number of items and quantities of non-destructive testing personnel shall meet the requirements of Table C-5;
- (2) The manufacturing unit using ultrasonic time-of-flight diffraction (TOFD) technique shall have no less than 2 persons of TOFD II.

Table C-5 Licensed items and quantities of non-destructive testing personnel

| License level | Nondestructive testing quality control system responsible personnel (Note C-4) | Non-destructive testing personnel | |
|---------------|---|-----------------------------------|------------------------------|
| | | Number of certified items | Quantity (person) (Note C-5) |
| A1 | UTIII or RTIII qualifications | RT II | 3 |
| | | UT II | 3 |
| | | MT II | 2 |
| | | PT II | 2 |
| A2、A3、C1、C2 | RT II and UT II qualifications with more than 4 years of non-destructive testing experience | RT II | 3 |
| | | UT II | 3 |
| | | MT II | 2 |
| | | PT II | 2 |
| A5、C3、D | RT II or UT II qualification | RT II | 2 |
| | | UT II | 2 |
| | | MT II | 2 |
| | | PT II | 2 |
| A6 | UTIII qualification; Or UT II qualification with more than 4 years of non-destructive testing experience | UT II | 3 |
| | | MT II | 2 |
| | | PT II | 2 |

Note C-4: If the manufacturers who consign the NDT to other enterprises shall have the personnel responsible for non-destructive testing quality control system in accordance with the requirements of Table C-5.

Note C-5: Non-destructive testing quality control system personnel are included in the number of non-destructive testing personnel.

C2.1.2 Workplace

- (1) There shall be production sites that meets the manufacturing needs of the corresponding level of product;
- (2) The welding (adhesive) connection of the pressure-bearing parts of the product must be completed indoors; when the large-scale pressure-bearing parts are welded (bonded) outdoors, it is necessary to ensure there are the welding (sticking) quality protection measures;
- (3) There shall be a storage place or special site with storage requirements for raw materials and welding (bonding) materials, with effective protective measures;
- (4) There shall be dedicated sites and protective measures for pressure test, leak test and other related tests that are compatible with the products manufactured, and meet the requirements of relevant safety technical specifications and related standards;
- (5) There shall be a radiation exposure room or a special inspection site that meets the requirements for protection and big enough for the product inspection, and a special place for ensuring the quality of the film rinsing and the preservation of the film, and a place for non-destructive testing instruments and equipment storage.

Where the manufacturing unit has the design capability of the pressure vessel at the same time, it shall have a special working organization and place for design.

C2.1.3 Production equipment and technology equipment

The manufacturing unit shall have cutting equipment, forming equipment, machining equipment, welding equipment, welding material drying and temperature maintaining equipment, lifting equipment, surface treatment equipment, etc., as necessary for product manufacturing, and necessary tooling; it shall has a heat treatment furnace that is compatible with the manufacturing process of the product, and is equipped with a temperature measuring instrument that automatically records the temperature curve.

Where the manufacturing unit has the design capability of the pressure vessel at the same time, it shall have the design equipment and design means that meet the requirements of C1.1 of this Annex.

Stainless steel and non-ferrous metallic pressure vessel manufacturing units shall also meet the following conditions:

- (1) There shall be a special production plant (or cleaning site) and production equipment, and may not be mixed or mixed with carbon steel; for the manufacture of titanium, zirconium, hafnium and other containers, there shall also be a dedicated clean and closed workshop;
- (2) Active metallic pressure vessel manufacturing units such as titanium and zirconium shall have cutting equipments that meet the requirements for material cutting;
- (3) The heat treatment apparatus of an active metallic pressure vessel such as titanium or zirconium shall have the ability to maintain a restorative atmosphere.

C2.1.4 Inspection instrument and test device

- (1) The manufacturing unit shall have testing platform for the manufacture of the product, non-destructive testing instrument, physical and chemical testing instrument, pressure test device, and leak test device;
- (2) If the special conditions stipulate that the inspection and test items are not allowed to be

subcontracted to other companies, the manufacturing unit shall have corresponding testing instruments and test devices;

- (3) There shall be measuring device that is compatible with the manufactured product, and is qualified and calibrated according to regulations.

C2.1.5 Subcontracted work

The manufacturing unit shall have the ability to independently complete the manufacturing process of the product's overall assembly, welding (bonding), pressure test, inspection, etc. It is not allowed to subcontract all pressure components of the pressure vessel product.

The design, non-destructive testing, heat treatment, physical and chemical inspection, and the forming work such as pressing and rolling of parts other than welding of the manufacturing unit may be subcontracted. The work of the special requirement that doesn't allow subcontract shall be done by the manufacturing unit.

C2.1.6 Manufacturing assurance capability for product safety performance

The manufacturing unit shall have the manufacturing capability to ensure the safety performance of the product, be able to manufacture according to the relevant safety technical specifications and related product standards, and demonstrate the effective implementation of the quality assurance system in the production process of the product, and provide complete product quality certification documents.

The manufacturing unit shall have the process files of welding (bonding), heat treatment, non-destructive testing, pressure test, leak test and other process documents related to the manufacture of pressure vessel products. The manufacturing unit shall establish and improve welding (bonding) procedure specification covering all products of the unit in accordance with relevant safety technical specifications and standards.

The welding (bonding) procedure qualification based on the welding (bonding) procedure specification shall be carried out in this unit. Test pieces shall be welded (bonded) by skilled welding personnel with welding equipment of the unit.

C2.1.7 Trial manufacture (Note C-6)

- (1) Trial manufactured product shall be fully identifiable and can verify manufacturing and inspection capabilities within the scope of the manufacturer's application;

- (2) The quantity and requirements of the trial manufactured product are shown in Table C-6.

The manufacturing unit shall prepare at least one trial manufactured product of the licensed range. If a trial manufactured product does not fully cover the manufacturing process of the licensed product, the manufacturing processes can be covered by adding trial manufactured product. The trial manufactured product shall be subject to a pressure test without sandblasting (pill), paint, or painting. The manufacturing process of non-welded (bonded) pressure vessels such as castings shall also include casting assembly, pressure test and other necessary processes.

- (3) Typical products involving vacuum insulated vessels (tanks), enameled vessels, multi-layer pressure vessels, gas storage wells and non-welded bottle containers shall be

prepared for the corresponding trial production. To manufacture a pressure vessel designed by the unit, the pressure vessel shall be designed in accordance with C1.3 of this Annex.

Note C-6: If the trial manufactured sample is to be sold and used, the trial production process shall pass supervised inspection.

Table C-6 The quantity and requirements of the trial manufactured product

| Licensed level | Quantity | Requirements of the trial manufactured product |
|----------------|---|---|
| A1,A2,D | 1 set | Generally designed and manufactured according to <i>GB/T 150 Pressure Vessel</i> or <i>JB 4732 Steel Pressure Vessel - Analysis Design Standard</i> [Except for pressure vessels such as vacuum insulated vessels (tanks), glass containers and gas storage wells, non-welded bottle containers]. The demo for A1 level is not smaller than \varnothing 2000mm, other levels are not less than \varnothing 800 \times 2000mm. Demos shall have manhole (or $D_i \geq 400$ mm flanged joint). Design parameters and manufacturing processes shall cover the scope of the application product. The manufacturing process must include plate bending and forming, welding (expansion) of three types of welds A, B, and D. |
| A3 | 1 set | The volume of the demo product shall be not smaller than 200 m ³ and is designed and manufactured according to <i>GB/T 12337 Steel Spherical Storage Tank</i> . |
| A4 | 1 set | (1)The demo product of graphite pressure vessel is generally designed and manufactured according to <i>GB/T 21432 Graphite Pressure Vessel</i> : the shell pressure of block type is not less than 0.6MPa, the medium side is not less than 0.3MPa; the shell pressure of tube type is not less than 0.4MPa, and the medium side is not less than 0.2MPa. The heat exchange area is not less than 10m ² , the block type with hole and the tube type do not cover each other; (2) Demo product of fiber-reinforced plastic pressure vessel is generally designed and manufactured according to the corresponding product standards with the design pressure not less than 0.6MPa and the length of the straight cylinder is not less than 1000mm. |
| A5 | One for each of high pressure chamber, medical oxygen pressurized oxygen chamber, medical air pressurized | Generally, demo product is designed and manufactured according to <i>GB/T 19284 Medical Oxygen Pressurized Chamber</i> , <i>GB/T12130 Medical Air Pressurized Oxygen Chamber</i> or the corresponding product standard. The simulation installation of the corresponding number of trial production samples is completed in the manufacturing unit. Debugging shall be completed. |

| | | |
|----|----------------|---|
| | oxygen chamber | |
| A6 | 1 set | Generally, demo product is designed and manufactured according to <i>GB/T 34019 Ultra-High Pressure Vessels</i> . |
| C1 | 1 set | Generally, demo product is designed and manufactured according to <i>GB/T 10478 Liquefied Gas Railway Tankers</i> . |
| C2 | 1 set | Truck Tank are generally designed and manufactured according to <i>GB/T 19905 Liquefied Gas Truck Tankers</i> and <i>NB/T 47058 Refrigerated Liquefied Gas Tuck Tankers</i> . ISO Tanks are generally based on <i>NB/T 47057 Liquefied Gas ISO Tanks</i> , <i>NB/T 47059 Design and Manufacture of "Refrigerated Liquefied Gas ISO Tanks "</i> and <i>NB/T 47064 Liquid Dangerous Goods ISO Tanks</i> . |
| C3 | 1 set | Designed and manufactured according to the corresponding product standards |

C2.2 Special requirements

C2.2.1 Large-scale High Pressure Vessels (A1)

C2.2.1.1 Production devices and process equipment

It shall have rolling machines with cold rolling capacity of not less than 150 mm for thickness (the container manufacturing unit of the forged welded structure has machining equipments with a diameter of not less than 5 meters and a height of not less than 2 meters), and a single lifting machine with a rated lifting capacity of not less than 200 tons and heat treatment furnace of not less than 10 m × 5 m × 5 m (length × width × height).

Note C-7: If the product range is limited to multi-layer pressure vessels, the production devices and process equipment requirements can be appropriately reduced.

C2.2.1.2 Inspection instruments and test devices

It shall have an X-ray inspection device with a transillumination capability of not less than 150mm.or TOFD inspection instrument

C2.2.2 Other High Pressure Vessels (A2)

It shall have rolling machines with cold rolling capacity of not less than 30 mm for thickness (except for non-welded structures) and a single lifting machine with rated lifting capacity of not less than 20 tons.

C2.2.3 Spherical tank (A3) (Note C-8)

C2.2.3.1 Personnel

There shall be no less than 8 welders with qualified flat, vertical, horizontal and vertical position welding of sheet butt welds. There shall be no less than 2 welders with qualified items for vertical, horizontal and vertical position welding of tube sheet fillet welds.

C2.2.3.2 Production devices and process equipment

- (1) It shall have a welding room that meets the requirements of on-site welding, a welding consumable house that guarantees temperature and humidity, and a drying and insulation equipment for welding consumables;
- (2) Measures and facilities to ensure welding conditions shall be available;
- (3) The unit engaged in the on-site overall heat treatment of the spherical tank shall also have the overall heat treatment capacity and the corresponding tooling.

C2.2.3.3 Inspection instruments and test devices

- (1) It shall have the safety protection and warning facilities and measures required for on-site radiographic inspection operations, and the darkroom facilities for handling the film;
- (2) It shall have testing devices and means to measure tank geometry, column leg verticality, foundation water filling and settlement.

Note C-8: Units engaged in the on-site manufacturing of super large medium and low pressure non-spherical pressure vessels shall meet the requirements of the basic conditions and special conditions of spherical tanks (A3) in addition to the corresponding manufacturing qualifications. The A3 condition is checked by the supervisory inspection agency.

C2.2.4 Non-metallic pressure vessels (A4)

C2.2.4.1 Graphite pressure vessels

C2.2.4.1.1 Personnel

- (1) There shall be at least 2 specially trained bonding and dipping personnel each;
- (2) There shall be no less than 2 full-time inspectors of graphite container quality and material physical and chemical performance inspectors. The material physical and chemical performance inspectors shall have the title of assistant engineer.

C2.2.4.1.2 Production devices and process equipment

- (1) There shall be special equipment for drying and cutting materials such as graphite blocks, special fixtures for bonding and splicing, cutting and drilling equipment with guaranteed machining accuracy;
- (2) Complete equipment for graphite impregnation and heat curing.

C2.2.4.1.3 Inspection instruments and test devices

There shall be test devices that meet the inspection requirements for graphite materials. Laboratory conditions, instruments and equipment meet the requirements of relevant quality and inspection standards.

C2.2.4.2 Fiber reinforced plastic pressure vessels (including thermoplastic lined fiber reinforced plastic pressure vessels)

C2.2.4.2.1 Personnel

- (1) There shall be at least 2 specially trained winding workers and bonding (hand lay) workers each; thermoplastic lining fiber reinforced plastic pressure vessel manufacturing units shall also have specially trained thermoplastic welding personnel of not less than 2 people;
- (2) There shall be no less than 2 full-time inspectors of specially trained fiber reinforced plastic pressure vessels; thermoplastic lining fiber reinforced plastic pressure vessel manufacturing units shall also have at least one full-time inspector with thermoplastic quality inspection capability;
- (3) The manufacturing units that have the ability to inspect the physical and chemical properties of fiber reinforced plastic pressure vessels or thermoplastic lining fiber reinforced plastic pressure vessel materials shall have specially trained physical and chemical performance inspectors of not less than 2 persons with the title of assistant engineer.

C2.2.4.2.2 Design capacity

-
- (1) There shall be design capability of fiber reinforced plastic pressure vessels;
 - (2) There shall be no less than 5 full-time designers, including no less than 3 assistant engineers and 2 engineers.

C2.2.4.2.3 Production devices and technology equipments

- (1) There shall be the manufacturing capability for the entire process of fiber reinforced plastic or thermoplastic lining fiber reinforced plastic pressure vessels that meet the scope of the licensing;
- (2) There shall be various types of molds and microcomputer-controlled automatic fiber winding production lines (including lining machine, curing machine, winding machine and demoulding machine), cutting equipment, grinding equipment, raw material mixing equipment such as mixing tanks, spray guns and assembly fixtures such as assembly rings, which meet the manufacture requirements of various product specifications in the scope of the license. For thermoplastic lining fiber reinforced plastic pressure vessels, there shall also be plastic welding equipment.

C2.2.4.2.4 Inspection instruments and test devices

There shall be test devices that meet the inspection requirements for fiber reinforced plastic and thermoplastic lining fiber reinforced plastic pressure vessel materials. Laboratory conditions, equipment and equipment shall meet the requirements of relevant quality and inspection standards.

C2.2.5 Oxygen cabin (A5)

C2.2.5.1 Personnel

- (1) Personnel responsible for the electrical system and installation quality control system shall be available, and the responsible person shall have the title of engineer;
- (2) There shall be no less than 8 technicians in the related fields (mechanical, welding and electrical) related to product design, manufacturing, installation, modification and major repair work, and no less than 5 technicians engaging in product design, among which electrical professional technician are not less than 2;
- (3) There shall be no less than 2 licensed electricians.

C2.2.5.2 Workplace

Indoor production sites for the manufacture, assembly and commissioning of products shall meet the requirements of cleaning conditions.

C2.2.5.3 Design capacity

There shall be design capabilities of the product within the scope of the license and shall have computer hardware and software for new product design development and transformation processes (including design drawings, plotting hardware and software).

C2.2.5.4 Production devices and technology equipments

It shall have the procedures of self-completion for manufacturing, installation, alteration and major repair within the scope of the manufacturing license, and the equipment suitable for the production process (such as cutting, forming, heat treatment, machining, welding, lifting, surface treatment, bending, etc.) and the corresponding technology equipment.

C2.2.5.5 Inspection instruments and test devices

It shall have inspection and test equipment and instruments that meet the procedures requirements of product manufacturing, installation, alteration and major repair, acceptance, etc., such as electrical test instrument (megohmmeter, grounding resistance tester, AC withstand voltage tester, leakage current tester, etc.), optical tester, acoustic tester, etc.

C2.2.6 Ultra-high Pressure Vessels (A6)

C2.2.6.1 Personnel

There shall be no less than 2 middle and senior machining personnel.

C2.2.6.2 Production devices and process equipments

It shall have mechanical processing and heat treatment equipment that meets the manufacturing of the product.

C2.2.6.3 Inspection instruments and test devices

It shall have relevant equipment for inspecting low-magnification structure, grain size, non-metallic inclusions, residual stress, etc., and ultra-high pressure container ultrasonic testing equipment.

C2.2.7 Railway Tankers (C1), Tankers, ISO Tanks (C2), Tube Trailer, Tube Skid (C3)

Tube Trailer and Tube Skid (C3) manufacturers shall obtain manufacture license of seamless gay cylinders.

C2.2.7.1 Personnel

- (1) There shall be personnel responsible for the safety control system, instrument, information traceability and loading and unloading appurtenance quality control system. The responsible person shall have the corresponding experience and has engineer's title;
- (2) There shall be no less than 2 staff members with training on safety accessories, instruments, information traceability and loading and unloading appurtenance;
- (3) There shall be no less than 2 argon arc welding welders in tube trailer and Tube Skid manufacturing units;
- (4) There shall be no less than 4 specially trained assembly personnel.

C2.2.7.2 Production devices and process equipments

- (1) It shall have tooling and equipment for the final assembly (or completion) of tanks or cylinders, safety accessories, instruments, loading and unloading valves, piping, running gear or frames;
- (2) The railway tanker manufacturing unit shall have a special railway line, and shall have the corresponding tooling and equipment necessary for the bogie manufacturing, and the devices for braking, coupler buffering, and the completion of the complete vehicle; the ISO Tanks and Tube Skid manufacturing unit shall have special end frame manufacturing tooling, frame-mounted carrier and test site, tooling and facilities that can meet the strength test(Except for tests required for containers used on ships, internal longitudinal bolting tests (dynamic) may be subcontracted) requirements of ISO Tanks and Tube Skid;
- (3) The manufacturing unit with the post weld heat treatment requirements for tank body

shall have an integral post weld heat treatment furnace for tank body and be equipped with the thermometer that automatically records the temperature curve;

- (4) Where gas replacement or vacuuming processes are required, gas replacement treatment equipment or vacuuming equipment that meets the relevant processes shall also be equipped;
- (5) There shall be heat treatment and non-destructive testing sites, tooling and facilities and special weighing scales that the product manufacturing requires.

C2.2.7.3 Inspection instruments and test devices

The tube trailer and Tube Skid manufacturing unit shall have gas cylinder static balance test device and valve test device.

C2.2.8 Medium and /or low pressure vessels (D)

It shall have bending machines for product manufacturing needs and lifting devices with rated lifting capacity of not less than 10t.

C2.2.9 Special requirements for special structural pressure vessels

In addition to complying with the corresponding level of pressure vessel manufacturing permit conditions, it shall also have the special conditions of this article.

The manufacture licensing for special structural pressure vessel manufacturing units shall mark out (or limit) vacuum insulated containers (tanks), glass-lined pressure vessels, multi-layer pressure vessels, gas storage wells or non-welded bottle vessels. If the certificate is not marked, it cannot be used for the manufacture of special structural pressure vessels. If the manufacturer needs to manufacture the above containers, the manufacturer shall apply for licensing item addition.

C2.2.9.1 Vacuum insulated containers (tanks)

C2.2.9.1.1 Personnel

Personnel with special training to inspect vacuum performance and low temperature insulation performance shall be available.

C2.2.9.1.2 Production devices and process equipments

There shall be filling or winding, vacuuming and degreasing equipment required for the manufacture of the product;

The units with products adopting winding insulation material for insulation shall have a clean room that can control temperature and humidity, and have winding tools;

There shall be sorbent activation equipment, and the heating temperature range can effectively guarantee the activation demand;

There shall be a dedicated vacuum chamber, corresponding internal and external container fitting equipment or tooling.

C2.2.9.1.3 Inspection and test devices

There shall be an expanded perlite moisture content analysis instrument, an evaporation rate tester, a dew point measuring instrument, a grease content detection and analysis instrument, a vacuum measuring instrument, and a helium mass spectrometer vacuum leak detector (with

corresponding calibration tools such as standard leaks).

C2.2.9.2 Glass-lined pressure vessel

C2.2.9.2.1 Personnel

- (1) Personnel responsible for the glass-lining quality control system shall be available with the engineer title and work experience in manufacturing the glass-lined pressure vessel;
- (2) There shall be no less than 2 people who have been specially trained in the glass lining process;
- (3) There shall be at least 2 specially trained professional quality inspectors of the glass-lined pressure vessel and the physical and chemical properties of the glass glaze.

C2.2.9.2.2 Production devices and process equipments

- (1) The manufacturing process of glass-lined pressure vessel body and lids is not allowed to be subcontracted in the manufacturing process;
- (2) There shall be special tooling, facilities and sites that meet the production of the product, including surface treatment facilities such as sandblasting (shot blasting) and polishing;
- (3) There shall be a enamel glass glaze dusting device that ensures the sealing, uniform suspension and stable spraying pressure of the glazed glaze during the spraying process;
- (4) There shall be a displayable simmering furnace with temperature control and automatic recording, simmering and burning equipment, a special site effectively isolated or away from sandblasting (shot blasting) and polished area for smoldering and dusting, and a anti-pollution glass glaze storage site.

C2.2.9.2.3 Inspection instruments and test devices

There shall be inspection instruments and devices necessary for product inspection and testing, including not less than 2 sets of glass-line coating thickness gauges, no less than 2 sets of DC high-voltage testers of not less than 20kV, glass-lined geometrical inspection tools, the whole machine test bench, glass glaze physical and chemical performance testing equipment.

C2.2.9.2.4 Trial manufacture

- (1) The trial manufactured product shall be a stirred vessel;
- (2) The structural type, size and specifications of the trial manufactured products shall comply with the relevant product standard requirements;
- (3) If the product specification is less than or equal to 5,000L, the demo of the largest specification of the application shall be provided; if the product specification is greater than 5,000L and less than or equal to 12,500L, the demo of trial manufacture greater than or equal to 6,300L shall be provided; if the product specification is greater than 12,500L, demo of greater than or equal to 16,000 L shall be provided.

C2.2.9.3 Multilayer pressure vessel

C2.2.9.3.1 Personnel

There shall be hot-shrink-fitted, coil wounded or spiral wrapped professional technicians, and the operators shall be specially trained.

C2.2.9.3.2 Production devices and process equipment

(1) There shall be special equipment for hot-shrink-fitted, coil wounded or spiral wrapped processes;

(2) There shall be special pulling (pressing), clamping, fitting and tooling moulds that are compatible with the multi-layer pressure vessel manufacturing method. The fitting device has the ability to automatically record temperature curves.

C2.2.9.3.3 Inspection instruments and test devices

There shall be special equipment for testing such as laminate (belt), nested interval and loose area, and winding (steel belt mis-wound) inclination.

C2.2.9.4 Gas storage wells

C2.2.9.4.1 Personnel

(1) Responsible personnel of well drilling, cementing and steel pipe assembly quality control system shall be available, and the responsible person of cementing quality control system shall have the title of engineer;

(2) There shall be no less than 5 technicians, and at least 1 person with UT II non-destructive testing qualification;

(3) The number of operators for steel pipe assembly and cementing shall meet the needs of multiple gas storage wells manufacturing sites of the manufacturer, and ensure that each manufacturing site have professional steel pipe assembly and cementing operations with no less than 8 people.

C2.2.9.4.2 Production devices and process equipment

(1) Steel pipe assembly and cementing process are not allowed to be subcontracted;

(2) There shall be steel pipe assembly equipment such as hydraulic tongs (casing power tongs with maximum torque not less than 28kN·m) required for the manufacture of gas storage wells, power systems and fixtures;

(3) There shall be a mud pump required for cementing.

C2.2.9.4.3 Inspection instruments and test devices

(1) Pressure test and air-tight test are not allowed to be subcontracted;

(2) There shall be a thickness gauge, length gauge, caliper, thread taper (gauge), pressure gauge, pressure torque gauge, etc. required for the manufacture of gas storage wells;

(3) There shall be no less than 2 pressure test pumps with a maximum working pressure of not less than 45 MPa.

C2.2.9.5 Non-welded bottle container

The special conditions for the manufacture of non-welded bottle containers shall comply with the manufacturing conditions of cylinders with a volume greater than 150L in the seamless gas cylinders (B1).

C2.3 Production requirements for license renewal

For renewal application, the manufacturing unit shall produce at least one corresponding level of product within the license range. Otherwise, the trial demo product shall be prepared in accordance with the requirements of C2.1.7 of this Annex.

To apply for the “license renewal by self-declaration” of 3.6.3.2 of these Rules, the manufacturing performance of the products corresponding to the license level within the license period shall not be less than 4 sets and at least 1 set per year.

CSSEI

Licensing requirements for Production and Filling of Gas Cylinder

D1 Requirements for Production of Gas Cylinder

D1.1 Basic requirements

D1.1.1 Personnel

D1.1.1.1 Technical staff

The manufacturers shall have one technical person-in-charge with licensed product manufacturing or inspection work experience, bachelor's degree and engineer's title.

D1.1.1.2 Quality assurance system personnel

According to the requirements of the manufacturing process of products, the manufacturer shall appoint quality assurance engineers and quality control system responsible personnel of design, material, technological process, welding, NDT, physical and chemical testing, inspection and testing, spinning bottom and closure of gas cylinders, winding and curing of filament wound gas cylinders, non-metallic inner bile forming, filling and curing of packed cylinders, heat-insulation material coating and vacuum extraction for low temperature insulation gas cylinders. The responsible person's technical title and qualification shall be no less than the requirements of Table D-1.

The qualifications of personnel in the quality assurance system shall meet the following requirements:

(1) Quality Assurance Engineer shall have working experience in cylinder manufacturing, quality management or inspection and professional education background in science and engineering;

(2) Quality control system responsible personnel for welding and heat treatment shall have working experience of welding and heat treatment and professional education background of welding, metallic materials and related machinery;

(3) Quality control system responsible personnel for inspection and testing shall have working experience in inspection of cylinder products and relevant professional education background in mechanics, welding, materials, non-destructive testing, etc.;

(4) Other quality control system responsible personnel shall have working experience of the work they are responsible for and background in mechanical or related professional education;

(5) Quality control system responsible personnel shall be familiar with the tasks and requirements of their posts and be able to perform their duties through job training.

Table D-1 Titles and Qualifications of Quality Assurance System Staff

| Quality Assurance System Staff | Titles and Qualifications |
|---|---------------------------|
| Quality assurance engineer | Engineer |
| Responsible person for design quality control system | Engineer |
| Responsible person for material quality control system | Engineer |
| Responsible person for technological process quality control system | Engineer |
| Responsible person for welding quality control system | Engineer |
| Responsible person for heat treatment quality control system | Engineer |

| | |
|---|-------------------------------------|
| Responsible person for NDE quality control system | Assistant Engineer and NDE Level II |
| Responsible person for physical and chemical testing quality control system | Assistant Engineer |
| Responsible person for inspection and testing quality control system | Engineer |

Note D-1: If there are no welding, heat treatment and NDT in product manufacturing process, there is no need to equip the corresponding personnel responsible for the quality control system.

D1.1.1.3 Technical Staff

The manufacturer shall be equipped with technical staff required for the manufacture of licensed products, and the number of such staff shall no less than the requirements of Table D-2.

Table D-2 Number of Technical Staff

| Sub-items | Proportion and number of employees | Major in mechanical or related (Note D-2) | Major in welding or related (Note D-2) |
|-----------|------------------------------------|---|--|
| B1、B3 | 10%, 8 | 3 | -- |
| B2、B4、B5 | 5%, 6 | 2 | 1 |

Note D-2: Major in mechanical or related, including manufacturing and control of process equipment (chemical machinery), mechanical design and manufacturing, mechatronics, etc. Major in welding or related, including welding, metallic materials, etc.

D1.1.1.4 Welders

(1) The manufacturer of welded structural cylinders shall be equipped with qualified welders required for the manufacture of licensed products. The qualified welder items shall meet the requirements of welding methods, types and locations of metallic materials required for the manufacture of licensed products.

(2) The number of welders of manufacturers shall match with the production capacity and not less than 8 people.

D1.1.1.5 NDT Personnel

The manufacturer's qualified items of the responsible person of NDT quality control system, qualified items and quantity of NDT personnel shall not be less than requirements of Table D-3.

Table D-3 Qualified Items and Quantity of NDT Personnel (Note D-3)

| Sub-items | Responsible Person of NDT Quality Control System | Qualified NDT Personnel | |
|-----------|--|-------------------------|----------|
| | | Qualified Items | Quantity |
| B1、B3 | Qualified RT II or UT II | UT II | 2 |
| | | MT II | 2 |
| | | PT II | 2 |
| B2、B4、B5 | | RT II | 2 |
| | | UT II | 2 |
| | | MT II | 2 |

Note D-3: When one person has more than one qualified items, it can be counted separately according to different items; the responsible person of NDT quality control system can be counted in the number of NDT personnel; if there is no requirement for relevant NDT methods in the relevant product standards of sub-items, there is no need to equip the corresponding NDT personnel.

D1.1.1.6 Inspection and testing personnel

The manufacturer shall be equipped with inspection and testing personnel to meet the

requirements of process inspection and batch inspection and testing of the licensed products.

D1.1.2 Workplace

The workplaces of manufacturers shall meet the following requirements,

(1) There are production sites required for each manufacturing process, punch forming of bottles (including blanking of blank metal and deep drawing of sheets), spinning bottom and closure of tube bottles, welding, heat treatment, NDT, winding and curing of filament wound gas cylinders, non-metallic inner bile forming, filling, degreasing and cleaning of cryogenic insulated cylinder, heat-insulation material coating and vacuum extraction are completed in the production site;

(2) Each manufacturing process is reasonably arranged in the production site according to the production process;

(3) Welding procedure of pressure components shall be carried out indoors; all welding seams on cylinders (including non-pressure welding seams) shall be evaluated according to requirements of GB/T 32209 Welding Procedure Qualification for Welded Gas Cylinders; welding procedure evaluation shall be carried out on the equipment of the production line of manufacturers, and welding specimens (or sample cylinders) shall be welded by welders skilled in operation of the manufacturers;

(4) The manufacturer shall have warehouses or specific areas with effective protection measures for storing raw materials and welding materials, and meet the requirements of relevant safety technical specifications and standards;

(5) The manufacturer shall have specific areas with necessary protective measures for pressure test, air-tight test, bursting test and other related tests;

(6) The inspection and testing of licensed products shall be completed in the same production site;

(7) The manufacturer shall have special areas (exposure chamber, darkroom, etc.) for NDT testing;

(8) The manufacturer shall have special areas for keeping technical data such as technical quality files, regulations, standards, etc.

D1.1.3 Production equipment and process equipment

The manufacturer shall have such equipment as cutting, forming, machining, welding, drying and preservation of welding materials, lifting, heat treatment, surface treatment, filling, curing and drying, winding and curing of composite materials, forming of non-metallic inner liners, vacuum extraction of cryogenic insulated cylinder, and other necessary fixtures and moulds.

D1.1.4 Inspection instrument and testing equipment

(1) The manufacturer shall have inspection instrument and testing equipment required for the individual and batch inspection items in the manufacturing process of the licensed products, such as testing platform, NDT, chemical analysis, tensile test, impact test, metallographic examination, determination of material properties of non-metallic liner, pressure test (external test equipment shall be equipped with calibrated standard bottles), air-tight test, bursting test, pressure circulation test, etc;

(2) The manufacturer shall have processing equipment required for preparation of the batch test samples and the instruments and equipment required for the test of samples.

D1.1.5 Subcontract

(1) Manufacture processes of bottles, such as hot forming, welding, NDT, heat treatment,

filler manufacturing, filament winding, are not allowed to subcontract.

(2) On the premise that the filament wound cylinder manufacturer has the manufacture capability of the inner liner for its own cylinder, it may subcontract the inner liner to the unit with the corresponding manufacturing qualification.

D1.1.6 Product batch management

The manufacturer shall have conditions for the corresponding batch production of the licensed products, manufacture, inspect and test the products in accordance with the requirements of batch management, file the quality records and inspection reports of the products in batches, and issue the batch quality certification documents of the products. Quality records shall have traceability of main materials, welding materials, key process parameters and operators. The definition of product batch can be found in Supervision Regulation on Safety Technology for Gas Cylinder.

D1.1.7 Manufacturing assurance ability of product safety performance

(1) The manufacturer shall have ability to independently complete the manufacture of cylinders and ensure product safety performance; ensure that the product safety performance meets the safety requirements;

(2) The safety performance of cylinder products shall meet requirements of *Supervision Regulation on Safety Technology for Gas Cylinder* and the relevant technical specifications and product standards. Where the cylinder is manufactured according to standards other than the harmonized *Supervision Regulation on Safety Technology for Gas Cylinder*, the manufacturer shall provide the adopted standards, design documents and Conformity Declaration which can prove that safety performance of the cylinder is not lower than requirements of Supervision Regulation on Safety Technology for Gas Cylinder.

(3) The manufacturer shall formulate technological procedures (operation instructions) and inspection procedures including all manufacturing process of licensed products.

D1.1.8 Trial manufacture (Note D-4)

(1) The specifications of the trial-manufactured samples shall verify the manufacturing and inspection capabilities of the manufacturer within the scope of the application for license;

(2) There shall be design document appraisal report for the trial-manufactured samples and meet the requirements of *Supervision Regulation on Safety Technology for Gas Cylinder*;

(3) The design parameters and manufacturing process of the trial-manufactured samples shall cover the scope of application for licensing. The manufacturing process shall include forming, welding, NDT, heat treatment, physical and chemical testing, pressure test, air-tight test, etc;

(4) Each sub-item applying for license shall produce at least two batches of qualified trial-manufactured samples (the qualified trial-manufactured samples shall complete all the procedures before painting, as well as the inspection and test, and the results of the inspection shall be qualified), in addition, there shall be at least 1 batch of in-process product of trial-manufactured samples, which shall cover the main manufacturing and inspection processes such as cold and hot forming, welding, NDT, heat treatment, physical and chemical testing, pressure test, air-tight test, winding and curing, filling, vacuum extraction and vacuum leak-sensing of cryogenic insulated cylinder (Note D-5);

(5) The number of qualified trial-manufactured cylinders samples per batch shall be no less than 50, for long tube cylinders with large capacity and cryogenic insulated cylinder, the number shall be no less than 10.

Note D-4: If the trial-manufactured samples are for sale, the trial-manufacture process shall be subject to supervision and inspection.

Note D-5: If 2 batches of qualified trial-manufactured samples and 1 batch of qualified in-process trial-manufactured samples cannot cover the necessary licensed product manufacturing process, the coverage requirements for all manufacturing process can be met by adding trial-manufactured samples.

D1.1.9 Traceability and publicity of manufacturing quality

The manufacturer shall set up its own website of gas cylinder product quality traceability information and publicize the manufacturing quality information to the public.

D1.2 Special Requirements

D1.2.1 Seamless cylinder (B1)

D1.2.1.1 Personnel

(1) The number of NDT personnel shall be matched with the production capacity, there shall be at least 1 qualified NDT II examiner per shift;

(2) There shall be at least 1 technician in metallic materials, heat treatment or related field.

D1.2.1.2 Production equipment and process equipment

(1) The cylinder manufacturer with volume less than or equal to 150L shall have a manufacturing assembly line that is compatible with the manufacturing process and inspection requirements of blanking, cold and hot forming, heat treatment (including solid solution an aging treatment), NDT, hardness test, bottle mouth processing, pressure test, air-tight test, surface coating, etc.;

(2) The cylinder manufacturer with volume greater than 150L shall have appropriate equipment and facilities, the manufacture process including spinning closure, heat treatment, NDT, bottle mouth processing shall set up a manufacturing assembly line;

(3) There shall be not less than 2 CNC spinning receptacles (bottom) equipment with the functions of automatic supplementary heating and bottom thickening, which can meet the processing requirements of the geometry and size of bottom and shoulder of the cylinder.

(4) The manufacturer of extruded gas cylinder shall have ingot heating furnace and punching and drawing equipment for the forming of cylinder;

(5) The manufacturer of tubular gas cylinder shall have bottom defect milling removal equipment and bottom air-tight test equipment;

(6) The manufacturer of plate punching gas cylinder shall have such equipment as plate punching and stretching, stress relief annealing and surface lubrication treatment.

(7) Steel cylinder manufacturing units shall have continuous heat treatment furnaces with automatic temperature control and real-time recording functions, and the temperature of the effective heating zone in the insulation zone shall not exceed the set temperature ($\pm 15^{\circ}\text{C}$); aluminum alloy seamless cylinder manufacturing unit shall have solid solution heat treatment furnace and aging heat treatment furnace with automatic temperature control and real-time recording function, the temperature of the effective heating zone in the furnace shall not exceed the set temperature ($\pm 5^{\circ}\text{C}$); the temperature measuring points used in actual production shall not be less than three and shall reflect the temperature variation trend of the temperature field in the whole effective heating zone (Note D-6); the temperature measurement of the heat treatment furnace shall be carried out in accordance with GB/T9452 *Method for Measuring the Effective Heating Zone of the Heat Treatment Furnace*, and shall be measured regularly. Small volume cylinders are allowed to be treated in periodic furnaces, but the same batch of products shall not be

heat treated across furnaces.

(8) Manufacturing units shall have numerical control processing equipment for processing inner and outer threads of bottle mouth which is suitable for the manufacture of licensed products.

Note D-6: Effective heating zone refers to the workspace occupied by the work piece during heat treatment and heat preservation.

D1.2.1.3 Testing Instruments and Testing Devices

(1) The manufacturer shall have on-line automatic ultrasonic testing and on-line magnetic particle testing instruments suitable for the testing items of licensed products. The ultrasonic testing instrument for quenched and tempered cylinders shall at least have the functions of longitudinal and transverse measurement of inner surface, longitudinal and transverse measurement of outer surface and wall thickness measurement. The manufacturer shall have magnetic powder testing instrument for the inner surface of bottle mouth if bottle threaded products require surface nondestructive testing.

(2) Where hardness testing is required by product standards, the manufacturing unit (except for long tube large volume cylinders) shall have on-line hardness automatic testing instrument, and have the functions of hardness automatic measurement, data acquisition and automatic recording;

(3) The testing device shall be able to record bottle numbers in real time, automatically record test date, test pressure, holding time, elastic expansion, residual deformation and other relevant test parameters; shall be able to generate the hydrostatic test report and have water pressure test device with data uploading function for external measurement method. The manufacturing units that only produce small volume cylinders or normalized cylinders are allowed to adopt an internal pressure testing device with the above functions.

(4) Where pressure cycle test is required in the product batch inspection, manufacturing units shall have pressure cycle test device. Its upper limit of cycle pressure and the number of test devices shall be matched with the scope of the production and batch manufacturing capacity.

(5) There shall be air tightness test device, complete set of continuous compressed gas supply devices and necessary safety protection facilities matching the manufacturing capacity of the licensed product.

(6) Where blasting test is required for batch inspection of products, manufacturing units shall have a hydraulic blasting test device which is suitable for the hydraulic blasting test device capable of automatically recording pressure water inflow, pressure holding time, water inflow time curves.

D1.2.2 Welded gas cylinder (B2)

D1.2.2.1 Personnel

(1) Based on the requirements of Annex D1.1.1.4, the number of welders and the qualified items shall also be matched with the production capacity and production shifts.

(2) The number of RTII level non-destructive testing personnel shall be matched with production capacity and production shifts, with at least one person per shift.

D1.2.2.2 Production Equipment and Process Equipment

D1.2.2.2.1 Basic Conditions

(1) The manufacturer shall have production lines of steel plate cutting, cylinder rolling, head forming, welding, heat treatment, non-destructive testing, pressure test, air tightness test, surface treatment, spraying and other processes which are suitable for the manufacturing process and

inspection requirements of the licensed products.

(2) Manufacturing units of cylinder products whose volume is less than or equal to 150L shall adopt manufacturing assembly line for workpiece transshipment between processes; manufacturing units of cylinder products whose volume is over 150L shall have special manufacturing sites and product production lines, and the process layout shall be compact and smooth;

(3) Manufacturing units shall have first and second grade welding material storehouses that meet the requirements of temperature and humidity control, and have welding material drying and heat preservation equipment.

(4) Manufacturing units shall have mechanical welding equipment for longitudinal and circumferential welds of gas cylinders.

(5) Where heat treatment is required during the manufacturing process of gas cylinders, manufacturing units shall have heat treatment furnaces with automatic temperature control and real-time recording functions. The temperature in the effective heating zone shall not exceed the set temperature ($\pm 25^{\circ}\text{C}$). Heat treatment furnaces shall not adopt induction heating (except for heat treatment furnaces for liquefied petroleum gas cylinders); if heated by flame, the flame shall not directly fire the workpiece, and the temperature measuring points used in actual production shall not be less than three. It can reflect the temperature change trend of the whole effective heating zone, and the temperature measurement of heat treatment furnace shall meet the requirements of GB/T 9452 and be carried out regularly.

D1.2.2.2.2 Special Requirements for Liquefied Petroleum Gas Cylinders

In addition to meeting the basic requirements of Annex D1.2.2.2.1, LPG cylinder manufacturers shall also meet the following requirements:

(1) The manufacturing equipment of LPG cylinder for a circumferential weld shall have an automatic production line including plate hoisting, steel plate flattening, blanking, head forming, valve seat welding, base welding, circumferential seam welding, heat treatment, water pressure test, air tightness test, external shot blasting, surface spraying, etc.

(2) The lifting capacity of the equipment used for plate rolling hoisting is not less than 25T.

(3) Mechanical welding equipment for circumferential welding, seat welding, base welding, shield welding and information-based identification plate, of which mechanical circumferential seam welding equipment shall be no less than 8. There are at least 2 mechanical welding equipments for seat welding, base welding, shield welding and information-based identification plate.

D1.2.2.2.3 Special requirements for non-refilled welded cylinders

In addition to meeting the basic requirements of Annex D1.2.2.2.1, non-refilled welded cylinder manufacturers shall also meet the following requirements:

(1) The manufacturing unit shall have the whole process automatic production line including the process of plate hoisting, steel plate flattening, blanking, head forming, rupture disc welding, valve seat welding, handle welding, surface rust-proof treatment, circumferential welding, air tightness test and surface spraying, etc.

(2) The lifting capacity of the equipment used for plate rolling hoisting is not less than 15t.

(3) There shall be mechanical welding equipment for girth welding, rupture disc welding, and seat welding, handle welding, of which no less than 8 mechanical welding equipment for girth welding, no less than 4 mechanical welding equipment for seat welding, and at least 2 mechanical

welding equipments for rupture disc welding and handle welding.

(4) There shall be automatic production equipment which is capable of on-line surface antirust treatment for upper and lower heads.

D1.2.2.3 Testing Instruments and Testing Devices

(1) The manufacturing units shall have X-ray photographic detection equipment or X-ray digital imaging detection device which shall match the production capacity. When X-ray digital imaging detection device is used, its system resolution shall be not less than 2.6LP/mm (line logarithm) the sensitivity of the image quality meter, the distortion rate of the image and the magnification of the image shall meet the requirements of GB/T 17925 "X-ray Digital Imaging Detection of Gas Cylinder Butt Weld".

(2) The number of cylinder water pressure test devices shall be matched with the production capacity of the cylinder (the total capacity of the LPG cylinder water pressure test device is not less than 200 units per hour); the water pressure test device shall have the capability of real-time recording the number of the cylinder (the LPG cylinder water pressure test device should have the capability of automatic reading two-dimensional code, electronic label or other information marking), automatically record test date, test pressure, holding time and other relevant test parameters, automatically generate water pressure test report and has data uploading function (LPG cylinder manufacturers generally need to equip each hydraulic test device with a remote video monitoring device with full automatic real-time uploading function);

(3) There shall be air tightness test equipment and matching continuous compressed gas supply device and necessary safety protection facilities which is suitable for the manufacturing capability of the licensed products.

(4) Where the blasting test is required for product batch inspection, the manufacturer shall have a hydraulic blasting test device which is compatible with the blasting pressure of the product and can automatically record the pressure water inflow, pressure holding time and water inflow time curves.

(5) The manufacturer shall have a direct reading spectrometer for chemical composition analysis of steel products.

(6) The manufacturing units of non-refilled welded cylinders shall have air tightness test device, complete set of continuous compressed gas supply devices and necessary safety protection facilities matching the manufacturing capacity of the licensed product.

D1.2.3 Fiber Wrapped Cylinder

D1.2.3.1 Personnel

There shall be at least 1 technician with polymer, composite material specialty or relevant working experience.

D1.2.3.2 Production Equipment and Process Equipment

(1) The manufacturing units shall have the manufacturing capacity of inner liner as required; manufacturing units using metallic inner liners shall meet the manufacturing conditions of seamless gas cylinders.

(2) There shall be manufacturing assembly line including winding, curing, water pressure test, air tightness test, etc.

(3) There shall be special warehouse that meets the storage requirements of fiber and resin materials, the warehouse and winding room shall have temperature and humidity control measures.

(4) There shall be automatic control of filament winding machine and filament tension control device which is suitable for the manufacture of licensed products.

(5) There shall be resin curing furnace with automatic temperature control, its effective heating zone temperature shall not exceed the set temperature ($\pm 10\text{ }^{\circ}\text{C}$) and the temperature measuring points shall be no less than 3 for actual production. The temperature changing trend of the whole temperature field can be reflected and measured regularly.

(6) The manufacturing units of non-metallic inner liner wound cylinder shall have full automatic production lines for the process of integral forming of inner gallbladder bottle, filament winding, resin curing (or pre-curing), The welding and filament winding process of inner tank body and valve base shall be completed under the condition of constant temperature and humidity. All operations of these processes shall be carried out by intelligent robots and automation equipment, and manual operation is not allowed.

D1.2.3.3 Testing Instruments and Testing Devices

(1) There shall be external hydraulic pressure testing device (non-metallic inner-liner wound cylinders shall be equipped with an internal measuring hydrostatic pressure testing or pneumatic testing device) which can record the number of cylinders in real production, automatically record the test date, test pressure, holding time, elastic expansion, residual deformation and other relevant test parameters, generate the test report and upload data. The amount of the device shall satisfy the production capacity.

(2) There shall be air tightness test device, complete set of continuous compressed gas supply devices and necessary safety protection facilities matching the manufacturing capacity of the licensed product.

(3) There shall be pressure cycle test devices, the upper limit of circulating pressure and the number of test devices shall be matched with the manufacturing scope of licensed product and batch production capacity, the number of test devices shall be not less than two.

(4) There shall be hydraulic blasting test device which is compatible with the blasting pressure of the product and can automatically record the pressure water inflow, pressure holding time, water inflow time curves.

(5) Manufacturing units of non-metallic inner-liner winding cylinders shall have non-metallic inner-liner forming equipment, physical and chemical performance testing devices for non-metallic materials, and testing instruments for measuring the thickness, appearance and size of non-metallic inner-liner wall.

D1.2.4 Cryogenic Insulated Cylinder (B4)

D1.2.4.1 Personnel

(1) Based on the requirements of Annex D1.1.1.4, the number of welders and the qualified items shall also be matched with the production capacity and production shifts.

(2) The number of NT personnel and the qualified items shall also be matched with the production capacity and each shift shall be equipped with at least two NT personnel of Grade II.

(3) Equip at least 1 technical personnel with relevant specialties or working experience in cryogenic engineering.

D1.2.4.2 Production Equipment and Process Device

(1) There shall be manufacturing line which includes blanking, inner and outer gallbladder forming, welding, non-destructive testing, pressure testing, parts cleaning and drying, insulation material binding, vacuum pumping and other processes.

(2) There shall be special place for storing stainless steel material and shall have welding material storehouse.

(3) There shall be relatively closed thermal insulation material bandaging and special operating place for inner and outer gallbladder suit, the operating place shall have temperature and humidity monitoring and control device.

(4) Protective measures shall be taken to avoid the contact and contamination with carbon steel during the manufacture process and transportation of cryogenic insulated cylinders and spare parts.

(5) There shall be cutting machine and rolling equipment, the manufacture of inner and outer of cylinder tank shall be able to proceed simultaneously. Longitudinal and circumferential welds of cylinder body shall adopt mechanical welding, and equip longitudinal and circumferential seam welding equipment 2 pieces for each at least.

(6) There shall be parts degreasing cleaning, drying equipment and molecular sieve dehydration activation device.

(7) There shall be automatic control equipment for thermal insulation material binding.

(8) There shall be vacuum extraction device with heating and temperature control function for sandwich insulation material.

D1.2.4.3 Testing Instruments and Testing Devices

(1) There shall be X-ray digital imaging device for non-destructive testing of longitudinal and circumferential welds of inner gallbladder, of which resolution shall be no less than 2.6LP/mm (line logarithm). Sensitivity of image quality meter, image distortion rate and image magnification shall meet the requirements of GB/T17925.

(2) There shall be at least two helium mass spectrometry vacuum leak detection devices.

(3) There shall be pressure test and air tightness test equipment adapted to the manufacturing capability of licensed products, continuous compressed gas supply device which is suitable for air pressure and air tightness test, and necessary safety protection facilities.

(4) There shall be cryogenic impact test device which meets the requirements of the inner gallbladder impact test.

(5) There shall be static evaporation rate measuring device for measuring the evaporation rate, including the cryogenic tank which is capable of supplying cryogenic liquids and the instrument for measuring liquid evaporation.

D1.2.5 Packed gas cylinder

D1.2.5.1 Personnel

(1) The manufacturer of dissolved acetylene gas cylinder shall be staffed with no less than 2 technicians who are specialized in silicate, chemical industry or have relevant working experience;

(2) The manufacturer of absorption gas cylinders shall be staffed with no less than 2 technicians who are specialized in chemical industry or have relevant working experience.

D1.2.5.2 Production equipment and technology equipment

(1) There shall be manufacturing assembly line with filling, curing and drying for cylinders and internal fillers;

(2) There shall be special storage warehouse for fillers, the warehouse shall be equipped with ability to prevent moisture and dehumidify;

(3) The manufacturer using seamless cylinders for cylinder shells shall meet the manufacturing requirements of seamless cylinders; the manufacturer using welded cylinders for

cylinder shells shall meet the manufacturing requirements of welded cylinders;

(4) The manufacturer of dissolved acetylene gas cylinder shall have equipment such as mixing kettle for filling slurry, slurry filling device, filling curing reaction kettle or special curing heating device and filling drying oven. Special curing heating device and filling drying oven shall have automatic temperature control and recording function. A multi-point temperature recorder shall be installed, and the arrangement of temperature measuring points of the recorder shall be able to cover curing heating device or effective heating zone of the drying oven. The effective heating zone shall be determined according to the relevant standards, and its temperature shall not exceed ± 10 °C of the set temperature;

(5) The manufacturer of absorption gas cylinders shall have equipment for filling adsorbed materials.

D1.2.5.3 Inspection instrument and testing equipment

(1) The manufacturer of dissolved acetylene gas cylinder shall have inspection and test equipment for packing technical index test;

(2) The manufacturer of absorption gas cylinders shall have inspection and test equipment for filling absorption materials.

D1.3 Production requirement for license renewal

During the validity of the license, the unit shall have production of all sub-items, and carry out manufacturing supervision and inspection according to requirements of safety technical specifications; otherwise the unit will be processed according to the requirements for the first application or licensing item addition application.

(1) In applying for Article 3.6.3.2 of this Regulation “license renewal by self-declaration”, the following production requirements shall be met: During the validity of the license, the unit shall have production of all sub-items. The annual output of each licensed sub-items is not less than 10 batches, and the production interruption is not more than 6 months;

(2) All products have obtained type test certificate and report, as well as design document appraisal report in accordance with the regulations, and every batch of products has passed the supervisory inspection.

Licensing Requirements for Pressure Piping Component Manufacturer

E2 Requirements for pressure piping components manufacture

E2.1 Basic requirements

E2.1.1 Personnel

E2.1.1.1 Quality assurance engineer

The pressure piping components manufacturing units shall be equipped with quality assurance engineers. Level A licensed manufacturing units' engineer shall have senior engineer title and related work experience; Level B licensed manufacturing units' engineer shall have engineer title and related work experience.

E2.1.1.2 Personnel responsible for the quality control system

Manufacturing units shall be equipped with the personnel responsible for the quality control system in accordance with the requirements of the product quality control of the application for license. The personnel shall have the corresponding abilities and qualifications, and can be answerable to the quality assurance engineer.

E2.1.1.3 Non-destructive examination personnel

For those self-conducted non-destructive testing items, manufacturing unit must be equipped no less than 2 people with level II non-destructive qualification on the corresponding test items. Any further request of the position, please reference special requirements.

E2.1.1.4 Welders

Manufacturing units shall be equipped with certified welders with corresponding qualification to meet the product manufacturing requirements.

E2.1.1.5 Inspection personnel

The manufacturing unit shall, in accordance with the needs of the product inspection, be equipped with a sufficient number of inspectors.

E2.1.2 Workplace

Manufacturing units' workplace shall meet the following requirements:

- (1) The units shall provide the workshop suitable for manufacturing; the production environment meets the requirements of manufacturing, the well-arranged production process and tooling, and enough area for the assembly and inspection etc.
- (2) The units shall provide the storage site for special materials, components and parts or the special material warehouse and shelf, materials (To be tested, qualified, unqualified) shall be zoned and placed in batches to meet the material protection requirements;
- (3) The storage site of welding materials shall meet the welding materials' temperature and humidity requirement.
- (4) The storage site of finished products shall meet the finished products' protection requirement.
- (5) The pressure test site has safety protection measures;
- (6) If the products are involved in radiographic testing, the radiographic testing site shall meet the protection requirements and product needs.

E2.1.3 Production equipment and process equipment

The manufacturing units shall possess the relevant equipment to satisfy the product manufacture needs, such as blanking equipment, machining equipment, molding equipment,

welding equipment, welding material drying and heat preservation equipment, heat treatment equipment, surface treatment equipment, lifting equipment, etc.

According to the needs of product manufacturing, configure the corresponding process equipment, such as moulds, welding auxiliary equipment, pressure test equipment etc.

E2.1.4 Testing instruments and testing devices

According to the needs of product inspection, the manufacturing units shall equip corresponding inspection instruments and devices, including physical and chemical testing instruments, non-destructive testing instruments, pressure test devices, thermo detectors, geometric size testing instruments, etc.

The variety, quantity and accuracy of measuring instruments shall be in line with the inspection item and product requirements, and it shall be used within the validity period of verification and calibration.

E2.1.5 Work subcontract

Nondestructive testing of manufacturing units (except continuous production lines), physical and chemical inspection, heat treatment and material pretreatment can be outsourced.

The subcontractor shall have corresponding qualifications and capabilities, and their personnel, testing instruments and equipments shall meet the requirements of the corresponding special conditions.

E2.1.6 Design documents and process documents

E2.1.6.1 Design documents

The manufacturing units shall have correct and complete design documents of the licensed products, such as product design drawings, design calculation documents, product manual, etc. Products manufactured by subcontract design documents, shall have the confirmation on the subcontract design documents, to ensure it meet the safety technical specifications and relevant criterions.

Licensed products shall be manufactured in accordance with the corresponding standards, and designs calculation documents may not be required if design documents are not specified in standards; In the case of non-standard products, correct and complete design documents shall be available.

E2.1.6.2 Process documents

According to the needs of product manufacturing, formulate relevant process regulations; provide process transfer card or inspection card and other process documents.

E2.1.7 Trial manufacture

The manufacturing units shall make samples according to the variety and grade of the products applied for, and the trial samples shall be representative, and able to reflect and verify the manufacturing and inspection capabilities required by the products applied.

The quantity of trial samples and the key processes included are shown in Table E-1.

Table E-1 The quantity of trial samples and the key processes of the trial manufacture

| Product variety | Quantity | Key process |
|---------------------|----------|---|
| Seamless steel tube | a batch | Hot rolling(cold drawing), Heat treatment, Non-destructive testing, Physical and chemical testing, Process performance testing, Pressure resistance test (can be replaced by non-destructive testing) |

| | | |
|---|--|---|
| Welded steel pipe | a batch | Welding, Non-destructive testing, Physical and chemical testing, Process performance testing, Pressure resistance test (can be replaced by non-destructive testing) |
| Seamless pipe fitting/ Seamed pipe fitting | a batch for each of elbow bend and tee joint | Molding, Non-destructive testing, Physical and chemical testing, Heat treatment, The manufacture of the seamed pipe fittings shall have welding process |
| Forged pipe fitting/ Steel forged flange | a batch | Machining, Physical and chemical testing and Non-destructive testing should also be included when the manufacturing unit forges by itself. |
| Metallic valve | 2 valves in each form of structure | Incoming inspection of material (spare parts), Welding (when needed), Heat treatment, Non-destructive testing, assembly, Pressure resistance test |
| Metallic bellows expansion joint | a batch | Bellows forming, Welding, Non-destructive testing, Pressure test |
| Non-metallic material pipe | a batch | Molding, Hydrostatic strength (pressure) test |
| Polyethylene pipe fitting | a batch | Molding, Hydrostatic strength (pressure) test |
| Component combination device | a batch for each applied products. | Welding, Non-destructive testing, Physical and chemical testing, Pressure resistance test |

E2.2 Special Requirements

E2.2.1 Seamless steel tube

E2.2.1.1 Personnel

E2.2.1.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of material, process, heat treatment, physical and chemical inspection, non-destructive testing, pressure resistance test, inspection and test, equipment management, etc..

Level A licensed manufacturing units' personnel, who is responsible for process, and physical and chemical testing quality control systems, shall be science and engineering professionals with the engineer title and seamless steel tube manufacture related work experience;

Level B licensed manufacturing units' personnel, who is responsible for process, and physical and chemical testing quality control systems, shall be science and engineering professionals with the assistant engineer title and seamless steel tube manufacture related work experience;

E2.2.1.1.2 Technical personnel

There shall be no less than 8 technicians in Level A licensed manufacturing unit. There shall be no less than 5 technicians in Level B licensed manufacturing unit;

E2.2.1.1.3 Non-destructive testing personnel

There shall be no less than 2 people with level II eddy current testing(or magnetic flux leakage test), and no less than 2 people with level II ultrasonic testing in Level A licensed manufacturing units.

Licensed manufacturers at all levels shall guarantee that the non-destructive testing

personnel's certificated items, within the permitted scope, meet the NDT item requirements of the stated product standards. And there shall be at least 1 level II personnel of each NDT post in the process of manufacturing during daily work shift.

E2.2.1.1.4 Physical and chemical testing personnel

Level A licensed manufacturing units' personnel, who is responsible for physical and chemical testing, shall be no less than 3 people, among them, at least 2 people with the assistant engineer title; Level B licensed manufacturing units' personnel who is responsible for physical and chemical testing, shall be no less than 2 person, among them, at least 1 person with the assistant engineer title;

Level A licensed manufacturing units' physical and chemical testing personnel, who engage in chemical composition analysis, mechanical property test, metallographic analysis, shall have related work experience.

E2.2.1.2 Production equipment and process equipment

The manufacturing units shall have pipe rolling mill, cold drawing machine (cold rolling mill), straightening equipment, heat treatment furnace, code spraying equipment, etc.

If a manufacturing unit does not manufacture hot rolled pipes, it may not require a rolling mill; if it does not manufacture cold drawn (rolled) pipes, a cold drawing machine (cold rolling mill) is not required. Equipment capacity shall be in line with licensed product specifications.

Level A license cold drawing (rolling) seamless steel tubes applicant shall have no less than 2 cold drawing (rolling) machines, and at least one of them shall have no less than 90t pullout force.

Stainless steel seamless tube shall not be electrically heated for solid solution heat treatment. The effective heating length of continuous solution heat treatment furnace for stainless steel seamless steel tube shall not be less than 10m.

Seamless steel tube billet heating furnace shall have temperature control system, which can record tube billet heating. Seamless steel tube heat treatment furnace shall have computer control system and automatic recording device.

E2.2.1.3 Testing instruments and test devices

E2.2.1.3.1 Physical and chemical testing instruments

The manufacturing units shall have a chemical composition analysis device, a universal material testing machine, an impact testing machine, a hardness testing machine, and a metallographic microscope capable of preserving metallographic photographs.

Stainless steel tube manufacturer shall have inter-granular corrosion test conditions.

E2.2.1.3.2 Non-destructive testing instruments

Level A licensed manufacturing units shall have seamless steel tube automatic eddy current testing units or magnetic flux leakage testing units and ultrasonic testing units which meet the requirements of product testing.

E2.2.1.3.3 Pressure resistance test device

Level A licensed manufacturing units of pressure test devices and Level B licensed manufacturing units, which do not have non-destructive testing devices, shall have special pressure test devices for steel tubes, and the pressure test devices shall have automatic monitoring and recording functions.

E2.2.1.3.4 Process performance test device

Level A licensed manufacturing units shall have flattening, bending and other test devices.

E2.2.2 Welded steel pipe

Welded steel pipe includes submerged arc welded steel pipe, straight seam high frequency welded steel pipe and welded stainless steel pipe.

E2.2.2.1 Personnel

E2.2.2.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of material, process, heat treatment (when required), physical and chemical inspection, non-destructive testing, pressure resistance test, inspection and test, equipment management, etc.

Level A licensed manufacturing units' personnel, who is responsible for process, welding and physical and chemical testing quality control systems, shall be science and engineering professionals with the engineer title and welded steel pipe manufacture related work experience;

Level B licensed manufacturing units' personnel, who is responsible for process, welding and physical and chemical testing quality control systems, shall be science and engineering professionals with the assistant engineer title and welded steel pipe manufacture related work experience;

E2.2.2.1.2 Technical personnel

There shall be no less than 8 technicians in Level A licensed manufacturing units. There shall be no less than 5 technicians in Level B licensed manufacturing units;

E2.2.2.1.3 Non-destructive testing personnel

The personnel requirements of non-destructive testing are shown in Table E-2.

Table E-2 Non-destructive personnel requirements:

| Welded steel pipe product | Licensed item | Quantity of non-destructive testing personnel | |
|---|--------------------------|---|----------------------------------|
| | | Level A | Level B |
| Submerged arc welded steel pipe and welded stainless steel pipe (limited arc welding) | RT II | 6 people, and 2 people per shift | 3 people, and 2 people per shift |
| | UT II | 3 people | 2 people |
| | MT II | 2 person | --- |
| Straight seam high frequency welded steel pipe | RT II or UT II or MFL II | 6 people and 2 people per shift | 3 people and 2 people per shift |
| | MT II | 2 people | --- |

If the eddy current testing is adopted to replace the pressure resistance testing, there shall be no less than 2 people with level II eddy current testing in Level B licensed manufacturing units.

E2.2.2.1.4 Physical and chemical testing personnel

Level A licensed manufacturing units' personnel, who is responsible for physical and chemical testing, shall be no less than 3 people, among them, at least 2 people with the assistant engineer title; Level B licensed manufacturing units' personnel, who is responsible for physical and chemical testing, shall be no less than 2 people, among them, at least 1 people with the assistant engineer title;

Level A licensed manufacturing units' physical and chemical testing personnel, who engage in chemical composition analysis, mechanical property test, metallographic analysis, shall have related work experience.

E2.2.2.1.5 Welder

There are no less than 6 operators of submerged arc welding machine in Level A submerged arc welding steel pipe manufacturing units, and no less than 4 welders of electrode arc welding or melting electrode gas shielded welder.

There are no less than 3 operators of submerged arc welding machine in Level B submerged arc welding steel pipe manufacturing units, and no less than 2 welders of electrode arc welding or melting electrode gas shielded welder.

There are no less than 6 high frequency welding (HFW) machine operators in Level A high frequency welding steel pipe manufacturing units; and no less than 3 HFW machine operators in Level B HFW steel pipe manufacturing units;

There are no less than 3 operators of automatic submerged arc welding machine or tungsten gas shielded welding automatic welding machine or plasma arc welding automatic welding machine in the welded stainless steel pipes manufacturing unit, and no less than 2 welders of electrode arc welding or tungsten gas shielded welding

E2.2.2.2 Production equipment and process equipment

The manufacturing units shall have unwinding and leveling equipment, milling equipment, molding machine, welding equipment, flat head equipment and inkjet coding equipment.

The internal and external welding equipment of Level A submerged arc welded steel pipe shall be a double wire or above automatic submerged arc welding equipment with automatic tracking device.

E2.2.2.3 Testing instruments and test devices

E2.2.2.3.1 Physical and chemical testing instruments

The requirements of physical and chemical testing instruments are shown in Table E-3.

Table E-3 Welded steel pipe physical and chemical testing instruments

| License Level | Physical and chemical testing instruments |
|---------------|--|
| A | Chemical composition analysis instrument, universal material testing machine, impact testing machine, drop hammer tester, metallographic microscope, hardness tester |
| B | Chemical composition analysis instrument, universal material testing machine |

E2.2.2.3.2 Non-destructive testing instruments

Level A licensed manufacturing units shall have the non-destructive testing instruments meeting the product testing requirements, and meet the following requirements:

(1) The digital ray detection instruments used for ray detection shall have the function of image processing and storage, and the image quality meets the requirements of welding defect evaluation, and the dynamic sensitivity and static sensitivity meet the needs of defect identification.

(2) Ultrasonic testing, eddy current testing and magnetic flux leakage testing instruments have automatic detection functions, defect alarm and automatic spray marking functions. In addition, the portable ultrasonic testing instruments shall meet the needs of manufacturing.

E2.2.2.3.3 Pressure resistance test device

Level A licensed manufacturing units and level B licensed manufacturing units without non-destructive testing devices shall have special pressure test devices for steel pipes, and pressure test devices shall have automatic monitoring and recording functions.

E2.2.3 Seamless pipe fitting and seamed pipe fitting

Pipe fittings include elbow, bend, tee, cross, different diameter pipe (large and small head), and pipe cap.

E2.2.3.1 Personnel

E2.2.3.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of material, process, heat treatment, physical and chemical inspection, non-destructive testing, inspection and test, equipment management, etc.

The manufacturing units of the seamed pipe fittings shall also be equipped with personnel responsible for welding quality control system.

Manufacturing units' personnel, who is responsible for process, and physical and chemical testing quality control systems, shall be science and engineering professionals with the assistant engineer title and pipe fittings manufacture related work experience;

E2.2.3.1.2 Technical personnel

There shall be no less than 6 technicians in Level B1 licensed manufacturing units, and no less than 3 technicians in level B2 licensed manufacturing units.

E2.2.3.1.3 Non-destructive testing personnel

There shall be no less than 2 people with level II magnetic particle testing and penetrate testing in Level B1 licensed manufacturing units.

E2.2.3.1.4 Physical and chemical testing personnel

There shall be no less than 3 people responsible for physical and chemical testing in level B1 licensed manufacturing units, and the manufacturing units shall have the capacity of chemical composition analysis, mechanical property test, and metallographic analysis.

E2.2.3.1.5 Welder

There shall be no less than 6 welders in Level B1 licensed seamed pipe fitting manufacturing units, and no less than 3 welders in level B2 licensed seamed pipe fitting manufacturing units.

E2.2.3.2 Production equipment and process equipment

Level B1 licensed manufacturing units shall have no less than 2 push machines or pipe benders, no less than 2 presses (at least 1 of which shall have a tonnage not less than 500t), and one heat treatment equipment at least.

Level B2 licensed manufacturing units shall have at least 1 push machine or pipe bender, at least 1 press (tonnage is no less than 300t)

The manufacturer of seamed pipe fittings shall also have no less than 4 welding equipments, including no less than 2 argon arc welding machines.

E2.2.3.3 Testing instruments and test devices

E2.2.3.3.1 Physical and chemical testing instruments

The manufacturing unit shall have material testing machines, chemical composition analysis devices or quantitative spectral analyzers, and no less than 2 portable hardness testers. Level B1 licensed manufacturing units shall also have impact testing machine and metallographic microscope.

E2.2.3.3.2 Non-destructive testing instruments

There shall be no less than 2 magnetic particle testing instruments in level B 1 licensed manufacturing units.

E2.2.4 Forged pipe fitting/ steel forged flange special requirements

E2.2.4.1 Personnel

E2.2.4.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of material, process, inspection and test, equipment management, etc. The manufacturing units of the self-forging billet shall also be equipped with personnel responsible for heat treatment,

physical and chemical inspection, non-destructive testing, and welding quality control system.

Manufacturing units' personnel, who is responsible for material, process, and physical and chemical testing quality control systems, shall be science and engineering professionals with the assistant engineer title and forged pipe fitting or steel forged flange manufacture related work experience;

E2.2.4.1.2 Technical personnel

There shall be no less than 3 technicians in the manufacturing units, and no less than 6 technicians in the self-forging billets manufacturing units.

E2.2.4.1.3 Physical and chemical testing personnel

The self-forging billets manufacturing units shall have no less than 1 people for material mechanical properties testing.

E2.2.4.2 Production equipment and process equipment

The manufacturing unit shall have no less than 12 mechanical processing equipments, and the self-forging billets manufacturing units shall also have heating furnaces, forging equipment and heat treatment furnace.

E2.2.4.3 Testing instruments and test devices

The self-forging billets manufacturing units shall have material testing machine, impact testing machine, portable hardness testers (no less than 2).

E2.2.5 Metallic valve

Metallic valves include gate valve, stop valve, throttle valve, check valve, ball valve, butterfly valve, diaphragm valve, plug valve, plunger valve, pressure reducing valve, control valve (control valve), solenoid valve, wellhead valve, discharge valve, disc valve.

E2.2.5.1 Personnel

E2.2.5.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of design, process, material, heat treatment, non-destructive testing, physical and chemical inspection, inspection and test, equipment management, etc.

Level A1 and A2 licensed manufacturing units' personnel, who is responsible for design, process, inspection and test quality control systems, shall be science and engineering professionals with the engineer title and valve design or manufacture related work experience;

Level B licensed manufacturing units' personnel, who is responsible for design, process, and inspection and test quality control systems, shall be science and engineering professionals with the assistant engineer title and valve design or manufacture related work experience;

E2.2.5.1.2 Technical personnel

There shall be no less than 20 technicians in Level A1 licensed manufacture units, no less than 12 technicians in Level A2 licensed manufacture units. There shall be no less than 5 technicians in Level B licensed manufacture units.

E2.2.5.1.3 Welder

If there is welding process in the manufacturing process, there shall be no less than 2 welders.

E2.2.5.1.4 Non-destructive personnel

There shall be no less than 2 level II personnel for X-ray or ultrasonic testing in level A1, A2 licensed manufacturing units, and no less than 2 level II personnel for magnetic powder or penetration detection.

E2.2.5.1.5 Physical and chemical testing personnel

There shall be no less than 3 people responsible for physical and chemical testing in level A1, A2 licensed manufacturing units, and no less than 2 people responsible for physical and chemical testing in level B licensed manufacturing units.

Personnel engaged in chemical composition analysis, mechanical property test in level A1, A2 licensed manufacturing units shall have related working experience of 3 years.

E2.2.5.2 Workplace

Units involved in the manufacture of oil-free and fat-free valves, shall have special pollution-proof manufacturing areas and workshops.

E2.2.5.3 Production equipment and process equipment

E2.2.5.3.1 Production equipment

The manufacturing unit shall have the ability to make sealing surface overlaying and processing, pipe welding, valve body, bonnet, gate plate and valve core machining (except for the machining of valve stem and sphere), assembly, inspection and test of valve machine products.

Level A2 licensed manufacturing unit shall have cryogenic treatment capacity.

Units involved in the manufacture of oil-free and fat-free valves, shall have degreasing and cleaning capacity.

Main production equipments are shown in Table E-4.

Table E-4 Main production equipments

| License level | Main production equipments |
|---------------|---|
| A1 | <ul style="list-style-type: none"> (1) 1 machining center (consists of a knife tool storage library and automatic tool change agencies), 1 CNC vertical lathe with a rotary diameter of 1600mm, and 5 NC machine tools; (2) Material cutting and all kinds of mechanical processing equipment to meet the needs of product processing; (3) Equipment to meet the requirements of automatic overlaying welding of sealing surface alloy materials (suitable for flat and conical parts), and has the equipment of preheating before welding and heat preservation and heat treatment after welding; (4) Any welding machine equipments to meet the other welding needs of the product. |
| A2 | <ul style="list-style-type: none"> (1) 6 CNC machine tools, materials cutting and all kinds of mechanical processing equipment to meet the needs of product manufacturing. (2) Equipment to meet the requirements of automatic overlaying welding of sealing surface alloy materials (suitable for flat and conical parts), and has the equipment of preheating before welding and heat preservation and heat treatment after welding; (3) Any welding machine equipments to meet the other welding needs of the product. (4) Low temperature heat preservation tank satisfying low temperature treatment of parts. |
| B | <ul style="list-style-type: none"> (1) 3 CNC machine tools, materials cutting and all kinds of mechanical processing equipment to meet the needs of product manufacturing. (2) Welding equipment to meet the requirements for overlaying and other welding; for the overlaying of hard alloy materials of the sealing surface , |

| | |
|--|--|
| | the manufacturer shall have the equipment of preheating before welding and heat preservation and heat treatment after welding; |
|--|--|

E2.2.5.3.2 Process equipment

The manufacturing unit shall have tooling and fixtures, moulds, sealing surface overlaying and turning mould tools for welding other parts to meet the manufacturing needs of the products.

E2.2.5.4 Testing instruments and test devices

E2.2.5.4.1 Physical and chemical testing instruments

The requirements of physical and chemical testing instruments are shown in Table E-5.

Table E-5 Physical and chemical testing instruments

| License level | Physical and chemical testing instruments |
|---------------|--|
| A1 | Spectral quantitative analyzer, spectral qualitative analyzer, material tensile tester, impact tester; hardness meter (HB, HRC) 2 sets, including 1 table type and 1 portable. |
| A2 | Spectral quantitative analyzer, material tensile testing machine, impact testing machine that meets the materials' low temperature test conditions. |
| B | Analytical device for material element content, spectral qualitative analyzer, portable hardness tester (HB, HRC) E 2. |

E2.2.5.4.2 Pressure resistance test devices

The requirements of pressure resistance test devices are shown in Table E-6.

Table E-6 Pressure resistance test devices

| License level | Pressure resistance test devices |
|---------------|---|
| A1 | (1) Valve pressure test device with nominal pressure PN150 and nominal diameter DN300; (2) 4 sets of pressure test devices; (3) 2 sets of high-pressure air tightness test devices for pressure test of the complete valve. |
| A2 | (1) 3 sets of strength and pressure test devices for low temperature valve shell; (2) 2 sets of high-pressure air tightness test devices for pressure test of the complete valve. (3) Gas source and gas pressure intensifier to meet the needs of delivery test of the highest nominal pressure of the low temperature valve; There are low temperature performance test devices (Cryogenic Insulated Gas Cylinders and gas pressure intensifier) that meet the needs of the maximum size and test pressure of the low temperature valve produced. |
| B | 3 sets of valve pressure test device |

E2.2.5.4.3 Non-destructive testing instruments

There shall be no less than 2 ultrasonic testing instruments in level A1, A2 licensed manufacturing units.

E2.2.5.5 Design ability

Level A1, A2 licensed manufacturing units shall have product design and development department with no less than 5 designers; Designers shall master the standards' technical requirements, product structure and strength and safety requirements, and be able to carry out strength check etc.

E2.2.6 Metallic bellows expansion joint

E2.2.6.1 Personnel

E2.2.6.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control systems of design, process, material, welding, non-destructive testing, physical and chemical inspection, inspection and test, equipment management, etc.

Level B1 licensed manufacturing units' personnel, who is responsible for design, process quality control systems, shall be science and engineering professionals with the engineer title and metallic bellows expansion joint design or manufacture related work experience;

Level B2 licensed manufacturing units' personnel, who is responsible for design, process quality control systems, shall be science and engineering professionals with the assistant engineer title and metallic bellows expansion joint design or manufacture related work experience;

E2.2.6.1.2 Technical personnel

There shall be no less than 10 technicians in Level B1 licensed manufacture units, no less than 3 technicians in Level B2 licensed manufacture units.

E2.2.6.1.3 Welder

There shall be no less than 10 welders in Level B1 licensed manufacture units, of whom at least 2 are automatic welding operators; And no less than 4 welders in Level B2 licensed manufacture units, of whom at least 1 is automatic welding operators.

E2.2.6.1.4 Non-destructive personnel

There shall be no less than 2 level II personnel for X-ray or ultrasonic testing in level B1 licensed manufacturing units, and no less than 2 level II personnel for magnetic powder or penetration detection.

E2.2.6.1.5 Physical and chemical testing personnel

The manufacturing units shall be equipped with at least 1 people for material spectral testing.

E2.2.6.2 Production equipment and process equipment

Level B1 licensed manufacturing units shall have no less than 4 bellow forming machines, including at least 2 hydraulic molding machines (1 set not less than 1200t) and at least 3 automatic argon arc welding machines.

Level B2 licensed manufacturing units shall have no less than 2 bellow forming machines, including at least 1 hydraulic molding machine and 1 automatic argon arc welding machine.

E2.2.6.3 Testing instruments and test devices

E2.2.6.3.1 Physical and chemical testing instruments

Level B1 licensed manufacturing units shall have at least 1 quantitative spectral analyzer.

E2.2.6.3.2 Non-destructive testing instruments

Level B1 licensed manufacturing units shall have at least 1 radiographic testing device and at least 1 magnetic particle testing device (if necessary).

E2.2.6.4 Design capability

Level B1 licensed manufacturing units shall have product design and development department with no less than 3 designers; Designers shall master the standards' technical requirements, product structure and strength and safety requirements, and be able to carry out strength check etc.

Have the design software meets the requirements of the products' current effective standards.

E2.2.7 Non-metallic material pipe

Non-metallic material pipe include polyethylene pipe (polyethylene pipe with metallic

skeleton, fiber reinforced polyethylene pipe), and other non-metallic material pipe.

E2.2.7.1 Personnel

E2.2.7.1.1 Personnel responsible for the quality control system

The manufacturing units shall provide the personnel responsible for quality control system of material, process, molding, inspection and test, equipment management, etc.

Level A manufacturing units' personnel, who is responsible for process quality control systems, shall be science and engineering professionals with the engineer title and non-metallic pipe manufacture related work experience;

Level B licensed manufacturing units' personnel, who is responsible for process quality control systems, shall be science and engineering professionals with the assistant engineer title and non-metallic pipe manufacture related work experience;

E2.2.7.1.2 Technical personnel

There shall be no less than 12 technicians in Level A licensed manufacturing units, and no less than 4 technicians in level B licensed manufacturing units.

E2.2.7.1.3 Inspection and testing personnel

There shall be no less than 6 inspections and testing personnel in Level A licensed manufacturing units, and no less than 3 inspection and testing personnel in level B licensed manufacturing units.

E2.2.7.2 Workplace

Raw materials storerooms shall be able to meet the needs of licensed products, different grades of raw materials shall be stored in different areas, off the ground stack, must not be stored in the open air, there shall be measures to prevent abruptly cooling or heating and measures preventing raw materials from dropping.

The metallic skeleton polyethylene pipe manufacturing units shall have the steel wire storage moisture-proof and rust-proof measures.

The laboratory of level A licensed manufacturing units shall obtain the certification of the national laboratory, and shall have a special hydrostatic test area with no less than 150 square meters.

E2.2.7.3 Production equipment

Level A licensed manufacturing units shall establish an information management system for the production process in order to achieve the purpose of on-line production monitoring.

Production equipment shall meet the requirements of Table E-7 and have online printing equipment that can print a permanent marking.

Table E-7 Production equipment and process equipment

| Non-metallic products | License level | production equipments and process equipments |
|-----------------------|---------------|--|
| Polyethylene pipe | A | Shall have 6 sets of polyethylene pipe extrusion molding unit, or 6 sets of metallic skeleton polyethylene pipe extrusion winding forming unit, which have closed concentrated dehumidification and drying system for polyethylene mixture. The storage tank can hold at least 5 tons of dried polyethylene mixed ingredients, and can automatically distribute raw materials to the vacuum transportation system or device of the hopper. |

| | | |
|-------------------------|---|---|
| | B | Shall have 3 sets of polyethylene pipe extrusion molding unit or 2 sets of metallic skeleton polyethylene pipe extrusion (winding) molding unit or 1 set of fiber reinforced polyethylene pipe extrusion (winding fusion) molding unit, have secondary drying means of polyethylene mixture, and the storage tank can at least accommodate polyethylene mixed ingredients which meet the needs of production. |
| Other non-metallic pipe | B | 3 sets of molding unit, feeding support equipments |

Note E-2: Metallic skeleton polyethylene pipe shall have special blasting test equipment, tooling and fixture.

E2.2.7.4 Testing instruments and test devices

The requirements of testing instruments and test devices are shown in Table E-6.

Table E-6 Testing instruments and test devices

| Non-metallic material products | Testing instruments and test devices |
|----------------------------------|--|
| Polyethylene pipe | Analytical balance (precision 0.1 mg), drying box, melt mass flow rate instrument, differential thermal analysis instrument, moisture measuring instrument, universal material testing machine, hydrostatic strength (pressure resistance) test device (the specification of water tank and clamp shall be in line with the product of the application); Level A licensed manufacturing unit shall also have a carbon black content and carbon black dispersion detection instrument |
| Other non-metallic material pipe | Universal material testing machine, Vicat softening temperature tester, hardness tester, melt flow rate meter, Ubbelohde viscometer, size change rate tester, drop hammer impact testing machine, hydrostatic strength (pressure resistance) test device |

Note E-3: hydrostatic strength test device shall have automatic monitoring and recording function.

E2.2.8 Polyethylene pipe fitting

Polyethylene pipe fittings include polyethylene (polyethylene with metallic skeleton) electric fusion pipe fittings and hot melt pipe fittings.

E2.2.8.1 Personnel

E2.2.8.1.1 Personnel responsible for the quality control system

The manufacture units shall provide the personnel responsible for quality control systems of material, process, molding, inspection and test, equipment management, etc.

Level A manufacturing units' personnel, who is responsible for process quality control systems, shall be science and engineering professionals, and have polyethylene pipe fittings manufacture related work experience;

E2.2.8.1.2 Technical personnel

There shall be no less than 4 technicians in the manufacturing units.

E2.2.8.1.3 Inspection and testing personnel

There shall be no less than 3 inspection and testing personnel in the manufacturing units.

E2.2.8.2 Workplace

Raw materials storerooms shall be able to meet the needs of licensed products, different specifications of raw materials shall be stored in different areas, off the ground stack, must not be

stored in the open air, there shall be measures to prevent abruptly cooling or heating and measures preventing raw materials from dropping.

The electric resistance wire of electric fuse pipe fittings shall be stored with moisture-proof and rust-proof measures.

E2.2.8.3 Production equipment and process equipment

The manufacturing units shall have at least 6 injection molding machines and supporting tools and molds, and the injection capacity shall be appropriate to the licensed scope; They shall have closed concentrated dehumidification and drying equipment, and machining and assembly equipment for polyethylene mixture drying up to standard; The electric fuse pipe fittings manufacturing units shall have wiring equipment; An online device capable of printing a permanent marking.

E2.2.8.4 Testing instruments and test devices

E2.2.8.4.1 Testing instruments

The manufacturing units shall have an analytical balance (precision 0.1mg), a drying box, a melt mass flow rate instrument, a differential thermal analyzer, a volatile content (moisture) measuring instrument, a hydrostatic strength tester (the specification of water tank and clamp shall be in line with the product of the application), a carbon black content and carbon black dispersion measuring instrument, etc. Electric fusion pipe fittings shall also have an electric resistance detector.

E2.2.8.4.2 Pressure testing equipment

Hydrostatic strength testing machine shall have automatic monitoring and recording function.

The metallic skeleton Polyethylene pipe fittings manufacturing units shall have special blasting test equipment, tools and fixtures.

E2.2.9 Component combination device (Note E-4)

This special requirement is applicable to the gas pressure regulating device, temperature reduction and decompression device, flame arrester, flow meter (shell), and prefabricated pipe section (Note E-5) in the component combination device.

Note E-4: Component combination device refers to the combination of pipe, pipe fittings, valves, flanges, compensators, sealing elements and other pressure piping component with a certain function, including wellhead device and oil production tree, throttle pressure well sink, gas pressure regulating device, temperature reduction and decompression device, flame arrester, flow meter (shell), prefabricated pipe section.

Note E-5: Prefabricated pipe section refers to the pipeline element product which is welded and assembled by the manufacturing unit according to the construction design drawing in the factory, excluding the pipeline prefabrication carried out by the installation unit at the construction site.

E2.2.9.1 Personnel

E2.2.9.1.1 Personnel responsible for the quality control system

The manufacture units shall provide the personnel responsible for quality control systems of design, material, process, welding, heat treatment (when necessary), non-destructive testing, physical and chemical inspection, inspection and test, equipment management, etc.

The manufacturing units' personnel, who is responsible for design, process, welding quality control systems, shall be science and engineering professionals with the assistant engineer title and related product manufacture work experience;

E2.2.9.1.2 Technical personnel

There shall be no less than 5 technicians in the manufacturing units.

E2.2.9.1.3 Non-destructive personnel

The manufacturing units shall equip no less than 2 people for the radiographic testing or level II ultrasonic testing.

E2.2.9.1.4 Physical and chemical testing personnel

The manufacturing units shall equip no less than 2 physical and chemical inspection personnel with mechanical properties and chemical composition analysis ability.

E2.2.9.1.5 Welder

There shall be no less than 2 welders in manufacture units, and no less than 6 welders in prefabricated pipe section manufacturing units.

E2.2.9.2 Production equipment and process equipment

The prefabricated pipe section manufacturing units shall have at least 1 automatic submerged arc welding machine, no less than 2 argon arc welding machines or CO₂ gas shielded welding machines, at least 1 pipe bender, at least 1 heat treatment furnace and no less than 2 sets of electric heaters.

E2.2.9.3 Testing instruments and test devices

E2.2.9.3.1 Physical and chemical testing instruments

The manufacturing unit shall have chemical composition analysis devices or quantitative spectrometers, and no less than 2 sets portable hardness meters. The prefabricated pipe section manufacturing unit shall also have a material testing machine.

E2.2.9.3.2 Non-destructive testing instruments

Prefabricated pipe section manufacturing units shall have at least 2 radiographic testing instruments and at least 2 ultrasonic testing instruments.

E2.2.9.3.3 Components and product performance testing instruments

The manufacturing units of gas pressure regulating device and temperature reducing and decompression device shall have valve performance debugging and testing instruments.

E2.2.9.4 Design capability

Manufacturing units shall set up the product design department, with no less than 3 designers. The designer shall have the title of assistant engineer and the corresponding design ability, master the standards' technical requirements of the manufactured product, the product structure and strength safety performance requirements, and be able to carry out strength check and so on.

If the manufacturing unit of the component combination devices does not have the design capability, it is allowed to subcontract design units with the corresponding pressure pipeline design qualification.

E2.3 Production requirement for license renewal

The manufacturing unit shall, within the licensing period, have production of the licensed products and conduct type tests and supervisory inspection in accordance with the requirements of the safety technical codes. If there is no product manufactured within the license period, it shall be treated as the first application for certification or licensing item addition.

The manufacturing units that apply for "License renewal by self-declaration" according to Article 3.6.3.2 of this regulation shall have the production, of which no less than 5 batches of each variety of licensed products within the license period, and conduct type test and supervisory inspection in accordance with the requirements of safety technical codes.

Licensing Requirements for Safety Appurtenance Manufacturers

F1 Basic requirements

F1.1 Personnel

F1.1.1 Quality assurance system personnel

Manufacturing units shall, in accordance with the requirements of the manufacturing process and quality control of products, equip and appoint quality assurance engineer, as well as responsible personnel for quality control systems in the processes of design, process, materials, physical and chemical inspection, welding, heat treatment, non-destructive testing, assembly, inspection and testing, and equipment management, and shall meet the following requirements:

(1) Quality Assurance Engineer, specializing in chemical machinery, fluid machinery, machinery manufacturing, metallic materials, etc. professional knowledge, familiar with product production quality control process; level A manufacturing unit's quality assurance engineer shall have senior engineer title and related work experience; other manufacturing units' quality assurance engineer shall have engineer title and related work experience;

(2) Personnel responsible for the quality control system of design, process, material, inspection and test shall have title of engineer;

(3) Personnel responsible for the quality control system of non-destructive testing shall have Class II non-destructive testing certificate suitable for products.

F1.1.2 Technical responsible person

Where a person in charge of technology is required, the person shall be an engineer with relevant expertise in chemical machinery, fluid machinery, machinery manufacturing, metallic materials, etc., and familiar with the technical characteristics and production process of the product, be able to handle the technical problems of the product and be responsible for the realization of the technical indicators of product safety.

F1.1.3 Welders

If the product has welding requirements, the welder engaged in welding the pressure-bearing part, the welding of non-pressure part of the product and the pressure-bearing part, or the surfacing of the sealing surface of the valve, shall hold the qualification of the welding operator, and the licensed item meets the manufacturing requirements.

F-1: Brazing operators shall have more than 2 years of practical brazing operation experience

F1.1.4 Other personnel

The manufacturing unit shall be equipped with a sufficient number of technicians, managers, inspectors and corresponding operators according to the needs of the products.

F1.2 Workplace

The workshop of the manufacturing unit shall be no less than 1000m², and shall have warehouses, material storage sites and working sites for processing, welding, assembling, pressure testing, functional performance testing and inspection, which are suitable for the manufacture of products, and meets the following requirements:

(1) There are special storage sites for materials and spare parts or warehouses and shelves for materials. Materials shall be (To be tested, qualified, unqualified) placed in zones or batches, and effectively isolated to meet the material protection requirements;

(2) There are special sites for the storage and processing of stainless steel and for the storage of spare parts and semi-finished products of other materials. Measures shall be in place to prevent bumps and scratches.

(3) Special site for surface treatment before casting and forging processing;

(4) Have gas cutting blanking area, welding and heat treatment area, and other special chemical, heating and cooling areas. However, the processing area shall be effectively separated from the machining area.

(5) Have machining area, which can ensure the reasonable storage and flow of processing and workpiece; high-precision machining equipment area should be kept clean.

(6) Have assembly and storage areas for various parts and components, and have clear process marking and identification;

(7) Have pressure (pressure) test and performance test areas, and shall be effectively and safely separated from other work areas. There are safety protection measures;

(8) There are physical and chemical analysis laboratories that meet the requirements of product inspection, physical and chemical inspection;

(9) When manufacturing oil-and lipid-prohibited products, there shall be manufacturing areas, workshops and warehouses specially designed to prevent pollution.

F1.3 Production equipment and process equipment

Manufacturing units shall, according to their needs, equip corresponding production equipment, such as blanking, mechanical processing, welding, forming, heat treatment, surface treatment and other equipment. Heat treatment equipment shall be equipped with temperature measuring instruments that can automatically record temperature curves.

Manufacturing units shall, in accordance with the requirements of product manufacturing, equip corresponding process equipment, such as moulds and welding auxiliaries.

If the product has welding requirements, the manufacturing unit shall have welding material drying and heat preservation equipment.

The manufacturer shall have special tools for making licensing marks on the products and the marks specified in the product standards.

F1.4 Testing instruments and testing devices

Manufacturing units shall equip corresponding inspection instruments according to the requirements of material acceptance inspection, inter-process inspection and delivery inspection. Testing instruments and devices include physical and chemical testing instruments, non-destructive testing instruments, pressure testing devices, thermometers, geometry dimension measuring instruments, etc.

The variety, quantity and accuracy of measuring instruments shall be in line with the requirements of the product inspection items, and shall be within the validity period of calibration.

Where the product standards require pressure (pressure) test and air tightness test, the manufacturer shall equip the equipment. The maximum test pressure of the device and the gas source equipped for the air tightness test shall be compatible with the product test requirements. No less than two pressure gauges which meet the precision requirement of the product standards shall be installed on the test equipment for pressure (pressure) test.

Where non-destructive testing or physical and chemical testing is subcontracted, the subcontractor shall have corresponding qualifications and abilities, and their personnel and testing instruments shall meet the requirements of the corresponding special conditions.

F1.5 Regulations, standards and technical documents

F1.5.1 Regulations and standards

Manufacturing units shall hold valid versions of laws, regulations, regulations, safety technical specifications and standards that are relevant to the manufacture of products.

The adoption of product standards shall meet the following requirements:

(1) To adopt national and industrial standards that meet the requirements of safety technical specifications;

(2) When adopting enterprise standards (including those formulated by oneself or transformed by foreign standards), the manufacturing shall provide a compliance statement and a comparative table that shows the enterprise standards meet the basic safety requirements of the relevant safety technical specifications.

F1.5.2 Design documents

The design documents shall meet the requirements of relevant safety technical specifications and standards.

Manufacturing units shall have complete design documents, such as product design drawings, design calculation books and product manual. Where foreign design documents are used for manufacturing, there shall be confirmation that the external design documents conform to the safety technical specifications and relevant standards.

F1.5.3 Technical documents

Manufacturing units shall compile process documents and quality plans such as process flow cards, inspection cards, welding process specifications, etc. in accordance with the needs of product manufacturing; key processes shall have specified manufacturing processes, operation instructions and inspection requirements.

F1.6 Basic manufacturing requirements

The manufacture of safety accessories shall meet the following requirements:

(1) Have acceptance inspection procedures and inspection records for materials and spare parts in and out of the warehouse;

(2) Before machining (assembling), the material and key parts shall be inspected (quality) to ensure the material quality meets the design requirements.

(3) Machining shall be carried out in accordance with the requirements of design and process documents and operation instructions;

(4) Pressure part welding, welding of non-pressure parts and pressure-bearing parts, and the surfacing of sealing surface shall be conduct welding process qualification, and have corresponding welding process and operation instructions.

(5) When heat treatment is needed, there are heat treatment processes and corresponding inspection requirements.

(6) There are assembly process and operation instructions for the assembly process.

(7) If the product has clean requirements, special processes shall be formulated to ensure that it meets the design requirements.

(8) Performance inspection and delivery inspection shall have specific inspection requirements. When special inspection equipment is applied, the inspector shall have training before operation.

F1.7 Trial manufacture

The parameters of the trial manufactured sample shall meet the product level corresponding to the application product range. Specific requirements can be found in the corresponding special licensing requirements.

F1.8 Production requirement for license renewal

During the validity of the license, the unit shall have production of the corresponding licensing level; otherwise the unit shall prepare the demo product according to the requirements for the first application or application addition. The products delivered/to be delivered for clients are counted, the trial manufactured sample at the time of first application is not counted. Specific requirements can be found in the corresponding special requirements.

F2 Safety valve special requirements

F2.1 Personnel

The personnel requirements of the safety valve manufacturer are shown in Table F-1.

Table F-1 Personnel of Safety Valve Manufacturing Unit

| Licensing Level | A | B | Remarks |
|----------------------------------|--|--|---|
| Total number of employees | 60 | 30 | — |
| Technician | The proportion is no less than 15% of the total number of employees, 10 employees. | The proportion is no less than 8% of the total number of employees, 5 employees. | Engineering and technology related majors in chemical machinery, fluid machinery, machinery manufacturing, metallic material, foundry, etc. |
| Welder | 2 | | According to the requirements of the products, the licensed items shall meet the welding requirements. |
| NDT personnel | 2 people-item of RT II, and 2 people-item of MT II or PT II | 1 people-item of UT II, and 2 people-item of MT II or PT II | Have X-ray or ultrasound inspectors as needed |
| Physical and Chemical Inspectors | 2 people | 1 people | Capability to analyze metallic materials |

F2.2 Design capability and production equipment

F2.2.1 Design capability

Level A manufacturing unit shall set up a design and development department with no less than five designers. Designers shall master the standard technical requirements, product structure and strength and safety performance requirements of the products, and be able to perform strength checking and other work.

For level B manufacturing unit, the designer shall master the standard technical requirements,

product structure and strength safety performance requirements of the products, and possess the capability of product design and process design transformation.

F2.2.2 Production equipment and process equipment

Manufacturing units shall have the capability of welding, surfacing and processing of sealing surface, low temperature treatment (when needed), mechanical processing and assembly of valve body, seat and core, and testing of the whole valve; manufacturing units of oil and fat-prohibited valves shall have the capability of degreasing and cleaning.

Where the procedure mentioned in the preceding paragraph involves non-destructive testing and physical and chemical testing, the work of non-destructive testing and physical and chemical testing are allowed to be outsourced, but no other work shall be outsourced.

F2.2.2.1 Major production equipment

Requirements for major production equipment of level A and level B manufacturing units are shown in Table F-2.

Table F-2 Major Production Equipment

| Licensing Level | Major production equipment |
|-----------------|--|
| A | (1) Casting (forging) billet surface treatment (shot blasting) equipment, material cutting equipment, one CNC machining center or five CNC machine tools for manufacturing needs; (2) All kinds of processing equipment (turning, milling, planer, boring, grinding, drilling machine, etc.) required for product processing; 2 special grinders for valve sealing surface, 2 welding equipment; and the hardfacing cemented carbide material shall have pre-welding and post-welding heating and heat preservation and heat treatment equipment; (3) Cryogenic Insulated Gas Cylinders that meets the maximum size of the applied valve (when required) |
| B | (1) Material cutting equipment for manufacturing, 5 CNC machine tools for main products, and various processing equipment (turning, milling, planer, boring, grinding, drilling, etc.) for product processing. (2) Welding equipment for product welding, surfacing, pre-heating, post-welding heat preservation and heat treatment equipment shall be used for surfacing cemented carbide materials; (3) Cryogenic Insulated Gas Cylinders that meets the maximum size of the applied valve (when required) |

F2.2.2.2 Process equipment

Requirements for process equipment of level A and level B manufacturing units are shown in Table F-3.

Table F-3 Process Equipment

| License Level | Process Equipment |
|---------------|--|
| A | (1) Special moulds for turning, milling and drilling, which are required for product processing; (2) Having tooling (such as turning fixture) for product welding and |

| | |
|---|---|
| | <p>hardening treatment equipment;</p> <p>(3) Tools required for inspection and test or air tightness test, and drying devices for test process;</p> <p>(4) Special equipment or appliances to affix marks on the products</p> |
| B | <p>(1) Moulds such as turning, milling and drilling for product processing;</p> <p>(2) Tools for of inspection and test or air tightness test;</p> <p>(3) Tools for product welding (e.g. turning fixture);</p> <p>(4) Special equipment or appliances to affix marks on the products</p> |

F2.3 Testing instruments and testing devices

Requirements for level A and level B safety valve testing instruments and test devices are shown in Table F-4.

Table F-4 Testing instruments and testing devices

| Testing instruments and testing devices | level A | level B |
|--|---|--|
| Safety valve test device | <p>(1) Having the test equipment needed for the delivery inspection items;</p> <p>(2) A safety valve operating performance test device with working pressure not less than 10 MPa and volume not less than 1m³ for normal temperature gas medium;</p> <p>(3) For the manufacture of steam safety valves with design temperatures not less than 425 °C, there shall be a test device with the working pressure not less than 10 MPa and the volume not less than 0.5m³;</p> <p>(4) For the manufacture of cryogenic safety valves, a cryogenic medium test device with a working pressure of not less than 6.4MPa and a volume of not less than 0.5m³ shall be installed.</p> <p>(5) The pressure source of test device shall meet the test requirements of safety valve.</p> | At least have test equipment to meet the needs of the factory inspection project |
| Physical and chemical inspection instruments | Quantitative chemical composition analysis equipment capable of analyzing more than 16 elements such as carbon, silicon, manganese, sulphur, phosphorus, chromium and nickel. 1 piece hardness tester for each HB and HRC. | One hardness tester for HB and one hardness tester for HRC |
| Nondestructive testing instrument | With two ultrasonic detectors or one radiographic detector | – |
| Strength testing device | A device meet the maximum test pressure and the range of the product to be manufactured | |
| Wall thickness measuring tool | Special tool for wall thickness measurement | |
| Pressure source for test | Gas and liquid pressure sources suitable for maximum test pressure of products | |

| | |
|--|---|
| Safety valve low temperature test device(Note F-2) | Setting pressure test and sealing test device with low temperature medium |
| Spring testing machine | Meet the requirements of spring performance test for the range of products to be manufactured |

Note F-2: The working temperature of the medium is no higher than -46 °C.

F2.4 Trial manufacture

According to the scope of licensed level, the manufacturer can produce at least two representative trial-manufacture models combining nominal pressure and nominal dimension parameters for each structural type of safety valve, and no less than 5 units for each models.

F2.5 Production requirement for license renewal

The manufacturer shall continue manufacturing products of various structural types within the license period, and the number shall not be less than 5. During the license period, should the number of products of a structure type be less than 5, the structural type product shall be treated as the first application or licensing item additions.

Where an application for "license renewal by self-declaration" in Article 3.6.3.2 of this Regulation is filed, the prove documents for production during the validity of the license and the corresponding type test certificate and report shall be submitted. The number of products manufactured annually shall be no less than 3 for all structure types within the scope of manufacturing license.

F3 Special requirements for rupture disc devices

F3.1 Personnel

The personnel of the rupture disc device manufacturer are shown in Table F-5.

Table F-5 Personnel of Manufacturing Unit of Rupture Disc Device

| | |
|---------------------------|---|
| Total number of employees | 30 |
| Proportion of technicians | 35% of the total number of employees |
| Technician | Eight technicians major in machinery, material and mould |
| Designer | There are 5 engineers, including 1 with rupture disc device design experience and 2 senior engineers. |

When there are welding requirements for rupture disc devices, the manufacturer shall have at least two qualified welders, and the granted items shall meet the requirements of product welding.

When the product standard of rupture disc device requires nondestructive testing, the manufacturer shall have at least 2 nondestructive testing personnel for each of UT II and PT II.

F3.2 Workplace

The building area of the workshop of the manufacturer is not less than 3000 m². The manufacturer which only produces rupture disc devices for non-flammable and non-toxic medium (which needs to be specified in the manufacturing license), the building area of the workshop of the manufacturer shall be no less than 1000 m².

F3.3 Production equipment and process equipment

The manufacturer shall have the corresponding design capability, set up the corresponding production process according to the type and process requirements of the rupture disc device, and have the capability of physical and chemical inspection of raw materials, blanking, forming, slotting, welding, mechanical processing, heat treatment, assembly, non-destructive testing, blasting test and final inspection.

The processes mentioned in the preceding paragraph shall not be outsourced except physical and chemical inspection of raw materials, non-destructive testing and mechanical processing of grippers.

F3.3.1 Major production equipment

The main production equipment of a manufacturing unit shall meet the needs of product manufacturing.

The quantity and requirements of the main production equipment of the manufacturing unit are shown in Table F-6.

Table F-6 Quantity and Requirements of Major Production Equipment

| Production equipment | Quantity and requirements (units or sets) |
|--|---|
| Blanking equipment (punch, shear, EDM and laser cutting) | 6 (of which laser cutting device 1) |
| Hydraulic press | 8 (1 of 300 T) |
| Mould and fixture (blanking, forming and grooving) | 150 |
| Machining equipment | 10 (including 2 CNC processing equipment) |
| Welding equipment | 3 |
| Heat treatment equipment (including vacuum heat treatment equipment) | 3 |

F3.3.2 Technological equipment

Manufacturing units shall have the necessary technological equipment for product processing and storage conditions for various technological equipment, moulds, fixtures, racks and other storage conditions.

F3.4 Testing instruments and testing devices

The manufacturer shall have the bursting test capability appropriate for the licensed product.

The quantity and requirement of testing instruments and test devices of the manufacturing unit are shown in Table F-7.

Table F-7 Quantity and requirements of testing instruments and testing devices

| Testing instruments and testing devices | Quantity and requirements (table or set) |
|--|---|
| Rupture disc test device(with automatic test data recording function) | 3 |
| Fatigue test device (test device with automatic test data recording function) | 1 liquid and 1 gas medium devices for fatigue testing |
| Sealing test device | Testing equipment and helium mass spectrometry |

| | |
|--|--|
| | leak detection equipment meeting the leak detection requirements of rupture disc device |
| Test pressure source and high and low temperature test equipment | Pressure source and high and low temperature test equipment suitable for products |
| Metering and detector | Pressure gauge (sensor), thermometer (sensor) and geometric shape measuring instrument. The measuring range and accuracy meet the testing requirements of the product, and within the validity period of verification. |

Note F-3: For the manufacturer of only non-flammable and non-toxic media rupture disc devices (as indicated in the manufacturing license), the resource requirements can be lowered appropriately. The proportion of technicians is no less than 20% of the total number of employees, among which there are no less than 5 professional technicians related to machinery, materials and moulds, and no less than 3 professional technicians with engineer or higher titles (at least 1 person with design experience of rupture disc device and at least 1 senior engineer title); the main production equipment is no less than 60% of the number in table F-6, and the number of rupture disc test moulds is not less than 40 sets. There are no less than 2 units of rupture disc testing devices, other requirements remain unchanged.

F3.5 Trial manufacture

The material, specification, pressure, temperature and other parameters of the trial manufactured sample shall cover the scope of its application for licensing and be representative. The manufacturer shall trial-produce at least three specifications of each structural type of rupture disc device and at least ten samples of each specification according to the scope of the application.

F3.6 Production requirement for license renewal

The manufacturer shall continue manufacturing the products within the scope of the license during the license-holding period and provide type test certificates and reports in accordance with the requirements of safety technical specifications; when there is no product manufactured during the license-holding period, the license renewal application of the manufacturer shall be treated as first application or application for licensing item addition.

Where an application for "license renewal by self-declaration" in Article 3.6.3.2 of this regulation is filed, the prove documents for production during the validity of the license and corresponding type test certificates and reports shall be submitted. The number of products manufactured annually shall be no less than 30 for all structural types within the scope of manufacturing license.

F4 Special requirements for emergency shutoff valves

F4.1 Personnel

The personnel of the emergency shutoff valve manufacturer shall meet the basic requirements. The total number of employees shall not be less than 40. The other personnel conditions and requirements are the same as those in Table F-1, Grade A.

F4.2 Design capability and production equipment

The design capability and production equipment of the manufacturing unit shall meet the basic requirements.

F4.2.1 Design capability

Manufacturing units shall set up design and development departments with no less than 5 designers. Designers shall master the standard technical requirements, product structure and strength and safety performance requirements of the products, be able to calculate the overflow of emergency shut-off valves and check their strength, and have the ability of product design and process design transformation.

F4.2.2 Production equipment and process equipment

Manufacturing units shall have the capability of welding, surfacing and processing of sealing surface to meet product requirements, mechanical processing of valve body, seat and core, assembling and performance test and inspection of the whole valve. Manufacturing units of oil and grease prohibition valves shall have the ability of degreasing and cleaning.

Where the procedure mentioned in the preceding paragraph involves non-destructive testing and physical and chemical testing, the work of non-destructive testing and physical and chemical testing are allowed to be outsourced, but no other work shall be outsourced.

F4.2.2.1 Major production equipment

The conditions and requirements of the main production equipment of the manufacturer are the same as those of Class A in Table F-2.

F4.2.2.2 Technological equipment

The process equipment requirements of the manufacturing units are the same as level of A in Table F-3.

F4.3 Testing instruments and testing devices

The manufacturer shall have test instruments and test devices suitable for the licensed products, such as strength test of valve body, delivery test of valve, emergency shut-off function test, etc. Requirements for inspection and test equipment are shown in Table F-8.

Table F-8 Testing Instruments and Testing Devices

| Testing Instruments and Testing Devices | Competence requirements |
|--|--|
| Emergency Cut-off Function Test Device | Test and calibration device for emergency cut-off function, suitable for licensed products |
| Pressure Testing Device | A device that satisfies the strength test and sealing performance test of product pressure shell; a gas and liquid pressure source corresponding to the maximum test pressure of the product |
| Physical and Chemical Inspection Instruments | (1) Quantitative analysis equipment capable of analyzing more than 10 elements such as carbon, silicon, manganese, sulfur, phosphorus, chromium and nickel; (2) When manufacturing low-temperature emergency shut-off valves, impact testing machines meeting low-temperature conditions shall be equipped; (3) One HB hardness tester |

| | | |
|---|---------|--|
| Nondestructive Instrument | Testing | With two ultrasonic detectors or one radiographic detector |
| Wall Thickness Measuring Device | | At least 1 ultrasound thickness gauge, special thickness gauge |
| Spring testing machine | | Spring performance testing device suitable for the licensed products |
| Cryogenic performance test device (Note F-4) | | Active performance testing device with low temperature medium suitable for licensed products |

Note F-4: The working temperature of the medium is not higher than -46 C.

The manufacturing unit shall also have a mechanical vibration test device suitable for the licensed product.

F4.4 Trial manufacture

According to the scope of licensed level, the manufacturer produces no less than two representative trial-manufactured models combining nominal pressure and nominal dimension parameters for each structural type of emergency shut-off valve..

F4.5 Production requirement for license renewal

The manufacturer shall continue manufacturing products of various structural types within the license period, and the number shall not be less than 5. During the license period, the number of products of a structure type shall be less than 5, the structural type product shall be treated as the first application or application additions.

Where an application for "license renewal by self-declaration" in Article 3.6.3.2 of this Regulation is filed, the prove documents for production during the validity of the license and the corresponding type test certificate and report shall be submitted. The number of products manufactured annually shall be no less than 3 for all structure types within the scope of manufacturing license.

F5 Specific conditions for cylinder valves

F5.1 Personnel

See Table F-9 for personnel requirements of cylinder valve manufacturer.

Table F-9 Personnel of Manufacturing Unit of Cylinder Valves

| | |
|---------------------------|---|
| Total number of employees | 30 |
| Technician | The proportion is no less than 8% of the total number of employees, 4 people, of whom two are majored in machinery and materials. |

F5.2 Production equipment and process equipment

The main production processes of cylinder valves include purchase and acceptance of raw materials, forging and forming of valve body, mechanical processing, assembly, performance test, final inspection, etc. Manufacturing units shall have the ability to meet the requirements of batch production, and usually (batch products) manufacture by means of production lines.

The main production and inspection procedures shall not be outsourced.

The manufacturing unit shall have production lines of product assembly, performance inspection, and meet the following requirements:

(1) Heating furnace with temperature control device, forging and forming equipment (with automatic manipulator), multi-station valve body automatic processing equipment not less than 2 or no less than 15 CNC machine tools, automatic processing equipment for valve stem and valve core, surface treatment equipment, etc., and a certain number of fixtures matching production capacity;

(2) Manufacturing liquefied petroleum gas cylinder valves and liquefied dimethyl ether cylinder valves, shall have no less than 2 automatic processing, assembly and testing lines of products;

(3) Manufacturing cryogenic valves with cryogenic treatment equipment;

(4) Manufacturing cylinder valves for high purity gases, shall have cleaning equipment and nitrogen test system meeting cleanliness requirements.

F5.3 Testing Instruments and Testing Devices

The manufacturer shall have the equipment and instruments required for product testing and testing, and are able to test and batch test the complete items in accordance with the requirements of relevant standards.

Manufacturing units shall have at least an opening and closing moment measuring device, an air tightness testing machine, an anti-vibration testing machine, a high and low temperature testing machine, a pressure testing machine, a durability testing machine, a salt spray testing machine, a safety relief device testing device, a universal testing machine, a full quantitative chemical composition spectrometer, vernier calipers, thread ring gauges, thread plug gauges, an image measuring instrument, a torque wrench, compactness degree analysis balance, non-metallic seals quality inspection equipment and instruments; LPG cylinder valves, liquefied dimethyl ether cylinder valves, gas tightness test and import and export thread inspection equipment shall also have automatic recording device; oxygen cylinder valve manufacturing unit shall have oxygen pressure ignition test device; low temperature insulation cylinder integrated valve manufacturing unit shall have low temperature testing device

F5.4 Trial manufacture

No less than 200 samples for each specification of cylinder valves.

F5.5 Production requirement for license renewal

The manufacturer shall continue manufacturing the products within the scope of the license during the license-holding period and provide type test certificates and reports in accordance with the requirements of safety technical specifications; when there is no product manufactured during the license-holding period, the license renewal application of the manufacturer shall be treated as first application or application for item addition.

Where an application is made for "license renewal by self-declaring " in Article 3.6.3.2 of this Regulation, the prove documents for 6 months of continuous production and corresponding type test certificates and reports shall be submitted.

Essential Requirements for Quality Assurance System of Special Equipment Manufacturers

M1 General Requirements

Special equipment quality assurance system refers to the planned and organized supervision and control conducted by the manufacturers who aim to make products, processes and services meet the quality requirements, and the manufacturers shall provide the corresponding evidence to ensure the users, the governmental supervision administration departments and the society trust its quality.

M1.1 Establishment principles

Special equipment manufacturers shall establish a quality assurance system and effectively implement the quality assurance system in accordance with the specific conditions and speciality of their licensed scope as well as the following principles:

- (1) Comply with laws, regulations, safety technical codes and standards;
- (2) Have effective control over special equipment safety performance;
- (3) Ensure the quality policy and quality objectives are in accordance with the specific conditions of the manufacturer;
- (4) Ensure that the quality assurance system can independently implement the responsibility of quality supervision and control;
- (5) The duties and responsibilities of the quality assurance system personnel (including the Quality Assurance Engineer or QAE and individual quality control system responsible person) and the coordination measures governing the quality control systems shall be clearly specified;
- (6) The essential elements of the quality assurance system, and the control scope, procedures, contents and records of the relevant quality control systems are complete;
- (7) The documents for the quality assurance system are normative, systematic and complete;
- (8) Meet the requirements of special equipment licensing.

M1.2 Quality assurance system organization

M1.2.1 Definition of organization

The legal representative (or the principal responsible person) of the manufacturer, the quality assurance engineer, the individual quality control system responsible person, the relevant responsible person and their corresponding responsibilities constitute the quality assurance system organization which shall effectively supervise and control the process of manufacture.

M1.2.2 Staff

The quality assurance engineer and the individual quality control system responsible person shall be appointed by the legal representative (or the principal responsible person) of the manufacturer. The quality assurance engineer shall be a member of management of the manufacturer. The individual quality control system responsible person shall be familiar with laws, regulations, safety technical codes and standards related to special equipment manufacturing, and shall have the relevant professional education background and work experience and be familiar with the work assignments and requirements of the occupied position.

According to the process control specified in Annex B to Annex L, the quality control system responsible person shall be appointed.

The quality assurance engineer cannot concurrently serve as a quality control system responsible person. A quality control system responsible person can be responsible for two uncorrelated quality control systems at most.

The educational background and work experience, etc. of the quality assurance engineer and the quality control system responsible people shall meet the requirements of corresponding special equipment production licensing.

M1.2.3 Staff responsibilities

M1.2.3.1 Legal representative (or the principal responsible person)

The legal representative (or the principal responsible person) is the main person responsible for special equipment safety and quality.

M1.2.3.2 Quality assurance engineer

(1) Implement laws, regulations, safety technical codes and standards related to special equipments and responsible for the implementation of the quality assurance system;

(2) Organize and establish the quality assurance system documents such as the quality manual and the procedure documents, and approve the procedure documents;

(3) Guide, coordinate and supervise the operation of individual quality control systems of the quality assurance system;

(4) Regularly organize the quality analysis and quality audit, and assist in management review;

(5) Control non-conforming products (items) and retain veto power over quality;

(6) Establish and improve the information feedback and processing system of internal and external quality information;

(7) Have the right and obligation to truthfully report quality problems to the safety supervision department of special equipments;

(8) Organize the regular education and training for quality control system responsible people and relevant person.

M1.2.3.3 Quality control system responsible people

Under the leadership of the quality assurance engineer, the quality control system responsible people shall perform the following duties for the implementation of the quality control system according to the requirements of the quality assurance system:

(1) Check the quality control procedure documents;

(2) Check and confirm the related work witness documents and oversee the implementation of the quality control procedures and requirements according to this Annex;

(3) If any problems are found, the quality control system responsible person shall contact the parties involved and solve the problem timely, and have right to stop the work of the parties involved and report to the quality assurance engineer.

M1.3 Management review

At least once a year, the management of the manufacturer shall conduct a management review for the quality assurance system of special equipments to determine its suitability, adequacy and effectiveness. The legal representative (or the principal responsible person) shall be responsible for the management review. The content and result of the review shall be recorded and a report shall be filed and approved by the legal representative (or the principal responsible person).

M1.4 Management of changes of the quality assurance system

When any changes happened to the quality assurance system (Note M-1), it shall be improved in a timely manner based upon stipulated procedures. The corresponding quality assurance system documents shall be revised, and a new edition of the quality manual shall be made when necessary.

Note M-1: Changes of the quality assurance system generally refers to the manufacturer's production organization structure, the staffing of the quality assurance system and its functions, the control elements of production processes are changed (reduced or increased), or laws, regulations, safety technical codes, etc. related to the safety of special equipments are changed, and the original quality assurance system needs to be modified or revised because it cannot adapt to the new requirements of the quality assurance system put forward by the special equipment safety supervision and administration departments.

M2 Quality assurance system documents

Special equipment manufacturers shall establish and implement the quality assurance system documents according to the specialty of their licensed scope and the actual requirements of quality control.

The quality assurance system documents include a quality manual, procedures, operational (technical) documents and records, quality plan, etc.

M2.1 Quality manual

The quality manual shall contain the following items at a minimum:

- (1) Terminology and abbreviations;
- (2) Applicable scope;
- (3) Quality policy and quality objectives (Note M-2);
- (4) Organization and management responsibilities of the quality assurance system, and its relationship with production, technology and quality inspection, etc. and the manufacturer's organization chart and the quality assurance system organization structure chart shall be attached;
- (5) Requirements and relationship of the essential elements of the quality assurance system and the related quality control systems;
- (6) Appointment, duties and responsibilities of all staff (it can be a separate document and not be included in the quality manual).

The quality manual shall be approved and issued by the legal representative (or the principal responsible person) or the authorized top management.

Note M-2: The quality policy and quality objectives shall be approved by the legal representative (or the principal responsible person) or his/her designee and documented, and shall meet the following requirements:

- (1) In conformity with the specific conditions and the licensed scope and specialty of the manufacturer, highlighting the special equipment safety performance requirements;
- (2) The quality policy shall reflect its commitment to the continual improvement of the safety performance and quality of special equipment, and indicate the quality guidance and quality objectives it pursues.
- (3) The quality objectives shall be quantified and assigned to the individual quality control systems, the relevant departments and responsible people, and shall be reviewed at regular intervals.

M2.2 Procedures

Procedures shall be consistent with the quality policy, meet the related requirements of the quality manual, fit the specific conditions of the manufacturer, and be operable.

M2.3 Process documents and quality records

Process documents and quality records shall correspond with the specialty of the licensed scope, and meet the implementation requirements of the quality assurance system. The format of the documents shall be normative and unified.

M2.4 Quality plan

Quality plan shall meet the specialty of the licensed scope and the specific conditions of the manufacturer, and rationally set the control sectors and control points (check/inspection points, hold points and witness points) in the process of manufacturing in accordance with the requirements of individual quality control systems. The quality plan shall contain the following:

- (1) Control items, content and requirements;
- (2) The in-process operational requirements;
- (3) Stipulations for signing-off by the quality control system responsible people, customers, and supervisory inspection agencies.

The quality plan can be compiled individually, or can be embodied in the relevant operating documents such as procedure specifications, process control cards, construction schemes or construction organization design for the manufacturing items.

M3 Control elements of the quality assurance system

Control elements of the quality assurance system generally include document and record control, contract control, design control, material and parts control, technical (process) control, welding control, heat treatment control, non-destructive testing (NDT) control, physical and chemical examination control (Note M-3), inspection and testing control, equipment and inspection & testing device control, non-conformity control, quality improvement and service, personnel management, procedures for implementing China special equipment licensing system requirements, and process control stipulated in Annex B to Annex L of this Regulation.

The control elements shall contain the following control scope, procedures and content at least:

- (1) Control requirements, process records, inspection and testing items, inspection and testing records and reports;
- (2) Relevant personnel and their responsibilities, and inspection and confirmation requirements.

For the process control elements stipulated in Annex B to Annex L of this Regulation, the specific provisions on control elements, procedures and content shall be made in accordance with the essential requirements prescribed in the previous paragraph and M3.1 to M3.15 of this Annex.

The quality control system responsible people shall perform the responsibilities of review, confirmation and recording. If the quality control system responsible person is not required for the elements, the relevant responsible person shall perform the responsibilities of review, confirmation and recording. The specific responsibilities no less than the requirements of corresponding elements of this Annex shall be clearly prescribed in the procedure documents.

For items and content for which outsourcing is allowed in Annex B to Annex L of this Regulation, the essential requirements of quality control shall be made for outsourcing, which include qualification verification, evaluation, selection, re-evaluation, supervision of activities, review and confirmation of quality records and reports, etc.

Note M-3: The welding control, heat treatment control, non-destructive testing control, physical and chemical testing control is only applicable to the production process which requires welding or heat treatment, as well as the product (equipment) production process which requires the non-destructive testing or physical and

chemical testing.

M3.1 Document and record control

M3.1.1 Document control

The scope, procedures and contents of document control are as follows:

(1) Determination of controlled document categories, including quality assurance system documents, external documents (Note M-4), and other documents which need to be controlled;

(2) Document management, including drafting, review, approval, marking, distribution, revision, withdrawal, usage control of design licensing stamp, maintenance (measures and facilities) and destruction of documents. For external document control, there shall be procedures for collection (purchase) and acceptance;

(3) The relevant departments, personnel and premises of the quality assurance system shall use valid editions of controlled documents;

For controlled documents, the corresponding quality assurance system responsible person shall review and verify the determination of categories, distribution and destruction, and make records.

Note M-4: External documents include laws, regulations, safety technical codes and standards, external design documents, design document appraisal reports, type test reports, supervisory inspection reports, subcontractor's product quality certificates and qualification certificates. The laws, regulations, safety technical codes and standards shall be the legally published official version.

M3.1.2 Record control

The scope, procedures and contents of record control are as follows:

(1) The filling, verification, collection, filing, retention, retention period and destruction of records for special equipment manufacturing;

(2) The relevant departments, personnel and premises for the implementation of quality assurance system shall use valid editions of record forms.

The filing of records and the valid edition of controlled records/forms shall be reviewed and verified by the corresponding quality assurance system responsible person who shall also carry out the periodic inspection for the usage and retention and make records.

M3.2 Contract control

The scope, procedures and contents of contract control are as follows:

(1) Contract review scope and contents shall include the applicable laws, regulations, safety technical code and standards and technical requirements. Contract review shall be recorded and retained.

(2) Procedures for contract conclusion, modification and joint review.

M3.3 Design control

The scope, procedures and contents of design control (including product design, alteration design and repair design, etc.) are as follows:

(1) The design input shall be documented (for example, design specification) which include the applicable regulations, safety technical codes and standards and technical requirements, etc.;

(2) The design output shall be documented as design explanations, design calculations, design drawings, etc. which shall meet the requirements of safety technical codes and standards and technical requirements, etc.;

(3) Where design verification by means of experimental method is required by safety technical codes and standards, the stipulation for design verification shall be established;

(4) There shall be stipulations for design modification;

(5) Where design documents are provided by external companies, stipulations for the control of external design documents shall be established;

(6) Where design unit licensing, design document appraisal and type test are required by regulations or safety technical codes, relevant stipulations shall be established.

Where the appraisal is required for design documents, the corresponding quality control system responsible person shall review and verify the design documents and make records before the design documents are submitted to the appraisal institution.

M3.4 Material and parts control

The scope, procedures and contents of material and parts control are as follows:

(1) The material and parts purchase (including purchase order and purchase contract) control shall clearly specify the quality control measures and procedures for subcontractors, including the evaluation, selection and re-evaluation of subcontractors. The unit shall maintain subcontractor evaluation reports and establish a list of qualified subcontractors. Where licensing of a subcontractor is required by regulations or safety technical codes, the stipulations for verification of the subcontractor's qualifications shall be established;

(2) Material and parts acceptance inspection (re-inspection) control shall include the stipulation that the material and parts cannot be used for production prior to passing inspection (or re-inspection) or if they are unqualified, etc.;

(3) Material identification (traceability marks), marking method, marking location and material identification transfer, etc.;

(4) Storage and maintenance of material and parts, including storage location and storage method by designated area, etc.;

(5) Material release and usage control, including quality certification documents, designations, specifications, heat No., verification of inspection results, material requisition, cutting and blanking, forming, material identification transfer and verification before machining, disposal of surplus materials and scrap materials, etc.;

(6) Material and parts substitution control, including the substitution essential requirements, substitution scope, substitution approval procedures, substitution inspection and testing, etc.

For material and parts, the corresponding quality assurance system responsible person shall review and verify the subcontractor evaluation report, the inspection and acceptance report and the substitution approval report; moreover, he/she shall also carry out the periodic inspection for the storage and usage of material and parts and make records.

M3.5 Technical (process) control

The scope, procedures and contents of technical (process) control are as follows:

(1) The essential requirements for technical (process) documents, including the conditions and principles for making general and specific technical documents, the requirements for process documents approval and modification, etc.;

(2) Inspection on technical (process) implementation, including inspection intervals, personnel, items and contents, etc.;

(3) Control of fixtures and moulds for production, including design, manufacture and acceptance as well as record keeping, identification, maintenance, periodic inspections, repair and disposal, etc.

The corresponding quality assurance system responsible person shall carry out the periodic

inspection for the implementation of technical (process) documents and make records.

M3.6 Welding control

The scope, procedures and contents of welding control are as follows:

(1) Welding personnel control, including training, examination, qualified items of certified welders, identification of certified welders, welding personnel files and their examination records, etc.;

(2) Welding consumables control, including the purchase, acceptance (re-inspection), inspection, storage, drying, distribution, use and return of welding consumables;

(3) Welding procedure qualification report (PQR) and welding procedure specification (WPS) control, including the storage of the PQR, related inspection and testing reports, welding records and the test coupon for welding procedure qualification, etc.;

(4) The items of welding procedure qualification shall cover the welding procedures adopted for special equipments;

(5) Welding process control, including welding procedures, product welding records, welding equipments, welding quality statistics, etc.;

(6) Weld joint repair (welding repair of base metallic flaws) control, including weld joint repair (welding repair of base metallic flaws) procedures, frequencies, approval, and the re-examination of repaired welds (welding repair of base metallic flaws), etc.;

(7) Product welding coupons shall be controlled according to the safety technical codes and standards, which includes the quantity, fabrication, welding methods, identification, heat treatment, inspection and testing items, testing specimen machining, inspection and testing, disposal of failed welding coupons and test specimens, and storage of test specimens, etc.

The corresponding quality assurance system responsible person shall inspect the implementation and make records.

M3.7 Heat treatment control

The scope, procedures and contents of heat treatment control are as follows:

(1) The essential requirements for heat treatment procedures;

(2) Heat treatment control, including the applied heat treatment facilities, thermometric devices, automatic temperature recorders, heat treatment records (record the heat treatment furnace number, job number (product serial number), heat treatment date, signature of the heat treatment operator and signature of the heat treatment responsible person, etc.), the filling, review and verification of heat treatment reports, etc.;

(3) Where heat treatment is subcontracted, there shall be quality control requirements on the subcontracted heat treatment, including the determination of subcontractors, heat treatment procedure control, heat treatment reports, records (record the heat treatment furnace number, job number (product serial number), heat treatment date, signature of the heat treatment operator and signature of the heat treatment responsible person), the review and verification of heat treatment reports, etc.

The corresponding quality assurance system responsible person shall review and verify the heat treatment procedures, heat treatment records and reports, evaluation of subcontractors and make records.

M3.8 NDT control

The scope, procedures and contents of NDT control as follows:

(1) NDT personnel control, including training, examination, certification, certified items,

duties and responsibilities, etc.;

(2) The essential requirements on the general NDT process and the specific NDT process, including NDT methods, the applicable safety technical codes and standards, etc.;

(3) NDT process control, including NDT methods, quantity, percentage, inspections of the non-conforming locations, percentage of additional NDT and evaluation criteria, etc.;

(4) NDT record and report control, including filling, review, re-evaluation, and release of NDT records and reports, storage of negative films and electronic data, etc.;

(5) NDT instrument and testing block control;

(6) Where NDT is subcontracted, there shall be quality control requirements on the subcontracted NDT, including the determination of subcontractors, review and verification of the subcontractor's NDT procedures, records and reports, etc.

The corresponding quality assurance system responsible person shall review and verify the NDT procedures, reports, witness documents (negative films, electronic data, etc.), the evaluation of subcontractors and the examination and certification of NDT personnel and make records.

M3.9 Physical and chemical examination control

The scope, procedures and contents of physical and chemical examination are as follows:

(1) The physical and chemical examination personnel cannot perform their duties without training;

(2) Physical and chemical examination control, including the method determination and operation control;

(3) The filling, review, results verification, release, re-examination of the physical and chemical examination records and reports; the control of test pieces, reagent and standard test pieces, etc.;

(4) The machining and inspection of test pieces for physical and chemical examination;

(5) Where physical and chemical examination is subcontracted, there shall be quality control requirements on the subcontracted physical and chemical examination, including the determination of subcontractors, review and verification of the subcontractor's physical and chemical examination procedures, records and reports.

The corresponding quality assurance system responsible person shall review and verify the evaluation of subcontractors and the physical and chemical examination report and make records.

M3.10 Inspection and testing control

The scope, procedures and contents of inspection and testing control are as follows:

(1) The essential requirements for inspection and testing technical documents shall include the basis, contents and methods, etc.;

(2) Inspection and testing condition control, including inspection and testing site, environment, temperature, medium, equipment (device), fixture, test load, safety protection, inspection and testing supervision and verification, etc.;

(3) Process inspection and testing control shall stipulate that the product cannot proceed to the next process or be released before it finishes the required inspection and testing of the last process or before the required inspection and testing are signed off;

(4) Final inspection and testing control shall stipulate that before the final inspection and testing, all the process inspection and testing must be completed and the inspection and testing results must meet the requirements of safety technical codes and standards;

(5) Inspection and testing status control, such as status identification for qualified,

unqualified, and pending for inspection and testing;

(6) Where type test or other specific testing is required by safety technical codes and standards, there shall be stipulations for the drafting of type test controls or other specific testing controls, including items, coverage, agencies, reports and results for type test, or testing conditions, methods, technologies, records, reports and testing conclusions for other specific testing, etc.;

(7) Inspection and testing record and report control, including the filling, review and verification of inspection and testing records and reports, etc. There shall be special requirements on the collection, filing and storage of inspection and testing records, reports and prototypes (test samples and test coupons), etc.

The corresponding quality assurance system responsible person shall review and verify the inspection and testing process and the final inspection and testing report and make records.

M3.11 Production equipment and inspection & testing device control

The scope, procedures and contents of production equipment and inspection & testing device control are as follows:

(1) Production equipment and inspection & testing device control, including purchase, acceptance inspection, record keeping, operation, maintenance, operating environment, calibration, repair, mothballing and scrap, etc.;

(2) Production equipment and inspection & testing device document control, including the establishment of production equipment and inspection & testing device directory and files, quality certification documents, instruction manuals, service records, maintenance and repair records, calibration plans, calibration records and reports, etc.;

(3) Production equipment and inspection & testing device status control, including the production equipment service status identification, inspection & testing device calibration identification and mandatory periodic inspection reports of production equipments, etc.

M3.12 Non-conformity control

The scope, procedures and contents of non-conformity control are as follows:

(1) Non-conformity records, identification, storage and segregation, etc.;

(2) Non-conformity cause analysis, disposition and inspection after disposition, etc.;

(3) The drafting, review, approval, execution and tracking of the corrective or preventive measures (when necessary) to non-conformities.

M3.13 Quality improvement and service

The scope, procedures and contents of quality improvement and service are as follows:

(1) Quality information control, including internal and external quality information, quality issues brought by special equipment safety supervision and administration departments and supervisory inspection agencies, quality information collection, compilation, analysis, feedback and disposition, establishment and responsibilities of product recall responsible agencies, etc.;

(2) At least once a year, the manufacturer shall conduct one complete internal audit, and analyze the findings, take corrective action(s), track and verify the effectiveness of the corrective action(s);

(3) The manufacturer shall keep regular statistics and analyze the pass rate and repair rate, and promulgate specific preventive measures, etc.;

(4) Customer service, including service plans, execution, verification, reports and the relevant personnel responsibilities, etc.

M3.14 Human resource management

The scope, procedures and contents people management are as follows:

- (1) Training requirements, contents, plans and execution, etc.;
- (2) Training and examination documents as required by the special equipment licensing system;
- (3) Employment control of relevant personnel as required by the special equipment licensing system.

M3.15 Procedures for implementing China special equipment licensing system

The manufacturer shall implement China special equipment licensing system requirements and formulate the scope, procedures and contents as follows:

- (1) Implement the China special equipment licensing system;
- (2) Accept the supervision of special equipment safety supervision and administration departments of all levels;

(3) Accept the supervisory inspection. Where supervisory inspection of special equipment manufacture, installation, alteration, maintenance and repair is required by regulations and/or safety technical codes, the manufacturer shall stipulate the acceptance of supervisory inspection, appoint a contact person for liaison with supervisory inspection agencies, provide working conditions for supervisory inspection, and formulate procedures for the response to the *Liaison Form of Supervisory Inspection* and the *Notice of Supervisory Inspection Result* sent by supervisory inspection agencies.

(4) Special equipment license control, including observation of the relevant laws, regulations and safety technical codes; change applications and registrations where there is any change to the licensed condition (such as name, address, quality manual); special equipment license and licensing symbol control; license renewal requirements, etc.;

(5) Provide information as required by regulations and/or safety technical codes and information work to special equipment safety supervision and administration departments, inspection agencies and the public, which includes information on manufacturing process, as well as organization establishment, staffing, equipments and facilities, etc.

Regarding the implementation of the China special equipment licensing system, the quality assurance engineer shall carry out the supervisory inspection and put forward disposal measures to the opinions brought by special equipment safety supervision and administration departments and the *Notice of Supervisory Inspection Result* sent by supervisory inspection agencies, moreover, review and verify the settled result and make records.