



Expandable Container House Structural Safety Inspection and Appraisal Report



<Report Number: JYJD-2024-0176>

Report query QR code

Project name: Expandable Container House

Project address: No. 68 Shunda East Road, Fucheng
Development Zone, Fucheng County, Hengshui City,
Hebei Province

Client: Hebei Dechang Guangtai Integrated Housing Technology
Co., Ltd.

Guangdong Jianye Inspection and Appraisal Co., Ltd.

April 25, 2024





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1 Testing appraisal conclusion

Project name		Expandable Container House			
Project address		No. 68 Shunda East Road, Fucheng Development Zone, Fucheng County, Hengshui City, Hebei Province			
Client		Hebei Dechang Guangtai Integrated Housing Technology Co., Ltd.			
Structure form		Steel structure	Single area/total area		About 34.56m ²
Usage		Steel Plate House	Inspection time		April 2024
Structure Detection Conclusion		1. On-site inspection of the actual structural layout revealed that the steel plate house has a reasonable planar layout with clear force transmission routes. The results of the actual axial dimension measurement of the steel plate house are detailed in Table 4.1 of this report. 2. The results of the inspected steel column section dimension measurement are provided in Table 5.1.1 of this report. 3. The results of the inspected steel beam component section dimension measurement are outlined in Table 5.2.1 of this report. 4. During on-site inspection, it was observed that the main load-bearing steel frame structure components of the steel plate house are bolt-connected between nodes and foundations, with the connections showing no abnormalities. The nodes between steel frame structural components are connected through welding and bolt connections, with the connections being generally in good condition. Weld seams exhibit a satisfactory appearance, without visible cracks, slag inclusion, undercut, or other quality defects. The quality of the sampled weld seams largely complies with the quality requirements outlined in the <i>Code for Acceptance of Construction Quality of Steel Structures</i> (GB50205-2020). 5. The main appearance quality of the key components of the steel plate house was inspected on-site, revealing no significant damage or deformations.			
Structure Identification Conclusion		Based on the verification analysis of the calculated results, the bearing capacity of the steel columns and beams was verified. The calculation indicates that the strength stress ratio, stability stress ratio, and slenderness ratio of the steel columns in the steel plate house meet the regulatory requirements. Additionally, the strength stress ratio and stability stress ratio of the steel beams in the steel plate house also conform to the specifications. In summary, under normal use and maintenance, the twin-wing expansion house meets the following requirements: wind resistance level nine (75-88 km/h), seismic intensity of 7° (0.10g), basic snow pressure of 0.35 kN/㎡, and meets the safety requirements for use as a steel panel house. The non-roof live load limit is 0.5 kN/㎡.			
Recommendation		1. After the steel plate house should be regularly anti-corrosion maintenance, found rust, paint off, cracking, weathering and other phenomena, should be cleaned, rust removal, repair, re-painting; Component connections (weld seams, bolts, anchor bolts) should be inspected regularly, and in case of cracks in weld seams or loosening nodes, timely repairs and tightening should be implemented. 2. During periods of strong winds or snowfall, the steel plate house should undergo emergency inspection and maintenance. 3. Without technical assessment or design approval, changes to the purpose and utilization environment of the steel plate house should not be made arbitrarily.			
Chief inspector:	Li Sheng		Prepared by:	Li Sheng	
Reviewed by:	Tang Chunneng		Approved by:	You Qihong	
Guangdong Jianye Inspection and Appraisal Co., Ltd. April 25, 2024 					



2 Project Overview

The steel plate house is located at No. 68 Shunda East Road, Fucheng Development Zone, Fucheng County, Hengshui City, Hebei Province. The steel plate house for this project measures 5.9m in length, 6.2m in width, and 2.2m to 2.50m in height. It has a steel structure and is currently used as a steel plate house pavilion, with each individual steel plate house covering an area of approximately 34.56m².

The architectural design, construction, supervision, and surveying data for this building are currently unavailable.

Commissioned by Hebei Dechang Guangtai Integrated Housing Technology Co., Ltd., our company conducted on-site safety inspections of the steel plate house pavilion structure in April 2024 and issued a Structural Safety Inspection and Appraisal Report based on the on-site inspection data and analysis results.

3 Inspection and Appraisal Content, Instruments, and Basis

3.1 Inspection and Appraisal Content

As authorized by the client, the inspection and appraisal content for the structural testing of the steel plate house is as follows:

- (1) Structural layout inspection and axial dimension measurement.
- (2) Steel structural component section dimension measurement.
- (3) Steel structural appearance quality inspection.
- (4) Steel structural load-bearing capacity verification and safety assessment.

3.2 Inspection and Appraisal Instruments

The main instruments used for testing the steel plate house structure are as follows:

- (1) Handheld laser distance meter...(Instrument model: GLM500; Instrument number: QY-JC-032);
- (2) Vernier caliper... (Instrument model: 0-150mm; Instrument number: QY-JC-058);
- (3) Steel tape measure... (Instrument model: 7.5m; Instrument number: QY-JC-061);
- (4) Ultrasonic thickness gauge... (Instrument model: SW6510; Instrument number: QY-JC-041);
- (5) Other relevant instruments.

3.3 Inspection and Appraisal Basis

The testing of the steel plate house is primarily based on the following standards:

- (1) Technical Standards for Building Structure Inspection (GB/T 50344-2019);
- (2) Building Seismic Appraisal Standard (GB 50023-2009);
- (3) Code for Acceptance of Construction Quality of Steel Structures (GB50205-2020);
- (4) Codes for Seismic Design of Buildings (GB50011-2010) (2016 Edition)
- (5) Load Code for the Design of Building Structures (GB 50009-2012)
- (6) Estándar de Diseño de Estructura de Acero (GB50017-2017);
- (7) (1) Technical Standard for In-Site Testing of Steel Structure (GB/T50621-2010);
- (8) Code for Deformation Measurement of Building and Structure (JGJ 8-2016);
- (9) Wind Load Classification (GB/T28591-2012)
- (10) Classification Standard for Seismic Protection of Building Engineering (GB 50223-2008);
- (11) Engineering Quality Testing Authorization from Hebei Dechang Guangtai Integrated Housing Technology Co., Ltd.

4 Structural Layout Inspection and Axial Dimension Measurement

On-site inspection of the actual structural layout revealed that the steel plate house has a reasonable planar layout with clear force transmission routes. The results of the actual axial dimension measurement of the steel plate house are detailed in Table 4.1 of this report.

Table 4.1 Structural Actual Axial Dimension Measurement Results (unit: mm)

Axis and Floor Height Position	Axis Dimension/Floor Height Measurement (mm)	Axis Dimension/Floor Height Assessment (mm)
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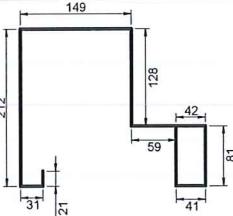
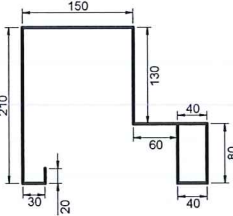
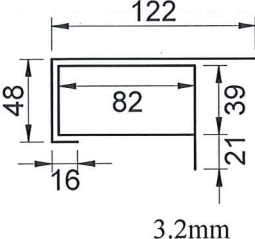
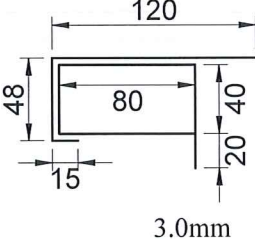
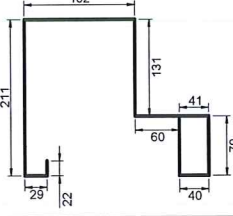
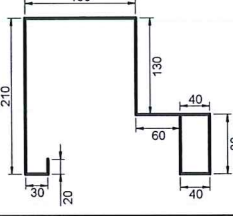
Axis Dimension	1-2	2203	2200
	2-3	2001	2000
	3-4	2198	2200
	A-B	5403	5400
Storey Height	1/F	2248~2502	2250~2500

5 Component Dimension Measurement

5.1 Steel column section dimension inspection

The results of the inspected steel column section dimension measurement are provided in Table 5.1.1 of this report.

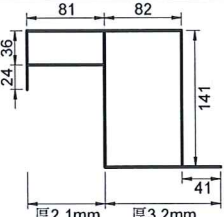
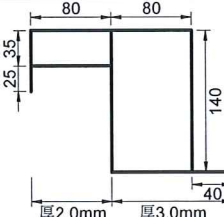
Table 5.1.1 Test Results of Steel Column Section Dimensions (unit: mm×mm)

Component name and number	Measured dimensions (including coating)	Assessed dimensions
Steel column 2-A	 Thickness 2.1mm	 Thickness 2.0mm
Steel column 4-B	 Thickness 3.2mm	 Thickness 3.0mm
Steel column 3-B	 Thickness 2.2mm	 Thickness 2.0mm

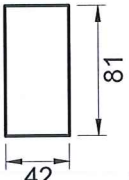
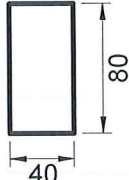
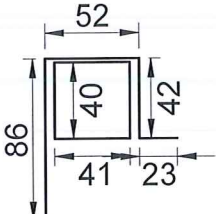
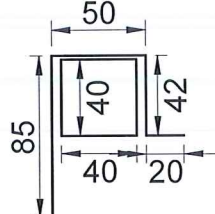
5.2 Steel beam member section dimension inspection

The results of the inspected steel beam component section dimension measurement are outlined in Table 5.2.1 of this report.

Table 5.2.1 Test Results of Steel Beam Section Dimensions (unit: mm×mm)

Component name and number	Measured dimensions (including coating)	Assessed dimensions
Steel beam 2-A-B	 厚2.1mm 厚3.2mm	 厚2.0mm 厚3.0mm



Steel beam 4-A-B	 Thickness 2.1mm	 Thickness 2.0mm
Steel beam 1-2-B	 Thickness 2.2mm	 Thickness 2.0mm

6 Structural and Component Damage and Defect Inspection

1. During on-site inspection, it was observed that the main load-bearing steel frame structure components of the steel plate house are bolt-connected between nodes and foundations, with the connections showing no abnormalities. The nodes between steel frame structural components are connected through welding and bolt connections, with the connections being generally in good condition. Weld seams exhibit a satisfactory appearance, without visible cracks, slag inclusion, undercut, or other quality defects. The quality of the sampled weld seams largely complies with the quality requirements outlined in the *Code for Acceptance of Construction Quality of Steel Structures* (GB50205-2020).

2. The main appearance quality of the key components of the steel plate house was inspected on-site, revealing no significant damage or deformations.

7 Main Structure Bearing Capacity Calculation

The structural load-bearing capacity calculation for this project is performed using the PKPM series software, developed by Beijing Gouli Technology Co., Ltd.

7.1 Structural Calculation Basis

- (1) Actual test results of the steel plate house;
- (2) *Code for Design Load of Buildings* (GB50009-2012)
- (3) *Code for Design of Steel Structures* (GB 50017-2017).
- (4) *Code for Seismic Design of Buildings* (GB50011-2010) (2016 version).
- (5) Engineering data provided by the client.

7.2 Basic Parameters for Structural Calculation

- (1) The axial positions and component dimensions are taken as design values.
- (2) The steel strength is taken as: Q235 for all main components.
- (3) The standard value for permanent load calculation: Roofing: 0.3 kN/m².
- (4) The standard value for live load calculation: Non-accessible roof: 0.5kN/m².
- (5) The steel plate house is located in Fucheng County, Hengshui City, Hebei Province. Based on the *Code for Design Load of Buildings* (GB50009-2012) and relevant information provided by the client, the basic wind pressure value for this calculation is taken as: 0.40 kN/m² (100-year return period), and the basic snow pressure value is taken as 0.35 kN/m² (100-year return period). The ground roughness category is B.
- (6) Seismic information: The seismic fortification intensity is 6 degrees, the design seismic basic acceleration value is 0.05g, and the design seismic grouping is the third group.

7.3 Calculation Results

7.3.1 Checking of Bearing Capacity for Steel Column Load-Bearing Members

Based on the verification and analysis results, the bearing capacity of the steel columns in the steel plate house was checked. The results show that the strength stress ratio, stability stress ratio, and slenderness ratio of the steel columns in the steel plate house meet the specifications. The inspection results are shown in Table 7.3.1.1 of this report.



Table 7.3.1.1 Calculation Results of Strength Stress Ratio and Slenderness Ratio for Steel Columns in Steel Plate House

Component name and number	Strength Stress Ratio	Stability Stress Ratio	Slenderness ratio	Conclusions
Steel column 2-A	<1.0	<1.0	Satisfied	Meet specification requirements
Steel column 4-B	<1.0	<1.0	Satisfied	Meet specification requirements
Steel column 3-B	<1.0	<1.0	Satisfied	Meet specification requirements

7.3.2 Steel Beam Main Load-bearing Component Verification

The bearing capacity of the steel beam of the steel plate house is checked according to the results of the checking analysis. The results show that the strength stress ratio of the steel beam of the steel plate house meets the requirements of the code. The inspection results are shown in Table 7.3.2.1 of this report.

Table 7.3.2.1 Calculation Results of Strength Stress and Stable Stress Ratio of Steel Beam in Steel Plate House

Component name and number	Strength Stress Ratio	Stability Stress Ratio	Conclusions
Steel beam 2-A-B	<1.0	<1.0	Meet specification requirements
Steel beam 4-A-B	<1.0	<1.0	Meet specification requirements
Steel beam 1-2-B	<1.0	<1.0	Meet specification requirements

8 Inspection and Appraisal Conclusion and Recommendations

8.1 Structural Inspection Conclusion

1. On-site inspection of the actual structural layout revealed that the steel plate house has a reasonable planar layout with clear force transmission routes. The results of the actual axial dimension measurement of the steel plate house are detailed in Table 4.1 of this report.
2. The results of the inspected steel column section dimension measurement are provided in Table 5.1.1 of this report.
3. The results of the inspected steel beam component section dimension measurement are outlined in Table 5.2.1 of this report.
4. During on-site inspection, it was observed that the main load-bearing steel frame structure components of the steel plate house are bolt-connected between nodes and foundations, with the connections showing no abnormalities. The nodes between steel frame structural components are connected through welding and bolt connections, with the connections being generally in good condition. Weld seams exhibit a satisfactory appearance, without visible cracks, slag inclusion, undercut, or other quality defects. The quality of the sampled weld seams largely complies with the quality requirements outlined in the *Code for Acceptance of Construction Quality of Steel Structures* (GB50205-2020).
5. The main appearance quality of the key components of the steel plate house was inspected on-site, revealing no significant damage or deformations.

8.2 Structural Appraisal Conclusion

Based on the verification analysis of the calculated results, the bearing capacity of the steel columns and beams was verified. The calculation indicates that the strength stress ratio, stability stress ratio, and slenderness ratio of the steel columns in the steel plate house meet the regulatory requirements. Additionally, the strength stress ratio and stability stress ratio of the steel beams in the steel plate house also conform to the specifications.

In conclusion, under normal use and regular maintenance, the twin-wing expansion house meets the requirements for wind resistance level nine (75-88 km/h), seismic intensity of 7° (0.10g),



basic snow pressure of 0.35 kN/m^2 , and complies with the safety requirements for use as a steel panel house. The non-live load limit for the roof is 0.5 kN/m^2 .

8.3 Recommendations

1. After the steel plate house should be regularly anti-corrosion maintenance, found rust, paint off, cracking, weathering and other phenomena, should be cleaned, rust removal, repair, re-painting; Component connections (weld seams, bolts, anchor bolts) should be inspected regularly, and in case of cracks in weld seams or loosening nodes, timely repairs and tightening should be implemented.

2. During periods of strong winds or snowfall, the steel plate house should undergo emergency inspection and maintenance.

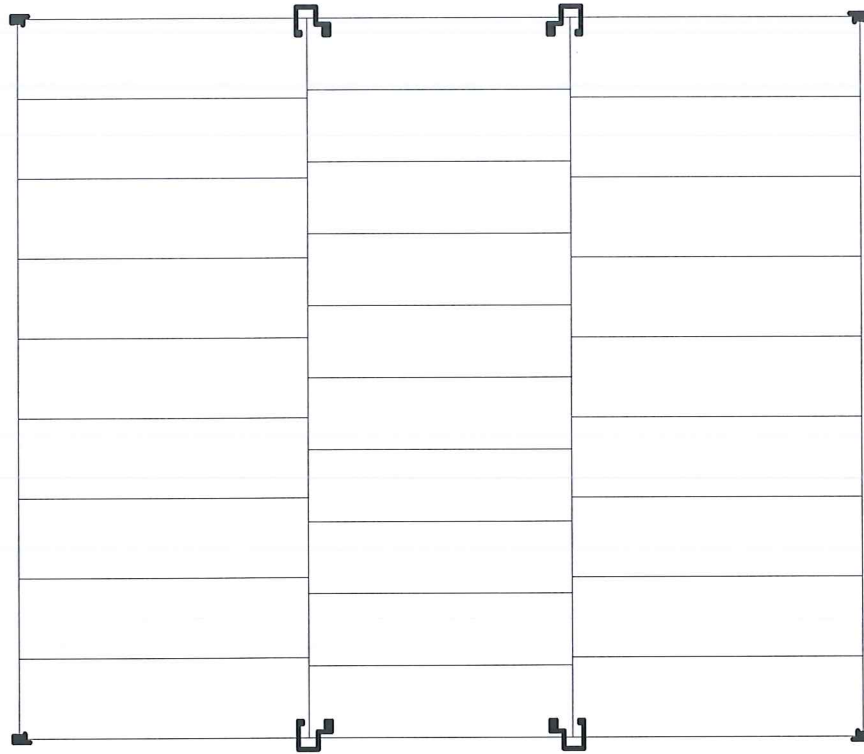
3. Without technical assessment or design approval, changes to the purpose and utilization environment of the steel plate house should not be made arbitrarily.

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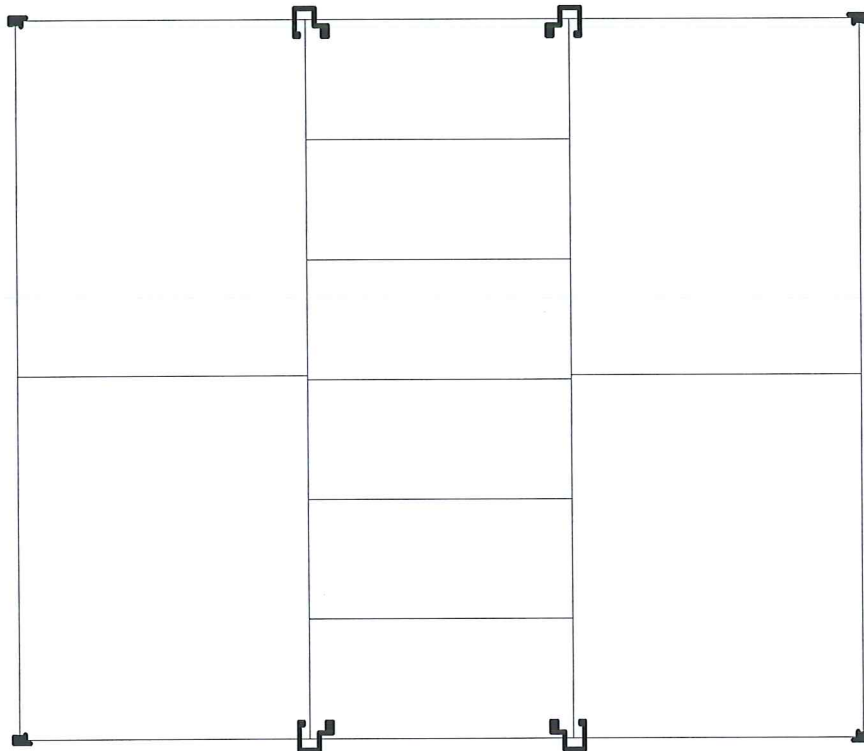




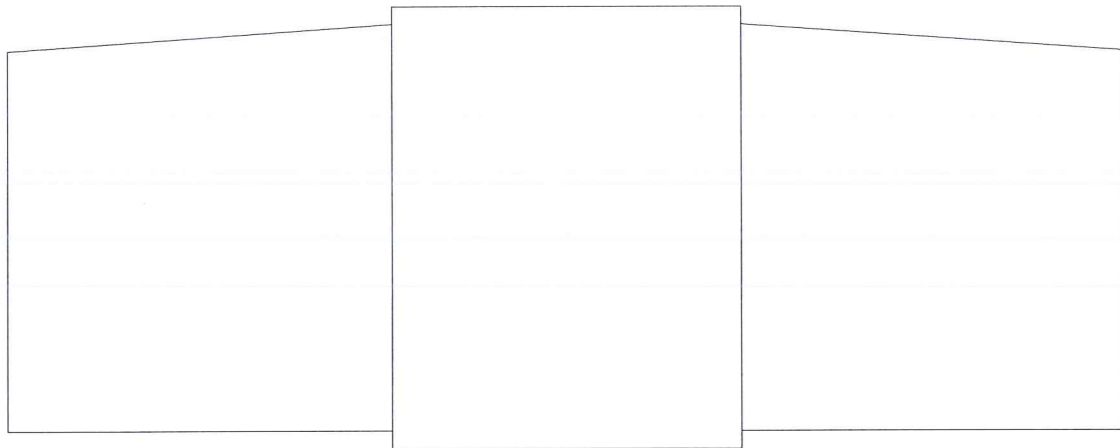
Annex 1: Layout Diagram of Steel Plate House



Plan Layout Diagram of Steel Plate House Bottom Structure



Plan Layout Diagram of Steel Plate House Top Structure



Front and Rear Elevation Diagram of Steel Plate House Structure

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Annex 2: Test photos



Exterior of the Steel Plate House



Dimension Inspection of Steel Components in the Steel Plate House



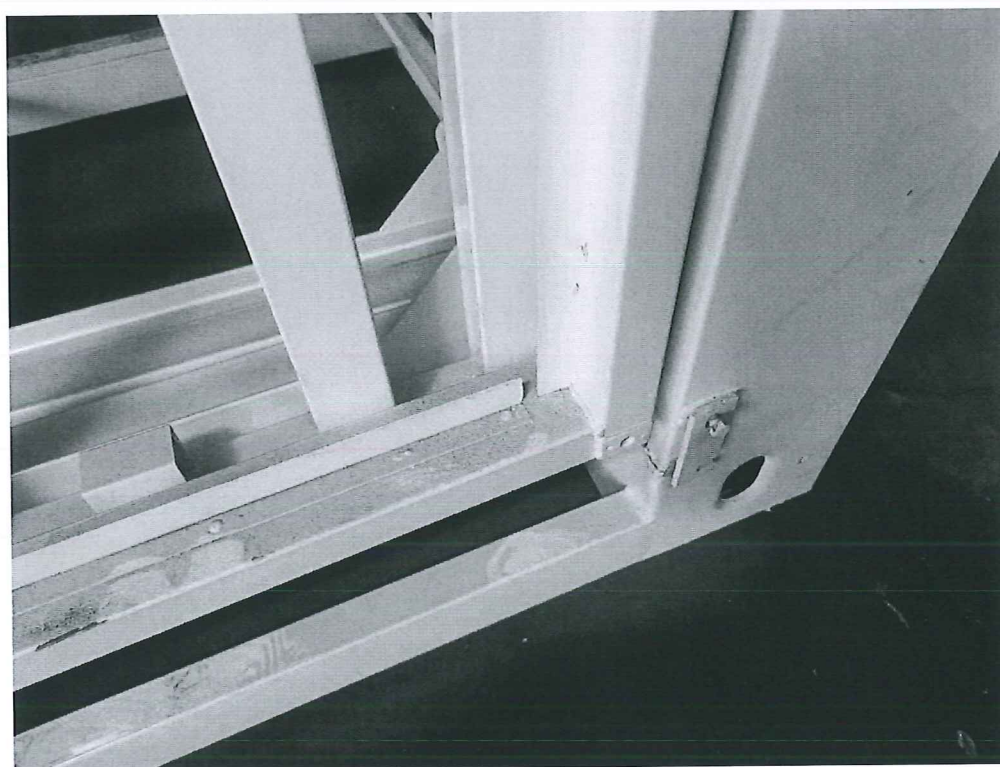
Thickness Inspection of Steel Components in the Steel Plate House



Leeb Hardness Inspection of Steel Components in the Steel Plate House



Coating Inspection of Steel Components in Steel Plate House



Steel Plate House Owner Bearing Support Member Node Inspection

Annex 2: Enterprise Related Qualification Certificate