# ANNEX A REFERENCES

# A1 ACCEPTABLE STANDARDS AND REFERENCES

This annex contains the standards considered acceptable to the Building Authority to be used together with the Code. Where it is intended to use other standards or technical references, or latest version of the standards given in Annex A, it should be demonstrated that they can achieve a performance equivalent to the acceptable standards as specified in the Code.

Future update of this list can be accessed in the Buildings Department's Homepage at "http://www.bd.gov.hk".

### A1.1 Steel materials

Α

#### A1.1.1 Australian and New Zealand standards

	AS/NZS 1163: 2016 AS/NZS 1594: 2002 (R2016) AS/NZS 1595: 1998 (R2016) AS/NZS 3678: 2016 AS/NZS 3679.1:2016 AS/NZS 3679.2:2016	Cold-formed structural steel hollow sections Hot-rolled steel flat products Cold-rolled, unalloyed, steel sheet and strip Structural steel - Hot-rolled plates, floorplates and slabs Structural steel - Hot-rolled bars and sections Structural steel - Welded I sections
1.1.2	American standards	
	ASTM A36/A36M-19	Standard Specification for Carbon Structural Steel
	ASTM A283/A283-18	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
	ASTM A308–2010	Standard Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot-Dip Process
	ASTM A423/A423M-19	Standard Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes
	ASTM A500/A500M-21a	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
	ASTM A514/A514M-18e1	Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
	ASTM A529/A529M-19	Standard Specification for High-Strength Carbon- Manganese Steel of Structural Quality
	ASTM A572/A572M-21e1	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
	ASTM A588/A588M-19	Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
	ASTM A595/A595M-18	Standard Specification for Steel Tubes, Low-Carbon or High-Strength Low-Alloy, Tapered for Structural Use
	ASTM A618/A618M-21	Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
	ASTM A653/A653M-20	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
	ASTM A656/A656M-18	Standard Specification for Hot-Rolled Structural Steel, High-Strength Low-Alloy Plate with Improved Formability
	ASTM A709/A709M-21	Standard Specification for Structural Steel for Bridges

	ASTM A847/A847M-21	Standard Specification for Cold-Formed Welded and Seamless High Strength, Low-Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance
	ASTM A871/A871M-20	Standard Specification for High Strength Low-Alloy Structural Steel Plate with Atmospheric Corrosion Resistance
	ASTM A875/A875M-21	Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process
	ASTM A913/A913M-19	Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)
	ASTM A924/A924M-20	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
	ASTM A945–2006	Standard Specification for High-Strength Low-Alloy Structural Steel Plate with Low Carbon and Restricted Sulfur for Improved Weldability, Formability, and Toughness
	ASTM A973/A973M-20	Standard Specification for Structural Steel Shapes
	ASTM A992/A992M-20	Standard Specification for Structural Steel Shapes
	ASTM A1011/A1011M-18a	Standard Specification for Steel, Sheet and Strip, Hot- Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
A1.1.3	Chinese standards	
	GB/T 247 - 2008	Rules of acceptance, package, label and certification for plate, strip and wide flat in structural steel
	GB/T 700 - 2006	Carbon structural steel
	GB/T 709 - 2019	Dimension, appearance, weight and tolerance of plate, strip and wide flat in hot rolled structural steel
	GB/T 1591 - 2018	High strength low alloy structural steel
	GB/T 5313 - 2010	Steel plates with through-thickness characteristics
	YB 4104 - 2000	Steel plate for high rise building structure
	GB/T 16270 - 2009	High strength structural steel plates in the quenched and tempered condition
	GB 50017 - 2017	Code for design of steel structures
	GB 50205 - 2020	Standard for acceptance of construction quality of steel structures

# A1.1.4 Japanese standards

JIS G 3101: 2020	Rolled steels for general structure
JIS G 3106: 2020	Rolled steels for welded structure
JIS G 3136: 2012	Rolled steels for building structure
JIS G 3350: 2021	Light gauge steels sections for general structure
JIS G 3352: 2014	Steel decks
JIS G 3444: 2021	Carbon steel tubes for general structure
JIS G 3466: 2021	Carbon steel square rectangular tubes for general structure
JIS A 5523:2021	Weldable hot rolled steel sheet piles
JIS A 5528:2021	Hot rolled steel sheet piles

# A1.1.5 UK and European standards

BS EN 10025-1: 2019	Hot rolled products of non-alloy structural steels. Part 1: General technical delivery conditions
BS EN 10025-2: 2019	Hot rolled products of non-alloy structural steels. Part 2: Technical delivery conditions for non-alloy structural steels
BS EN 10025-3: 2019	Hot rolled products of non-alloy structural steels. Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels
BS EN 10025-4: 2019	Hot rolled products of non-alloy structural steels. Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels
BS EN 10025-5: 2019	Hot rolled products of non-alloy structural steels. Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
BS EN 10025-6: 2019	Hot rolled products of non-alloy structural steels. Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition
BS EN 10164: 2018	Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions.
BS EN 10210-1: 2006	Hot finished structural hollow sections of non-alloy and fine grain structural steels. Part 1: Technical delivery requirements.
BS EN 10210-2: 2019	Hot finished steel structural hollow sections. Tolerances, dimensions and sectional properties.
BS EN 10210-3: 2020	Hot finished steel structural hollow sections. Technical delivery conditions for high strength and weather resistant steels.
BS EN 10248-1: 1996	Hot rolled sheet piling of non alloy steels. Part 1: Technical delivery conditions
BS EN 10147: 2000	Continuous hot dip zinc coated carbon steel sheet of structural quality (withdrawn, and replaced by BS EN 10346:2015)
BS EN 10149-1: 2013	Hot rolled flat products made of high strength steels for cold forming – Part 1: General technical delivery conditions
BS EN 10149-2: 2013	Hot rolled flat products made of high strength steels for cold forming – Part 1: Technical delivery conditions for thermomechanically rolled steels

BS EN 10149-3: 2013	Hot rolled flat products made of high strength steels for cold forming – Part 1: Technical delivery conditions for normalized or normalized rolled steels
BS EN 10346: 2015	Continuously hot-dip coated steel flat products for cold forming.
BS EN 10219-1: 2006	Cold formed welded structural hollow sections of non-alloy and fine grain steels. Technical delivery requirements
BS EN 10219-2: 2019	Cold formed welded steel structural hollow sections. Tolerances, dimensions and sectional properties
BS EN 10219-3: 2020	Cold formed welded steel structural hollow sections. Technical delivery conditions for high strength and weather resistant steels

A1.1.6 Standards for destructive tests

BS EN ISO 148-1: 2016	Metallic materials - Charpy Pendulum impact test. Part 1: Test method
BS EN ISO 6892-1: 2019	Metallic materials - Tensile testing. Part 1: Method of test at ambient temperature
ASTM E8/E8M-21	Standard Test Methods for Tension Testing of Metallic Materials
ASTM E23-18	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
ASTM A770/A770M-03 (R2007)	Standard Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications
JIS G 3199: 2021	Specification for through-thickness characteristics of steel plate, wide flat and sections
AS/NZS 3678: 2016	Structural steel – Hot-rolled plates, floorplates and slabs
GB 5313:2010	Steel plate with through-thickness characteristics

# A1.2 Castings and forgings

A1.2.1	Australian standards	
	AS 2074: 2003	Cast steels
A1.2.2	American standards	
	ASTM A27/A27M-20	Standard Specification for Steel Castings, Carbon, for General Application
	ASTM A148/A148M-20e1	Standard specification for steel castings, high strength, for structural purposes
	ASTM A488/A488M -18e2	Standard Practice for Steel Castings, Welding Qualifications of Procedures and Personnel
	ASTM A781/A781M -21	Standard Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use
	ASTM A957/A957M -21	Standard Specification for Investment Castings, Steel and Alloy, Common Requirements, for General Industrial Use
A1.2.3	Chinese standards	
	GB 50017 – 2017	Code for design of steel structures
A1.2.4	Japanese standards	
	JIS G 3201: 1988	Carbon steel forgings for general use
	JIS G 5101: 1991	Carbon steel castings
	JIS G 5102: 1991	Steel castings for welded structure

JIS G 5111: 1991

High tensile strength carbon steel castings and low alloy steel castings for structural purposes

A1.2.5 UK and European standards

BS 29: 1976	Specification for carbon steel forgings above 150mm ruling section (Withdrawn in the UK, replaced by BS EN 10250-2: 2000)
BS 3100: 1991	Specification for steel castings for general engineering purposes (Withdrawn in the UK, replaced by BS EN 10293: 2005)
BS EN 10250-2: 2000	Open steel die forgings for general engineering purposes - Part 2: Non-alloy quality and special steels
BS EN 10293: 2015	Steel castings for general engineering uses
DIN 1681: 1990	Cast steel for general engineering purposes: technical delivery conditions

## A

A1.3	Bolts	
A1.3.1	Australian and New Zealar	nd standards
	AS 1110.1: 2015	ISO metric hexagon bolts and screws - Product grades A and B - Bolts
	AS 1110.2: 2015	ISO metric hexagon bolts and screws - Product grades A and B - Screws
	AS 1111.1: 2015	ISO metric hexagon bolts and screws - Product grade C - Bolts
	AS 1111.2: 2015	ISO metric hexagon bolts and screws - Product grade C - Screws
	AS 1112.1: 2015	ISO metric hexagon nuts - Style 1 - Product grades A and B
	AS 1112.2: 2015	ISO metric hexagon nuts - Style 2 - Product grades A and B
	AS 1112.3: 2015	ISO metric hexagon nuts - Product grade C
	AS 1112.4: 2015	ISO metric hexagon nuts - Chamfered thin nuts - Product grades A and B
	AS/NZS 1252: 2016	High strength steel bolts with associated nuts and washers for structural engineering
	AS/NZS 1559: 2018	Hot-dip galvanized steel bolts with associated nuts and washers for tower construction
A1.3.2	American standards	
	ASTM A193-2014	Standard Specification for Alloy-steel and Stainless Steel Bolting Materials for High Temperature Service
	ASTM A194/A194M-20a	Standard Specification for Carbon Steel, Alloy Steel and Stainless Steel Nuts for Bolts for High Pressure or High Temperature, or Both
	ASTM A307-21	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
	ASTM A325-2014 (withdrawn)	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
	ASTM A325M-2014 (withdrawn)	Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)
	ASTM A490-14a (Withdrawn)	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
		374

	ASTM A490M-14a (Withdrawn)	Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)
	ASTM A563/A563M-21a	Standard Specification for Carbons and Alloy Steel Nuts
	ASTM F436-19	Standard Specification for Hardened Steel Washers
	ASTM F436M-19	Standard Specification for Hardened Steel Washers (Metric)
	ASTM F1852-14 (Withdrawn)	Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
	ASTM F3125/F3125M-21	Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
	ASTM F3148-17a	Standard Specification for High Strength Structural Bolt Assemblies, Steel and Alloy Steel, Heat Treated, 144ksi Minimum Tensile Strength, Inch Dimensions
A1.3.3	Chinese standards	
	JGJ 82 - 1991	Bolts
	GB 1228 - 2006	Form and Dimensions of high-strength large hexagonal bolts used in steel structures
	GB 1229 - 2006	Form and Dimension of high-strength large hexagonal nuts used in steel structures
	GB 1230 - 2006	Form and Dimensions of high-strength washers used in steel structures
	GB 1231 - 1991	Technical Specifications for high-strength bolts, nuts and washers used in steel structures
	GB 3098.1 - 2000	Mechanical properties of bolts for connection use
	GB 3103.1 - 2001	Tolerance of bolt products
	GB 3632 - 2008	Form and Dimensions of high-strength twist/shear type bolts used in steel structures
	GB 3633 - 1983	Technical Specification for high-strength twist/shear type bolts used in steel structures
	GB 50017 - 2003	Code for design of steel structures
A1.3.4	Japanese standards	
	JIS B 1051: 2000	Mechanical properties of fasteners made of carbon steel and alloy steel
	JIS B 1180: 2004	Hexagon head bolts and hexagon head screws
	JIS B 1181: 2004	Hexagon nuts and hexagon thin nuts
	JIS B 1186: 1995/AMD1: 2007	Sets of high strength hexagon bolt, hexagon nut and plain
	JIS B 1256: 2008	washers for friction grip joints (Amendment 1) Plain washers
A1.3.5	UK , European and ISO sta	andards
	BS 3692: 2014	ISO metric precision hexagon bolts, screws and nuts, Specification
	BS 4190: 2014	ISO metric black hexagon bolts, screws and nuts, Specification
	BS 4320: 1968	Specification for metal washers for general engineering purposes. Metric series (Withdrawn, and replaced by BS EN ISO 898-3:2018, BS EN ISO 7091:2000, BS EN ISO

	7092:2000, BS EN ISO 7093:2000, and BS EN ISO 7094:2000)
BS 4395-1: 1969	Specification for high strength friction grip bolts and associated nuts and washers for structural engineering - Part 1: General grade (Withdrawn, and replaced by BS EN 14399-1: 2015, BS EN 14399-2: 2015, BS EN 14399-3: 2015, BS EN 14399-4: 2015, BS EN 14399-5: 2015, BS EN 14399-6: 2015, BS EN 14399-7: 2018, and BS EN 14399-8: 2018)
BS 4395-2: 1969	Specification for high strength friction grip bolts and associated nuts and washers for structural engineering - Part 2: Higher grade bolts and nuts and general grade washers (Withdrawn, and replaced by BS EN 14399-1: 2005, BS EN 14399-2: 2015, BS EN 14399-3: 2015, BS EN 14399-4: 2015, BS EN 14399-5: 2015, BS EN 14399-6: 2015, BS EN 14399-7: 2018, and BS EN 14399-8: 2018)
BS 4604-1: 1970	Specification for the use of high strength friction grip bolts in structural steelwork - Metric series - Part 1: General grade (Withdrawn in the UK, replaced by BS EN 1993-1.8: 2005)
BS 4604-2: 1970	Specification for the use of high strength friction grip bolts in structural steelwork - Metric series - Part 2: Higher grade (parallel shank) (Withdrawn in the UK, replaced by BS EN 1993-1-8: 2005)
BS EN 1993-1-8: 2005	Eurocode 3 ; Design of steel structure. Design of joints
BS 4933: 2010	Specification for ISO metric black cup and countersunk head bolts and screws with hexagon nuts
BS 7419: 1991	Specification for holding down bolts
BS 7644-1: 1993	Direct tension indicators - Part 1: Specification for compressible washers (Replaced by BS EN 14399-9: 2009 but remains current)
BS 7644-2: 1993	Direct tension indicators - Part 2: Specification for nut face and bolt face washers (Replaced by BS EN 14399-9: 2009 but remains current)
BS EN 14399-1: 2015	High-strength structural bolting assemblies for preloading. General requirements
BS EN 14399-2: 2015	High-strength structural bolting assemblies for preloading. Suitability for preloading
BS EN 14399-3: 2015	High-strength structural bolting assemblies for preloading. System HR. Hexagon bolt and nut assemblies
BS EN 14399-4: 2015	High-strength structural bolting assemblies for preloading. System HV. Hexagon bolt and nut assemblies
BS EN 14399-5: 2015	High-strength structural bolting assemblies for preloading. Plain washers
BS EN 14399-6: 2015	High-strength structural bolting assemblies for preloading. Plain chamfered washers
BS EN 14399-7: 2018	High-strength structural bolting assemblies for preloading. System HR. Countersunk head bolt and nut assemblies
BS EN 14399-8: 2018	High-strength structural bolting assemblies for preloading. System HV. Hexagon fit bolt and nut assemblies
BS EN 14399-9: 2018	High strength structural bolting for preloading. System HR or HV. Part 9: Direct tension indicators for bolts and nuts assemblies

BS EN ISO 898-1:2013	Mechanical properties of fasteners made of carbon steel and alloy steel. Bolts, screws and studs with specified property classes. Coarse thread and fine pitch thread
BS EN ISO 898-2:2012	Mechanical properties of fasteners made of carbon steel and alloy steel. Nuts with specified property classes. Coarse thread and fine pitch thread
BS EN ISO 898-3:2018+A1:21	Fasteners. Mechanical properties of fasteners made of carbon steel and alloy steel. Flat washers with specified property classes View details
BS EN ISO 4014: 2011	Hexagon head bolts: Product grades A and B
BS EN ISO 4016: 2011	Hexagon head bolts: Product grade C
BS EN ISO 4017: 2011	Hexagon head screws: Product grades A and B
BS EN ISO 4018: 2011	Hexagon head screws: Product grade C
BS EN ISO 4032: 2001	Hexagon nuts, style 1: Product grades A and B
BS EN ISO 4033: 2001	Hexagon nuts, style 2: Product grades A and B
BS EN ISO 4034: 2001	Hexagon nuts: Product grade C
BS EN ISO 7091: 2000	Plain washers: Normal series, Product grade C

# A1.4 Welding

## A1.4.1 Welding Standards

	-	
A1.4.1.1	American standards	
	AWS D1.1/D1.1M: 2010	Structural Welding Code - Steel
	AWS D1.3/D1.3M: 2008	Structural Welding Code - Sheet Steel
	AWS A5.5/5.5M: 2014	Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding
	AWS A5.23/5.23M: 2021	Specification for Low-Alloy and High Manganese Steel Electrodes and Fluxes for Submerged Arc Welding
	AWS A5.28/A5.28M: 2005	Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding
	AWS A5.29/A5.29M: 2010	Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding

A1.4.1.2 UK European and ISO standards

BS EN 440: 1995	Welding consumables. Wire electrodes and deposits for gas shielded metal arc welding of non alloy and fine grain steels. Classification (Withdrawn in the UK, replaced by BS EN ISO 14341: 2011)
BS EN ISO 14341: 2011	Welding consumables. Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels. Classification
BS EN 499: 1995	Welding consumables. Covered electrodes for manual metal arc welding of non alloy and fine grain steels. Classification (Withdrawn in the UK, replaced by BS EN ISO 2560: 2009)
BS EN ISO 2560: 2009	Welding consumables. Covered electrodes for manual metal arc welding of non alloy and fine grain steels. Classification
BS EN 719: 1994	Welding coordination. Tasks and responsibilities (Withdrawn in the UK, replaced by BS EN ISO 14731: 2006)
BS EN ISO 14731: 2006	Welding coordination. Tasks and responsibilities
BS EN 729-2: 1995	Quality requirements for welding. Fusion welding of metallic materials. Part 2: Comprehensive quality requirements (Withdrawn in the UK, replaced by BS EN ISO 3834-2: 2005)
BS EN ISO 3834-2: 2005	Quality requirements for fusion welding of metallic materials. Part 2: Comprehensive quality requirements
BS EN 729-3: 1995	Quality requirements for welding. Fusion welding of metallic materials. Part 3: Standard quality requirements (Withdrawn in the UK, replaced by BS EN ISO 3834-3: 2005)
BS EN ISO 3834-3: 2005	Quality requirements for fusion welding of metallic materials. Part 3: Standard quality requirements
BS EN 729-4:1995	Quality requirements for welding. Fusion welding of metallic materials. Part 4: Elementary quality requirements (Withdrawn in the UK, replaced by BS EN ISO 3834-4: 2005)
BS EN ISO 3834-4: 2005	Quality requirements for fusion welding of metallic materials. Part 4: Elementary quality requirements

BS EN 756: 2004	Welding consumables. Solid wires, solid wire-flux and tubular cored electrode-flux combinations for submerged arc welding of non alloy and fine grain steels. Classification (Withdrawn in the UK, replaced by BS EN 14171: 2010)
BS EN 14171: 2010	Welding consumables. Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels. Classification
BS EN 758: 1997	Welding consumables. Tubular cored electrodes for metal arc welding with and without a gas shield of non-alloy and fine grain steels. Classification (Withdrawn in the UK, replaced by BS EN ISO 17632: 2008)
BS EN ISO 17632: 2008	Welding consumables. Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non- alloy and fine grain steel. Classification
BS EN 1011-1: 2009	Welding - Recommendations for welding of metallic materials. Part 1: General guidance for arc welding
BS EN 1011-2: 2001	Welding - Recommendations for welding of metallic materials. Part 2: Arc welding of ferritic steels
BS EN 22553: 1995	Welded, brazed and soldered joints - Symbolic representation on drawings
BS EN ISO 14174: 2018	Welding consumables. Fluxes for submerged arc welding and electroslag welding. Classification.
BS EN ISO 18275: 2018	Welding consumables – Covered electrodes for manual metal arc welding of high-strength steels – Classification
BS EN ISO 18276: 2017	Welding consumables – Tubular cored electrodes for gas- shielded and non-gas-shielded metal arc welding of high- strength steels – Classification
BS EN ISO 16834: 2012	Welding consumables – Wire electrodes, wires, rods and deposits for gas shielded arc welding of high-strength steels – Classification
BS EN ISO 26304: 2018	Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels - Classification (ISO 26304:2017)

A1.4.2 Welding Procedure Specification (WPS)

A1.4.2.1	American standards AWS D1.1/D1.1M: 2010	Structural Welding Code - Steel
A1.4.2.2	UK European and ISO standard	ds
	BS EN 288-3: 1992	Specification and approval of welding procedures for metallic materials. Part 3: Welding procedure tests for the arc welding of steels (Withdrawn in the UK, replaced by BS EN ISO 15614-1: 2017+A1: 2019)
	BS EN ISO 15607:2019	Specification and qualification of welding procedures for metallic materials – General rules
	BS EN ISO 15609-1:2019(E)	Specification and qualification of welding procedures for metallic materials – Welding procedures specification – Part 1: Arc welding

	BS EN ISO 15614-1: 2017 +A1: 2019	Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys
	BS EN ISO 15614-8:2016	Specification and qualification of welding procedures for metallic materials – Welding procedure test - Part 8: Welding of tubes to tube-plate joints
A1.4.3	Welder Qualification Tests	3
A1.4.3.1	American standards	
	AWS D1.1/D1.1M: 2010	Structural Welding Code - Steel
A1.4.3.2	UK European and ISO standard	ds
	BS EN 287-1: 2011	Qualification test of welders. Fusion welding. Part 1: Steels (Withdrawn, and replaced by BS EN ISO 9606- 1:2017)
	ISO 9606-1: 2017	Qualification testing of welders. Fusion welding. Steels
	BS EN 1418:1998	Welding personnel. Approved testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials (Withdrawn, and replaced by BS EN ISO 14732:2013)
	BS 4871-3:1985	Specification for approval testing of welders to approved welding procedure. Part 3: Arc welding of tube to tube- plate joints in metallic materials
	BS 4872-1:1982	Specification for approval testing of welders to welding procedure approval is not required. Part 1: Fusion welding of steel
	BS EN 14732:2013	Welding personnel. Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials

## A1.4.4 Non-Destructive Test Methods

A1.4.4.1	American standards	
	AWS D1.1/D1.1M: 2010	Structural Welding Code - Steel
A1.4.4.2	UK European and ISO stand	ards
	BS 3923: Part 1: 1986	Methods for ultrasonic examination of welds. Part 1: Methods for manual examination of fusion welds in ferritic steels (Withdrawn in the UK, replaced by BS EN 1714: 1998)
	BS EN 1714: 1998	Non-destructive testing of welded joints. Ultrasonic examination of welded joints (Withdrawn in the UK, replaced by BS EN ISO 17640: 2018)
	BS EN ISO 17640: 2018	Non-destructive testing of welds. Ultrasonic testing, Techniques, testing levels and assessment
	BS EN 571-1: 1997	Non-destructive testing. Penetrant testing. Part 1 : General principles (Withdrawn and replaced by BS EN ISO 34521-1:2021)
	BS EN ISO 3452-1 :2021	Non-destructive testing. Penetrant testing. General principles
	BS EN 970: 1997	Non-destructive examination of fusion welds. Visual examination (Withdrawn in the UK, replaced by BS EN ISO 17637: 2016)

BS EN 1290: 1998	Non-destructive examination of welds. Magnetic particle examination of welds (Withdrawn in the UK, replaced by BS EN ISO 17638: 2016)
BS EN ISO 17637: 2016	Non-destructive testing of welds. Visual testing of fusion welded joints
BS EN ISO 17638: 2016	Non-destructive testing of welds. Magnetic particle testing
BS EN ISO 17639: 2022	Destructive tests on welds in metallic materials. Macroscopic and microscopic examination of welds
BS EN 1435: 1997	Non-destructive examination of welds. Radiographic examination of welded joints (Withdrawn, and replaced by BS EN ISO 17636-1:2013, and BS EN ISO 17636-2:2013)
BS EN ISO 9934-1: 2016	Non-destructive testing. Magnetic particle testing. Part 1 : General Principles
BS EN ISO 17636-1:2013	Non-destructive testing of welds. Radiographic testing. X- and gamma-ray techniques with film
BS EN ISO 17636-2:2013	Non-destructive testing of welds. Radiographic testing. X- and gamma-ray techniques with film
BS EN ISO 10893-2:2011 + A1	:2020 Non-destructive testing of steel tubes. Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections
BS EN ISO 10893-3:2011 + A1	:2020 Non-destructive testing of steel tubes. Automated full peripheral flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal and/or transverse imperfections BS EN ISO 10893-8:2011 + A1:2020 Non- destructive testing of steel tubes. Automated ultrasonic testing of seamless and welded steel tubes for the detection of laminar imperfections
BS EN ISO 10893-9:2011 + A1	2020 Non-destructive testing of steel tubes. Automated ultrasonic testing for the detection of laminar imperfections in strip/plate used for the manufacture of welded steel tubes
BS EN ISO 10893-10:2011 + A	1:2020 Non-destructive testing of steel tubes. Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transverse imperfections

The abstracted essentials for typically used welding symbols are given in Annex C.

A1.4.5	Destructive test methods	Destructive test methods for welds		
	BS EN 875:1995	Destructive tests on welds in metallic materials. Impact tests. Test specimen location, notch orientation and examination (Withdrawn in the UK, replaced by BS EN ISO 9016: 2022)		
	BS EN ISO 9016: 2022	Destructive tests on welds in metallic materials. Impact tests. Test specimen location, notch orientation and examination		
	BS EN 876:1995	Destructive tests on welds in metallic materials. Longitudinal tensile tests on weld metal in fusion welded joints (Withdrawn in the UK, replaced by BS EN ISO 5178: 2019)		
	BS EN ISO 5178: 2019	Destructive tests on welds in metallic materials. Longitudinal tensile tests on weld metal in fusion welded joints		

BS EN 895:1995	Destructive tests on welds in metallic materials. Transverse tensile test (Withdrawn in the UK, replaced by BS EN ISO 4136: 2022)
BS EN ISO 4136: 2022	Destructive tests on welds in metallic materials. Transverse tensile test
BS EN 910:1996	Destructive tests on welds in metallic materials. Bend tests (Withdrawn in the UK, replaced by BS EN ISO 5173: 2010)
BS EN ISO 5173: 2010	Destructive tests on welds in metallic materials. Bend tests
BS EN 1043-1:1996	Destructive tests on welds in metallic materials. Hardness testing hardness test on arc welded joints (Withdrawn in the UK, replaced by BS EN ISO 9015: 2016)
BS EN ISO 9015: 2016	Destructive tests on welds in metallic materials. Hardness testing hardness test on arc welded joints
BS EN 1320:1997	Destructive tests on welds in metallic materials. Fracture tests (Withdrawn and replaced by BS EN ISO 9017:2018)
BS EN 1321:1997	Destructive tests on welds in metallic materials. Macroscopic and microscopic examination of welds (Withdrawn and replaced by BS EN ISO 17639:2022)
BS EN ISO 9017:2018	Destructive tests on welds in metallic materials. Fracture test
BS EN ISO 17639:2022	Destructive tests on welds in metallic materials. Macroscopic and microscopic examination of welds
BS EN ISO 6505:1-3: 2005	Metallic materials. Brinell hardness test
BS EN ISO 6507:1-3: 2005	Metallic materials. Vickers hardness test

# A1.5 Materials for composite design

Materials for composite design shall conform to the requirements of the Hong Kong Code of Practice for Structural Use of Concrete.

## A1.6 Shear studs

A1.6.1	Australian standards	
	AS 1443: 2004	Carbon and carbon-manganese steel – Cold-finished bars
	AS/NZS 1554.2: 2003	Structural steel welding - Stud welding (steel studs to steel)
A1.6.2	American standards	
	AWS D1.1/D1.1M: 2010	Structural Welding Code - Steel
A1.6.3	Chinese standards	
	GB 10433 - 2002	Shear studs
	GB 50017 - 2003	Code for design of steel structures
A1.6.4	Japanese standards	
	JIS B 1198: 2011	Headed studs
A1.6.5	UK, European and ISO	standards
	BS EN ISO 13918: 2008	Welding. Studs and ceramic ferrules for arc stud welding

# BS EN ISO 13918: 2008Welding. Studs and ceramic ferrules for arc stud weldingBS EN ISO 14555: 2006Welding. Arc stud welding of metallic materials

## A1.7 Cold-formed steel materials

A1.7.1	Australian and New Zealand standards		
	AS 1397: 2001	Steel sheet and strip - Hot-dipped zinc-coated or aluminium/zinc-coated	
	AS/NZS 1595: 1998	Cold-rolled, unalloyed, steel sheet and strip	
A1.7.2	American standards		
	ASTM A308/A308M-10	Standard Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot-Dip Process	
	ASTM A500/A500M-10a	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes	
	ASTM A653/A653M-10	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process	
	ASTM A792/A792M-10	Standard Specification for Steel Sheet, 55 % Aluminum- Zinc Alloy-Coated by the Hot-Dip Process	
A1.7.3	Japanese standards		
	JIS G 3302: 2010	Hot-dip zinc-coated steel sheet and strip	
	JIS G 3312: 2008	Prepainted hot-dip zinc-coated steel sheet and strip	
	JIS G 3321: 2010	Hot-dip 55 % aluminium-zinc alloy-coated steel sheet and strip	
	JIS G 3322: 2008	Prepainted hot-dip 55 % aluminium-zinc alloy-coated steel sheet and strip	
	JIS G 3466: 2010	Carbon steel square and rectangular tubes for general structure	
A1.7.4	Chinese standards		
	GB 50018 - 2002	Technical code of cold-formed thin-wall steel structure	
A1.7.5	UK, European and ISO standards		
	BS 5950-7: 1992	Structural use of steelwork in building. Specification for materials and workmanship: cold formed sections	
	BS EN 10149-1: 1996	Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 1: General delivery conditions	
	BS EN 10149-2: 1996	Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 2: Delivery conditions for thermomechanically rolled steels	
	BS EN 10149-3: 1996	Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 3: Delivery conditions for normalized or normalized rolled steels	
	BS EN 10219-1: 2006	Cold formed welded structural hollow sections of non-alloy and fine grain steels. Part 1: Technical delivery requirements	
	BS EN 10219-3: 2020	Cold formed welded structural hollow sections. Part 3: Technical delivery conditions for high strength and weather resistant steels	
	BS EN 10249-1: 1996	Cold formed sheet piling of non alloy steels. Part 1: Technical delivery conditions	

BS EN 10268: 2006 Cold-rolled steel flat products with high yield strength for cold forming – Technical delivery conditions

## A1.8 Dimensions and tolerances of sections

A1.8.1	Australian standards	
	AS/NZS 1163: 2009	Cold-formed structural steel hollow sections
A1.8.2	American standards	
	ASTM A6/A6M-11	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
	ASTM A500/A500M-10a	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
	API 5L: 2007	Specification for Line Pipe
A1.8.3	Chinese standards	
	GB 50017 - 2003	Code for design of steel structures
	GB 50205 - 2001	Code for acceptance of construction quality of steel structures
	GB/T 702 - 2008	Hot-rolled round and square steels - Dimension, shape, weight and tolerance
	GB/T 704 - 1988	Dimensions, shape, weight and tolerances for hot-rolled flats
	GB/T 705 - 1989	Hot-rolled hexagonal and octagonal steel bars - Dimensions, shape, weight and tolerance
	GB/T 706 - 2008	Hot-rolled beam steel - Dimensions, shape, weight and tolerances
	GB/T 707 - 1988	Hot-rolled channel steel - Dimensions, shape, weight and tolerances
	GB/T 708 - 2006	Dimensions, shape, weight and tolerances for cold-rolled plates and sheets
	GB/T 709 - 2006	Dimension, appearance, weight and tolerance of plate, strip and wide flat in hot rolled structural steel
A1.8.4	Japanese standards	
	JIS G 3191: 2002/AMD1: 2010	Dimensions, mass and permissible variations of hot rolled steel bars in coil (Amendment 1)
	JIS G 3192: 2008	Dimensions, mass and permissible variations of hot rolled steel sections
	JIS G 3193: 2008	Dimensions, mass and permissible variations of hot rolled steel plates, sheets and strip
	JIS G 3194: 1998	Dimensions, mass and permissible variations of hot rolled flat steel
A1.8.5	UK and European standar	ds
	BS 4-1: 2005	Structural Steel Sections. Part 1: Specification for hot-rolled sections
	BS EN 10024: 1995	Hot-rolled taper flange I sections. Tolerances on shape and dimensions
	BS EN 10029: 2010	Hot-rolled steel plates, 3mm thick or above. Tolerances on dimensions and shape

BS EN 10034: 1993	Structural steel I and H sections. Tolerances on shape and dimensions
BS EN 10055: 1996	Hot-rolled steel equal flange tees with radiused root and toes. Dimensions and tolerance on shape and dimensions
BS EN 10056-1: 1999	Specification for structural steel equal and unequal angles. Part 1: Dimensions
BS EN 10056-2: 1993	Specification for structural steel equal and unequal angles. Part 2: Tolerances on shape and dimensions
BS EN 10210-2: 2006	Hot finished structural hollow sections of non-alloy and fine grain structural steels. Part 2: Tolerances, dimensions and sectional properties
BS EN 10219-2: 2006	Cold formed welded structural hollow sections of non-alloy and fine grain steels. Part 2: Tolerances, dimensions and sectional properties
BS EN 10248-2: 1996	Hot rolled sheet piling of non alloy steels. Part 2: Tolerances on shape and dimensions
BS EN 10249-2: 1996	Cold formed sheet piling of non alloy steels. Part 2: Tolerances on shape and dimensions
BS EN 10279: 2000	Hot rolled steel channels. Tolerances on shape, dimensions and mass
EU 91	Hot-rolled wide flats: Tolerances on dimensions, shape and mass

## A1.9 Protective treatment

A1.9.1	UK and European standards	
	BS 4652: 1995	Specification for zinc-rich priming paint (Organic media)
	BS 4921: 1988	Specification for sherardized coatings on iron or steel
	BS EN 22063: 1994	Metallic and other inorganic coatings. Thermal spraying. Zinc, aluminium and their alloys (Withdrawn in the UK, replaced by BS EN ISO 2063: 2005)
	BS EN ISO 2063: 2005	Thermal spraying. Metallic and other inorganic coatings. Zinc, aluminium and their alloys
	BS EN ISO 1461: 2009	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
	BS EN ISO 11124-1:1997	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast- cleaning abrasives. Part 1: General introduction and classification
	BS EN ISO 11124-2: 1997	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast- cleaning abrasives. Part 2 : Chilled-iron grit
	BS EN ISO 11124-3: 1997	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast- cleaning abrasives. Part 3 : High-carbon cast-steel shot and grit
	BS EN ISO 11124-4:1997	Preparation of steel substrates before application of paints and related products. Specifications for metallic blast- cleaning abrasives. Part 4 : Low carbon cast-steel shot

## A1.10 Other acceptable references

BS 2573-1: 1983	Rules for the design of cranes - Part 1: Specification for classification, stress calculations and design criteria for structures	
BS 2853: 1957	Specification for the design and testing of steel overhead runway beams	
BS 7608: 1993	Code of practice for fatigue design and assessment of steel structures (Withdrawn in the UK, replaced by BS EN 1993-1-9: 2005)	
BS 7910: 2005	Guide on methods for assessing the acceptability of flaws in metallic structures	
BS EN 1993-1-9: 2005	Eurocode 3: Design of Steel structures. Fatigue	
Code of Practice on Wind Effects in Hong Kong		
Code of Practice for Structural Use of Concrete		
Code of Practice for Precast Concrete Construction		
Code of Practice for Fire Resisting Construction 1996		

# A2 INFORMATIVE REFERENCES

### A2.1 Practice Notes for Authorized Persons and Registered Structural Engineers

The following Practice Notes for Authorized Persons and Registered Structural Engineers provide useful guidance on steel design and construction:

PNAP APP-8	Chimneys and Flues
PNAP APP-48	Requirements for Qualified Supervision of Structural Works, Foundation Works and Excavation Works – Buildings Ordinance section 17
PNAP APP-53	Building (Construction) Regulations
PNAP ADM-13	Monitoring for Site Safety and Quality
PNAP APP-80	Code of Practice for Fire Resisting Construction 1996
PNAP APP-85	Application of the Revised Fire Safety Code
PNAP APP-87	Guide to Fire Engineering Approach
PNAP APP-102	Superstructure Works Measures for Public Safety
PNAP APP-118	Testing of Building Materials

### A2.2 The Steel Construction Institute, UK

SCI Design Guides	
SCI P-055: 1989	Design of composite slabs and beams with steel decking
SCI P-078: 1990	Commentary on BS5950: Part 3: Section 3.1 "Composite beams"
SCI P-142: 1994	Composite column design to Eurocode 4
SCI P-172: 1996	Castings in construction
SCI P-276: 2002	Building design using cold-formed steel sections: Structural design to BS5950: Part 5: 1998 - Section properties and load tables

#### Joint SCI & BCSA Publications

Joints in steel construction: 1995 - Moment connections

Joints in steel construction: 2002 - Simple connections (2nd edition)

# A2.3 UK and European Standards

BS 5950: Structural use of steelwork in building:

Part 1: 2000	Code of practice for design - Rolled and welded sections (Withdrawn in the UK, replaced by group of BS EN 1993- 1-1: 2005, BS EN 1993-1-5: 2006, BS EN 1993-1-10: 2005, BS EN 1993-5: 2007, BS EN 1993-6: 2007 & BS EN 1993-1-8: 2005)
Part 2: 2001	Specification for materials, fabrication and erection - Rolled and welded sections (Withdrawn in the UK, replaced by BS EN 1090-2: 2008)
Part 3: 1990	Design in composite construction - Code of practice for design of simple and continuous composite beams (Withdrawn in the UK, replaced by BS EN 1994-1-1: 2004)
Part 4: 1994	Code of practice for design of composite slabs with profiled steel sheeting (Withdrawn in the UK, replaced by BS EN 1994-1-1: 2004)
Part 5: 1998	Code of practice for design of cold formed thin gauge sections (Withdrawn in the UK, replaced by BS EN 1993- 1-3: 2006)
Part 6: 1995	Code of practice for design of light gauge profiled steel sheeting (Withdrawn in the UK, replaced by BS EN 1993-1-3: 2006)
Part 7: 1992	Specification for materials and workmanship: cold formed sections
Part 8: 2003	Code of practice for fire resistant design (Withdrawn in the UK, replaced by BS EN 1993-1-2: 2005)
BS 499-2c: 1999	Welding terms and symbols. Part 2c : European arc welding symbols in chart form
BS 5427-1: 1996	Code of practice for the use of profiled sheet for roof and wall cladding on buildings. Part 1: Design
BS 7608: 1993	Code of Practice for Fatigue Design and Assessment of Structures
BS EN 1090-1: 2009+A1:2011	Execution of steel structures and aluminium structures. Part 1: Requirements for conformity assessment of structural components
BS EN 1090-2: 2008	Execution of steel structures and aluminium structures. Part 2 : Technical requirements for the execution of steel structures
BS EN 1991-2: 2003	Eurocode 1: Actions on structures. Part 2: Traffic loads on bridges
BS EN 1993-1-1: 2005	Eurocode 3: Design of steel structures. Part 1-1: General rules and rules for buildings
BS EN 1993-1-2: 2005	Eurocode 3: Design of steel structures. Part 1-2 : General rules. Structural fire design
BS EN 1993-1-3: 2006	Eurocode 3: Design of steel structures. General rules Part 1-3 : Supplementary rules for cold-formed members and sheeting
BS EN 1993-1-5: 2006	Eurocode 3: Design of steel structures. Part 1-5 : Plated structural elements

BS EN 1993-1-8: 2005	Eurocode 3: Design of steel structures. Part 1-8 : Design of joints
BS EN 1993-1-10: 2005	Eurocode 3: Design of steel structure. Part 1-10 : Material toughness and through-thickness properties
BS EN 1993-5: 2007	Eurocode 3: Design of steel structures. Part 5 : Piling
BS EN 1993-6: 2007	Eurocode 3: Design of steel structures. Part 6 : Crane supporting structures
BS EN 1994-1-1: 2004	Eurocode 4: Design of composite steel and concrete structures. Part 1-1: General rules and rules for buildings
NA to BS EN 1991-2: 2003	UK National Annex to Eurocode 1: Actions on structures. Part 2: Traffic loads on bridges
PD 6688-2: 2011	Published Document – Background to the National Annex to BS EN 1991-2. Part 2 : Traffic loads on bridges

#### A2.4 Australian Standards

AS 4100: 1998 Steel structures

## A2.5 General references

#### Appraisal of Existing Iron and Steel Structures written by Michael Bussell, published by the Steel Construction Institute (1997).

#### Appraisal of Existing Structures

a guide published by the Institution of Structural Engineers, U.K.

# Comité International pour le Développement et l'Étude de la Construction Tubulaire (CIDECT)

#### Design of Floors for Vibration: A New Approach (Ascot: Steel Construction Institute) by Smith, A.L., Hicks, S.J. and Devine, P.J. (2007).

#### Fire-Resistance Tests – Elements of Building Construction IS0-834, International Organization for Standardization.

#### Floor Vibrations due to Human Activity

written by T. M. Murray, D. E. Allen and E. E. Ungar, published by the American Institute of Steel Construction (1997).

# Floor Vibration Induced by Dance-Type Loads: Theory

The Structural Engineer, Vol. 72 No.3, 1 February 1994, incorporated in BRE Digest 426 (2004).

#### Floor Vibration Induced by Dance-Type Loads: Verification

The Structural Engineer, Vol. 72 No.3, 1 February 1994, incorporated in BRE Digest 426 (2004).

#### Limit States Design of Steel Structures

CAN/CSA-S16.1-94, a National Standard of Canada published by Canadian Standard Association.

#### **Response of Structures Subject to Dynamic Crowd Loads**

(London: BRE Centre for Structural Engineering, 2<sup>nd</sup> edition) by Ellis, B.R. and Ji, T. (2004).

#### Steel Design Guide Series 11: Floor Vibrations due to Human Activity

by Murray et al, with Revisions and Errata List included.