Metal Gates

The installation of metal gates[1] involves building works as defined under the Buildings Ordinance. This practice note provides guidelines on design and installation of metal gates at fence walls or entrances of buildings as well as maintenance of metal gates.

2. For new buildings, metal gates should be shown on the building plans submitted for prior approval and consent by the Building Authority (BA). For large metal gates with a height exceeding 3.2m, plans showing structural details of the metal gates including design calculations are also required to be submitted for approval. For the installation of new metal gates in existing buildings, if the height of the metal gate exceeds 3.2m, both building and structural plans are required to be submitted for approval prior to installation.

Minor Works Relating to Metal Gates

3. Under the Minor Works Control System, certain works relating to installation of metal gates in existing buildings have been designated as minor works, which may be carried out under the simplified requirements as an alternative to obtaining prior approval and consent from the BA. For the list of minor works items and the simplified requirements, please refer to Schedule 1 of the Building (Minor Works) Regulation and PNAP APP-147 respectively.

Design and Installation Requirements

4. In general, all metal gates should be constructed of suitable materials and satisfy the performance requirements stipulated in section 3 of the Building (Construction) Regulation. They should be properly designed and constructed in accordance with recognised standards to ensure their satisfactory and safe operation under the expected conditions of use. All parts of the metal gate installations, whether fixed or movable, including the fixings, should in all respects be of sound construction, adequate strength and free from obvious defects for their intended working life.

5. Except for works which are prescribed as designated exempted works, the installation of metal gates should be under the qualified supervision of a registered general building contractor (RGBC) or registered minor works contractor (RMWC) as the case may be to ensure that the works are carried out in accordance with the approved plans or the prescribed plans of minor works and the required standards are complied with. Upon completion of installation, the metal gate should be inspected and trial operated to ensure that it has been properly installed.

/6. …

[1] Manually or electrically operated.

6. Where submission of structural details of a metal gate is required, special attention should be paid to the following:

(a) design wind load should be in accordance with the appropriate provisions in the prevailing Code of Practice on Wind Effects in Hong Kong;

(b) details and design for the elements of the gate framework, post support and foundation should be given to demonstrate the stability of the metal gate during operation;

(c) design of connection to fix the gate framework to the surrounding structure and the design check on the supporting structure should be provided;

(d) for a swing-type metal gate, details of hinge pin fittings to permit pivotal movement should be given;

(e) for a sliding metal gate, details of end stoppers to prevent the metal gate from over-travel at both ends should be shown; similar provisions should be made for multi-passing metal gate which also serve as connection between gate leaves;

(f) additional measures at guide should be provided to stop the metal gate from being lifted off or derailment during operation; and

(g) details of decorative parts of the metal gate need not be submitted.

Additional Measures and Reference Standards

7. Recommendations on additional measures, design considerations and maintenance for enhancing the safety of metal gates are given in Appendix A. Some relevant standards/specifications for the design and installation of metal gates are given in Appendix B. Authorized person (AP) and registered structural engineer (RSE) may also make reference to other international or national standards and specifications if equivalent performance can be demonstrated.

Tests on Anchors and Welding Joints

8. Where drilled-in anchors are proposed to secure the stability of a metal gate, at least 5 numbers of each type and size of the anchors installed should be tested by pull-out test, in accordance with the relevant requirements given in Appendix B of Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers APP-169, to demonstrate that its pull-out capacity is not less than 1.5 times the recommended tensile load as specified by the anchor manufacturer. The test result will be considered satisfactory if the tested anchor and its surrounding area do not show any signs of separation, plastic deformation or deleterious effect.

/9. …

9. Non-destructive tests should also be carried out to all welded joints at the supports of a metal gate and the mechanical end stoppers to verify the integrity and adequacy of the welds.

10. All tests required under paragraphs 8 and 9 above should be carried out by laboratories accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or other laboratory accreditation bodies which have reached mutual recognition agreements/arrangements with HOKLAS for the particular test concerned. They should be carried out under the direction of AP/RSE for metal gates with plans approved by the BA, or under the direction of prescribed building professionals (PBP) for gates carried out under Class I minor works. Regarding metal gates carried out under Class II or III minor works without PBP appointed, such tests should be carried out under the direction of RGBC or RMWC as the case may be.

Electrically Operated Metal Gates

11. For electrically operated metal gates, reference should also be made to the "Code of Practice for Installation of Electrically Operated Sliding Gates, Sliding Glass Doors and Rolling Shutters" published by the Electrical and Mechanical Services Department.

Guidelines for Registered Contractors

12. A similar practice note is issued to registered contractors.

(YU Po-mei, Clarice)
Building Authority

Ref.: BD GP/BORD/108 (II)

This PNAP is previously known as PNAP 304
First issue December 2008
Last revision April 2018
This revision March 2025 (AD/NB1 and AD/NB2) (Paragraphs 1, 5, 6 & 8 and Appendices A & B amended, and paragraphs 9 & 10 added)

Appendix A
(PNAP APP-146)

Recommendations for Enhancing the Safety of Metal Gates

Swing-Type Metal Gate

All hinge fittings of a swing-type metal gate should be welded all round to the gate framework and should be able to withstand the dead weight of the metal gate and wind loads during normal operation.

2. A minimum of three hinges should be provided for the connection between the metal gate and each supporting post. For a large metal gate with a height exceeding 3.2m, stainless steel hinges should be provided at centre to centre spacing of not more than 1000mm and at a distance of not more than 300mm from the top and bottom of the gate, to connect the gate with its supporting post. To prevent the metal gate being lifted off from its hinges after installation, measures such as installing one of the hinge fittings with the hinge pin pointing in a reverse direction should be incorporated for providing restraint against vertical movement.

Sliding Metal Gate

3. The gate leaf as well as any other moving parts of a sliding metal gate should be designed and constructed in such a way so as to prevent them from falling down, collapsing or derailment during normal operation or in case of contact with stationary obstacles. Proper design and provisions of guide and metal gate stopper of adequate size and strength are required to maintain lateral stability of the metal gate and to resist the imposed loads and impact force.

4. A minimum of two pairs of guiding wheels with a minimum spacing of 1000mm should be provided at the end support of a metal gate with sufficient overlapping with the gate leaf. The guiding wheels should be designed to safeguard the metal gate from disengagement or derailment.

5. A minimum of one stopper should be provided to the sliding gate leaf and additional stopper(s) should be installed on the ground, column or fence wall to prevent overrun when the stopper on the gate leaf is damaged. Rubber cushion should be fixed to the end stoppers to prevent excessive impact caused by percussion and vibration during the operation of the gate.

6. The recommendations outlined in paragraphs 2, 4 and 5 above are illustrated diagrammatically in Annex 1.

Folding Metal Gate

7. Paragraphs 1 to 6 above are applicable to a folding metal gate with two or more hinged leaves, guided and/or supported at the top or at the bottom. Similar provisions for preventing the gate leaf from being lifted off should be made for the hanging fittings connecting the hinged leaves.

Alternative Access on Metal Gates

8. Alternative openable access on a metal gate may be provided to reduce the frequency of swinging/sliding the gate.

Installation and Use

9. Before installation, all members and components of the metal gate should be visually inspected to ensure that they are free from visual defects and comply with the approved structural details. In addition, all welding points for hinges should not be covered up so as to allow easy inspection at all times.

10. Notices may be added to alert users of the proper use and operation of the metal gate, such as avoid hanging any object or impose additional load on the metal gate, the opening direction of push or pull if the gate is not a two-way gate, and use the gate handle to open and close the gate.

Maintenance and Repair

11. All parts of the metal gate providing mechanical resistance and connection, whether fixed or movable, are subject to normal deterioration of wear and tear. Regular inspection and maintenance should be provided to safeguard the metal gate from disengagement or derailment.

12. AP should coordinate with RGBC or RMWC to prepare documentation on the safe operation and maintenance of the metal gate, for regular maintenance and repair to be arranged by the owner/Incorporated Owners/management company. Defects with safety concerns such as defective or missing hinges, defective guiding wheels, floor track or stopper and corrosion of supporting structural steel works and fixings should be identified and suitable repair or replacement works should be carried out. Routine inspection and maintenance work such as checking the condition and levelling of the floor track and removing any debris left in it, checking the stopper, guiding wheels and axle for wear and tear, checking all welding points and hinges and applying lubrication to enable smooth movement of the metal gate should be carried out every three months.

13. Reference should also be made to the information contained in the following documents:

(a) "A Safety Guide on Gate Work" published by the Labour Department;

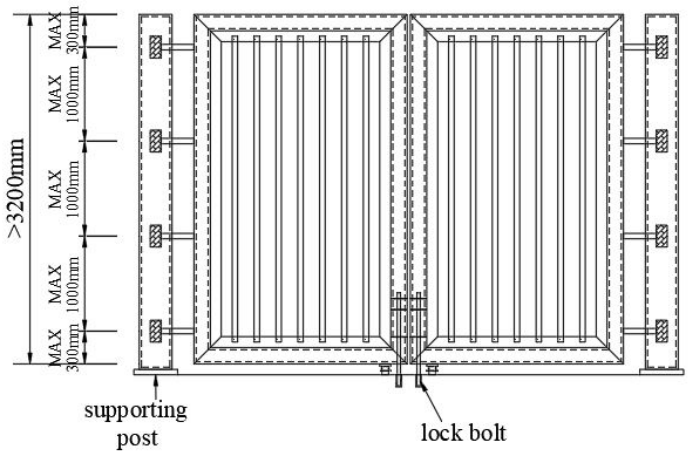
(b) "Code of Practice for Installation of Electrically Operated Sliding Gates, Sliding Glass Doors and Rolling Shutters" published by the Electrical and Mechanical Services Department;

(c) "Guide to Safety of Electrically Operated Sliding Gates" published by the Electrical and Mechanical Services Department; and

(d) "Green Cross Volume 30 No.1" published by the Occupational Safety & Health Council (Chinese version only).

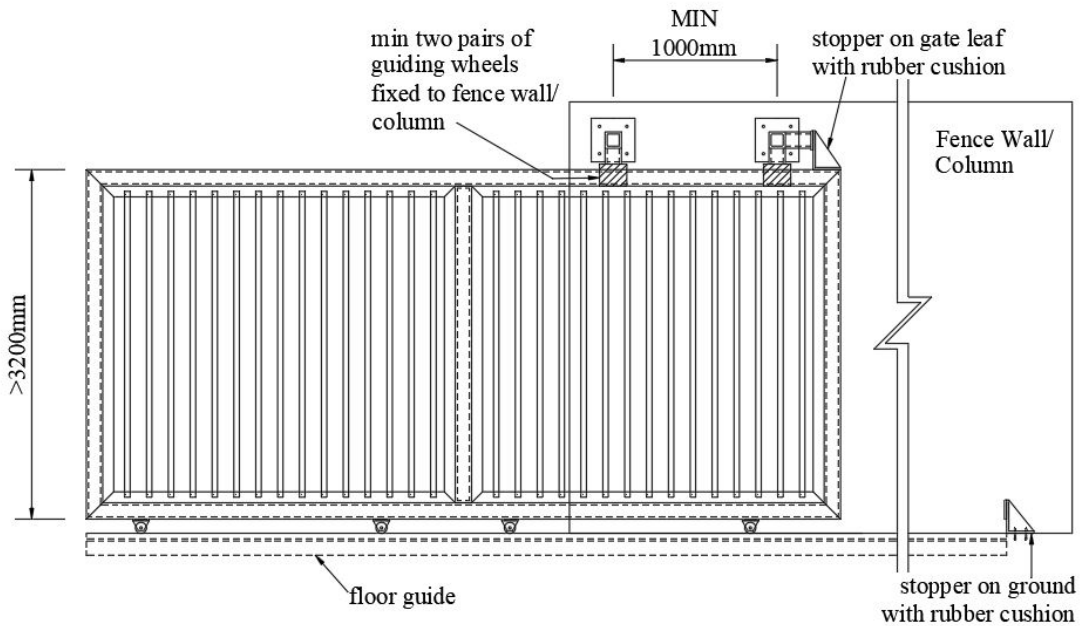
(Rev. 3/2025)

Illustrative Diagrams for Recommendations on Swing-Type and Sliding Metal Gates



Swing-Type Metal Gate

stainless steel hinges



Sliding Metal Gate

one pair of guiding wheels

Appendix B
(PNAP APP-146)

Relevant Standards and Specifications for Metal Gates

The various standards, specifications for the design and installation of metal gates as listed below are intended to provide reference information and the list is not exhaustive. Other international or national standards and specifications may also be referred to if equivalent performance can be demonstrated.

BS 4092:Part 1:1996	:	Domestic front entrance gates. Specification for metal gates.
BS EN 12433-1:2000	:	Industrial, commercial and garage doors and gates. Terminology. Types of doors.
BS EN 12433-2:2000	:	Industrial, commercial and garage doors and gates. Terminology. Parts of doors.
BS EN 12604: 2017 +A1:2020 (Incorporating corrigendum April 2023)	:	Industrial, commercial and garage doors and gates. Mechanical aspects. Requirements and test methods.
BS EN 12453:2017 +A1:2021	:	Industrial, commercial and garage doors and gates. Safety in use of power operated doors - Requirements and test methods.
BS EN 13241:2003 +A2:2016	:	Industrial, commercial and garage doors and gates. Product standard, performance characteristics.
BS EN ISO 1461:2022	:	Hot dip galvanised coatings on fabricated iron and steel articles. Specifications and test methods.
BS EN ISO 12944-1 to 4:2017	:	Paints and varnishes. Corrosion protection of steel structures by protective paint systems.
BS EN ISO 12944-5:2019	:	Ditto
BS EN ISO 12944-6:2018	:	Ditto
BS EN ISO 12944-7 to 8:2017	:	Ditto
BS EN ISO 14713-1:2017	:	Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel in structures.
BS EN ISO 14713-2:2020	:	Ditto
BS EN ISO 14713-3:2017	:	Ditto
BS EN 1176-1:2017	:	Playground equipment and surfacing. General safety requirements and test methods.