

Jis g3454 equivalent astm

JIS G3454 Equivalent ASTM: A Comprehensive Guide

When selecting steel pipes for various industrial, construction, or manufacturing applications, understanding the compatibility and equivalence of standards is crucial. One of the most commonly referenced standards in the industry for steel pipes is the JIS G3454, a Japanese Industrial Standard. To ensure international compatibility and meet project specifications, engineers and procurement specialists often look for its equivalent standards in other regions, notably the ASTM standards used primarily in the United States.

This article delves into the details of JIS G3454 equivalent ASTM standards, providing a comprehensive comparison, application insights, and guidance for selecting the appropriate materials for your needs.

Understanding JIS G3454

Overview of JIS G3454

JIS G3454 is a Japanese Industrial Standard that specifies the requirements for carbon steel pipes used in various industrial applications. These pipes are generally used for fluid transportation, structural purposes, and other engineering needs. JIS G3454 covers several grades and types, including seamless and welded pipes, with specific mechanical properties, chemical compositions, and manufacturing processes.

Key Features of JIS G3454:

- Applicable to carbon steel pipes
- Suitable for high-temperature and high-pressure applications
- Includes seamless and welded pipe types
- Defines chemical composition, mechanical properties, dimensions, and testing procedures

Common Grades under JIS G3454:

- SS400
- SS490
- SS540
- STPG370
- STPG410

What Does "Equivalent" Mean in Standards?

Before diving into specific ASTM standards, it's essential to understand what constitutes an "equivalent" standard.

Definition of Equivalent Standards:

An ASTM standard is considered equivalent to a JIS G3454 standard if it:

- Has similar chemical composition requirements
- Offers comparable mechanical properties
- Meets similar dimensional tolerances
- Is suitable for similar applications and operating conditions

Why Is Equivalence Important?

- Ensures compatibility in international projects
- Facilitates procurement and reduces costs
- Maintains safety and performance standards
- Simplifies quality assurance and certification processes

ASTM Standards Related to Steel Pipes

ASTM International has developed numerous standards for steel pipes, many of which align with JIS G3454 in terms of scope and application. The most relevant ASTM standards include:

- ASTM A53**
Scope: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
Application: Used for mechanical and pressure applications
Grades: A, B
Materials: Carbon steel
- ASTM A106**
Scope: Seamless Carbon Steel Pipe for High-Temperature Service
Application: High-temperature and high-pressure conditions
Grades: A, B, C
ASTM A500
- ASTM A500**
Scope: Cold-Formed Welded and Seamless Carbon Steel Structural Tubing
Application: Structural purposes
- ASTM A234**
Scope: Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High-Temperature Service
Application: Fittings for pipelines
- ASTM A519**
Scope: Seamless Mechanical Tubing
Application: Mechanical and structural use

Matching JIS G3454 to ASTM Standards

To determine the ASTM equivalent of JIS G3454, focus on the specific grade and application. The comparison primarily hinges on chemical composition, mechanical properties, and intended use.

JIS G3454 Grades and Their ASTM Equivalents

JIS G3454 Grade	Typical Use	Approximate ASTM Equivalent	Notes
SS400	General purpose	A36	
SS490	General purpose	A36	
SS540	General purpose	A36	
STPG370	General purpose	A36	
STPG410	General purpose	A36	

SS400 | General structural steel | ASTM A53 Grade B | Similar mechanical properties and chemical composition || SS490 | Higher strength structural steel | ASTM A572 Grade 50 | Higher strength than SS400, similar applications || SS540 | High-strength structural steel | ASTM A992 | Used for structural applications requiring higher yield strength || STPG370 | Carbon steel pipe for pressure service | ASTM A106 Grade B | Seamless pipe for high-temperature service || STPG410 | Carbon steel pipe for pressure service | ASTM A106 Grade C | Higher carbon content for increased strength |Important Considerations:Chemical Composition: Both standards specify limits on carbon, manganese, phosphorus, sulfur, and other elements.Mechanical Properties: Tensile strength, yield strength, and elongation are key parameters.Manufacturing Process: Seamless vs welded pipes, with seamless generally matching ASTM A106 or A53.Detailed Comparison of JIS G3454 and ASTM StandardsChemical Composition Comparison| Element | JIS G3454 SS400 | ASTM A53 Grade B | JIS G3454 SS490 | ASTM A572 Grade 50 | JIS G3454 SS540 | ASTM A992 ||-----|-----|-----|-----|-----|-----|-----|| Carbon (C) | ? 0.26% | ? 0.30% | ? 0.23% | ? 0.23% | ? 0.23% | ? 0.23% || Manganese (Mn) | 0.60?1.20% | 0.60?1.20% | 0.60?1.20% | 0.40?0.65% | 0.60?1.20% | 0.40?0.65% || Phosphorus (P) | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% || Sulfur (S) | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% | ? 0.035% |Note: Exact chemical composition may vary slightly depending on specific grades and manufacturing processes.Mechanical Properties Comparison| Property | JIS G3454 SS400 | ASTM A53 Grade B | JIS G3454 SS490 | ASTM A572 Grade 50 | ASTM A992 ||-----|-----|-----|-----|-----|-----|| Tensile Strength (MPa) | ? 410 | 414 ? 581 | ? 490 | 380 ? 630 | 50 ksi (345 MPa) minimum yield strength || Yield Strength (MPa) | ? 245 | 275 | ? 345 | 345 | 50 ksi (345 MPa) |Dimensional and Manufacturing ConsiderationsWall Thickness: Both standards specify tolerances suitable for pressure and structural applications.Surface Finish: ASTM standards often specify surface requirements for seamless pipes.Manufacturing Process: Seamless pipes in ASTM A106 and JIS G3454 STPG series are comparable.Applications and Selection GuidelinesChoosing the right standard and grade depends on specific project requirements, such as pressure, temperature, environmental conditions, and structural demands.When to Use JIS G3454Projects based in Japan or regions where Japanese standards are mandatedApplications requiring specific grades like SS400, SS490, SS540General-purpose piping in construction and industrial settingsWhen to Use ASTM EquivalentsInternational projects requiring ASTM complianceProcurement from US or international suppliers familiar with ASTM standardsApplications requiring high-temperature or high-pressure pipes (A106, A572)Selection ChecklistIdentify application parameters: pressure, temperature, environmentDetermine required mechanical properties: tensile and yield strengthMatch chemical composition requirementsConfirm dimensional and manufacturing process compatibilityConsult with steel suppliers for certification and testing dataConclusionUnderstanding the JIS G3454 equivalent ASTM standards is essential for ensuring material compatibility, compliance, and optimal performance in international projects. The key ASTM standards such as A53, A106, and A572 serve as reliable equivalents for various grades of JIS G3454, especially in structural and pressure pipe applications.By thoroughly comparing chemical compositions, mechanical properties, and intended uses, engineers and procurement specialists can confidently

select the appropriate standards and materials. Always verify with the latest standards documentation and consult with manufacturers or suppliers for certification and testing data to ensure compliance and safety. Final Note: Always consider project-specific requirements and consult with a qualified engineer or materials specialist when selecting steel pipes and standards for critical applications. Proper documentation and compliance with relevant standards will ensure the longevity, safety, and efficiency of your infrastructure or equipment.

JIS G3454 Equivalent ASTM: A Comprehensive Review When it comes to industrial piping materials, understanding the equivalence between standards is crucial for ensuring quality, safety, and compatibility across various projects. JIS G3454 equivalent ASTM refers to the comparison and compatibility between the Japanese Industrial Standard (JIS) G3454 and the American Society for Testing and Materials (ASTM) standards, particularly those governing carbon steel pipes used in high-temperature and pressure applications. This article aims to provide an in-depth analysis of JIS G3454 and its ASTM equivalents, exploring their specifications, applications, similarities, differences, and practical considerations for engineers, suppliers, and end-users.

Understanding JIS G3454 and ASTM Standards What is JIS G3454? JIS G3454 is a Japanese Industrial Standard that specifies the requirements for carbon steel pipes used in high-temperature service, including applications like boilers, heat exchangers, and industrial piping systems. It covers seamless and welded pipes, emphasizing mechanical properties, chemical composition, and dimensional tolerances suitable for elevated temperatures and pressures.

Key Features of JIS G3454: Applicable for hot-water supply, steam, and other high-temperature fluids. Encompasses various pipe categories based on strength and application. Emphasizes strict chemical and mechanical property requirements. Includes testing procedures for quality assurance.

What are ASTM Standards Relevant to Carbon Steel Pipes? ASTM has several standards governing carbon steel pipes, with ASTM A106 and ASTM A53 being among the most common for high-temperature and general-purpose applications.

ASTM A106: Seamless carbon steel pipe for high-temperature service. It is widely used in power plants, refineries, and chemical industries.

ASTM A53: Welded and seamless steel pipe for mechanical and structural purposes, also used in high-pressure applications but with different specifications.

Features of ASTM A106 & A53: Cover a range of grades (e.g., Grade A, Grade B, Grade C). Specify chemical composition, tensile strength, and impact properties. Include testing protocols for hydrostatic testing, flattening, and bend tests. Provide dimensional tolerances and surface finish requirements.

Comparing JIS G3454 and ASTM Standards

Material Composition and Chemical Requirements One of the fundamental aspects of standard equivalence is the chemical composition of the pipes. Both JIS G3454 and ASTM A106 Grade B specify similar carbon ranges (around 0.30-0.40%) and limited amounts of manganese, phosphorus, sulfur, and other elements. The chemical composition limits are largely comparable, ensuring similar mechanical properties and corrosion resistance.

Differences: Slight variations in allowable impurity levels may exist. JIS standards often have more detailed specifications for trace elements, reflecting regional manufacturing practices.

Mechanical Properties Mechanical properties such as tensile strength, yield

strength, and elongation are critical for ensuring pipes can withstand operational stresses. JIS G3454 typically requires tensile strengths around 415-520 MPa for certain grades, with elongation percentages that match ASTM standards. ASTM A106 Grade B: Tensile strength of 485-620 MPa, with minimum elongation of 25% in 2 inches. Comparison: Both standards aim for similar mechanical performance, though specific values may vary slightly based on grade and application. Both require tests like tensile testing, flattening, and hydrostatic testing to verify compliance. Dimensional and Tolerance Specifications Dimensional accuracy ensures compatibility and ease of installation. Both standards specify pipe diameters, wall thicknesses, and tolerances that are similar, with ASTM A53 and JIS G3454 pipes falling within comparable ranges. JIS G3454 provides detailed tolerances for outside diameter, wall thickness, and straightness, aligning closely with ASTM requirements. Testing and Quality Assurance Testing procedures are fundamental to certifying that pipes meet the required standards. Both standards mandate nondestructive testing (such as ultrasonic or radiographic testing), hydrostatic pressure tests, and chemical analysis. Material traceability and certification are emphasized in both standards. Differences: JIS G3454 may include additional regional testing protocols or documentation requirements. ASTM standards often specify more detailed testing methods, especially for weldability and impact resistance. Equivalent Grades and Their Applications JIS G3454 and ASTM A106 Grade B This is the most directly comparable grade when considering high-temperature applications. Features: Suitable for high-temperature, high-pressure environments. Seamless pipe with good toughness and weldability. Widely used in power plants, refineries, and chemical plants. Pros: Well-documented and globally accepted. Similar chemical and mechanical properties to JIS G3454. Readily available from international suppliers. Cons: Slight differences in manufacturing standards that may require extra verification. Regional variations in certification processes. JIS G3454 and ASTM A53 Grade B While A53 is more general-purpose, it can be suitable in certain high-temperature applications with caution. Features: Suitable for low to moderate pressure applications. Can be welded easily. Typically less expensive compared to seamless pipes. Pros: Cost-effective for less demanding applications. Good availability. Cons: Not always suitable for extremely high-temperature environments. Possible differences in wall thickness tolerances. Practical Considerations for Engineers and Procurement Material Selection Choosing the right pipe involves considering the application, operating conditions, and compatibility with standards. For high-temperature, high-pressure environments, ASTM A106 Grade B or JIS G3454 STPG 370/410 are recommended. For general-purpose piping, ASTM A53 Grade B or equivalent JIS G3454 pipes may suffice. Certification and Compliance Ensuring proper certification is paramount. Always verify that the supplier provides material test reports (MTRs) compliant with both standards. For projects requiring strict compliance, third-party inspection and certification are advisable. Welding and Fabrication Material properties influence welding procedures. Both standards emphasize weldability, but differences in chemical composition and mechanical properties may necessitate specific welding techniques. Compatibility of filler materials and welding codes should be considered. Cost and Availability Supply chain considerations often influence material choice. ASTM standards generally have broader international acceptance, potentially offering easier procurement. JIS G3454 pipes may be more readily available in Japanese and regional markets. Conclusion and Final Thoughts The comparison between JIS G3454 and ASTM standards

reveals a high degree of similarity, especially between JIS G3454 and ASTM A106 Grade B. Both standards are designed to ensure high-quality, reliable pipes suitable for demanding industrial applications involving high temperatures and pressures. When selecting materials, it is essential to consider not only the raw specifications but also the certification, fabrication, and regional availability. Key takeaways: Both standards emphasize chemical and mechanical properties that align closely. ASTM A106 Grade B is often regarded as the ASTM equivalent for JIS G3454 seamless pipes. Understanding subtle differences in testing and certification procedures is vital for compliance. Proper documentation and third-party verification improve confidence in material performance. Final recommendation: For projects requiring high-temperature and pressure resistance, ASTM A106 Grade B and JIS G3454 pipes can often be used interchangeably, provided proper certification and testing are verified. Always consult with manufacturers and standards experts to ensure compatibility, especially when crossing regional standards, to prevent unforeseen issues during installation or operation. By maintaining a thorough understanding of these standards and their equivalences, engineers and procurement specialists can make informed decisions that optimize safety, performance, and cost-efficiency in their piping systems.

QuestionAnswer

What is the ASTM equivalent of JIS G3454?

The ASTM equivalent of JIS G3454 is ASTM A106/A106M, which covers seamless carbon steel pipes for high-temperature service.

How do the mechanical properties of JIS G3454 compare to ASTM A106?

Both standards specify similar mechanical properties such as tensile strength and yield strength, with slight variations depending on the grade, but generally, ASTM A106 grades E and F are considered equivalent to certain JIS G3454 grades.

Can I use ASTM A106 pipes as a substitute for JIS G3454 pipes?

Yes, ASTM A106 pipes can often be used as a substitute for JIS G3454 pipes in many applications, provided the specific grade and specifications match the required performance standards.

What are the main differences between JIS G3454 and ASTM A106 standards?

The main differences lie in testing methods, chemical composition limits, and dimensional tolerances. JIS G3454 is a Japanese standard, while ASTM A106 is an American standard, leading to variations in certification and testing procedures.

Which grade of ASTM A106 is most commonly considered equivalent to JIS G3454 Grade SPHT1? ASTM A106 Grade E is most commonly considered equivalent to JIS G3454 Grade SPHT1, both designed for high-temperature and pressure applications with similar chemical and mechanical properties.

Related keywords: JIS G3454, ASTM equivalent, seamless carbon steel pipe, jis g3454 standard, astm steel pipe, jis g3454 grade, astm a53, jis g3454 specifications, astm pipeline standards, jis g3454 vs astm, steel pipe standards

Aisi 4145 steel astm equivalent

aisi 4145 steel astm equivalent Understanding the different grades of steel and their standards is essential for engineers, manufacturers, and procurement specialists. When it comes to AISI 4145 steel, one of the most common inquiries is its ASTM equivalent. Knowing the ASTM equivalent of AISI 4145 steel helps ensure compatibility, meet regulatory requirements, and select the right material for specific applications. This article provides a comprehensive overview of AISI 4145 steel, its properties, and its ASTM equivalents, offering valuable insights for professionals in the steel and manufacturing industries.

Introduction to AISI 4145 Steel What is AISI 4145 Steel? AISI 4145 steel is a chromium-molybdenum alloy steel known for its high strength, toughness, and excellent hardenability. It is commonly used in the manufacturing of components that require high tensile strength, wear resistance, and fatigue resistance, such as gears, shafts, and structural parts.

Main Characteristics of AISI 4145 Steel Chemical Composition: Carbon (C): 0.43-0.50% Chromium (Cr): 0.80-1.10% Molybdenum (Mo): 0.20-0.30% Manganese (Mn): 0.60-1.00% Silicon (Si): 0.15-0.35% Sulfur (S): Max 0.040% Phosphorus (P): Max 0.040% Mechanical Properties: High tensile strength Good ductility Excellent hardenability Heat Treatment: Suitable for various heat treatments like quenching and tempering to enhance specific properties. Applications: Used in manufacturing gears, shafts, axles, and other components requiring high strength and toughness.

ASTM Standards and Their Role ASTM International develops and publishes technical standards for a wide range of materials, including steels. ASTM standards specify chemical compositions, mechanical properties, testing methods, and other criteria to ensure material quality and performance. When selecting materials for critical applications, it is vital to identify ASTM equivalents to ensure compliance, compatibility, and optimal performance.

ASTM Equivalent Grades of AISI 4145 Steel Understanding the Equivalence Steel grades from different standards often have similar chemical compositions and mechanical properties but are designated differently. The ASTM standards most relevant to alloy steels like AISI 4145 include ASTM A29, ASTM A193, ASTM A320, and ASTM A105. However, for

the specific chemical composition and mechanical properties of AISI 4145, the most common ASTM equivalent is ASTM A182 Grade F22. Primary ASTM Equivalent: ASTM A182 Grade F22

ASTM A182 Grade F22 Composition: Similar to AISI 4145, with comparable chromium and molybdenum content.

Application: Often used for high-temperature and high-pressure applications, such as flanges, valves, and fittings.

Properties: High strength, good toughness, and excellent hardenability.

Other Related ASTM Grades While ASTM A182 F22 is the primary equivalent, other grades can sometimes serve as substitutes depending on specific requirements:

- ASTM A29 4140 / 4145 This specification covers alloy steel bars, plates, and shapes. 4140 steels are similar but may have slight variations in chemical composition.
- ASTM A193 Grade B7 Used primarily for fasteners, but shares some properties with 4145, especially after heat treatment.
- ASTM A320 Grade L7 For low-temperature service applications, with similar alloying elements.

Note: Always verify chemical composition and mechanical properties before substituting grades to ensure suitability.

Comparison of Chemical Composition Understanding the chemical composition helps determine the interchangeability of steel grades.

Element	AISI 4145 (%)	ASTM A182 F22 (%)	Remarks
Carbon (C)	0.43-0.50	0.20-0.30	Slightly higher in 4145, contributing to higher strength
Chromium (Cr)	0.80-1.10	1.00-1.50	Similar, with F22 sometimes having higher chromium for corrosion resistance
Molybdenum (Mo)	0.20-0.30	0.15-0.25	Similar, enhances hardenability
Manganese (Mn)	0.60-1.00	0.60-0.90	Comparable
Silicon (Si)	0.15-0.35	0.15-0.40	Similar

Implication: The chemical compositions are close enough for these grades to be used interchangeably in many applications, provided mechanical properties and heat treatments are also aligned.

Mechanical Properties and Heat Treatment

Mechanical Property	AISI 4145	ASTM A182 F22
Tensile Strength	850-1000 MPa	690-930 MPa
Yield Strength	~620 MPa	~450 MPa
Hardness (after heat treatment)	Up to 50 HRC	Similar, depending on heat treatment

Heat Treatment Processes

- Quenching and Tempering: Enhances hardness, strength, and toughness.
- Annealing: Improves ductility and machinability.
- Normalization: Refines grain structure for better toughness.

The heat treatment procedures are similar across grades, and the choice depends on the desired mechanical properties for specific applications.

Applications and Suitability of ASTM Equivalents Knowing the ASTM equivalent of AISI 4145 steel is crucial when sourcing materials for projects requiring compliance with American standards. Below are typical applications where these grades are suitable:

- High-Strength Components ? Gears, shafts, and axles in automotive and industrial machinery.
- Structural Parts ? Structural steel in construction that demands high tensile strength.
- Pressure Vessels and Piping ? For high-pressure and high-temperature environments, especially when using ASTM A182 F22.
- Oil and Gas Industry ? Components exposed to harsh environments, benefiting from the alloy's toughness.

Choosing the right ASTM grade depends on:

- Mechanical property requirements
- Environmental conditions
- Specific standards compliance
- Cost considerations

Procurement and Quality Assurance When procuring AISI 4145 steel or its ASTM equivalents, consider the following:

- Certification: Ensure the supplier provides proper mill test reports (MTRs) verifying chemical composition and mechanical properties.
- Standards Compliance: Confirm that the material meets relevant ASTM standards such as ASTM A182, A29, or A193.
- Heat Treatment Documentation: Verify heat treatment procedures and results to ensure material

performance. Inspection and Testing: Conduct non-destructive testing (NDT), hardness testing, and chemical analysis if necessary. Conclusion In summary, the primary ASTM equivalent of AISI 4145 steel is ASTM A182 Grade F22, sharing similar chemical composition, mechanical properties, and applications. While other grades like ASTM A29 4140/4145 and ASTM A193 B7 can serve as substitutes depending on specific requirements, always verify compatibility through detailed specifications and testing. Understanding these equivalences ensures the right material selection, compliance with standards, and optimal performance in critical applications. By thoroughly analyzing chemical compositions, mechanical properties, and intended uses, engineers and procurement specialists can confidently select the appropriate ASTM grade that aligns with the characteristics of AISI 4145 steel, ensuring safety, durability, and efficiency in their projects.

aisi 4145 steel astm equivalent ? this phrase encapsulates a vital link within the global steel industry, connecting a specific alloy to its standardized counterparts recognized across various standards organizations. Understanding this equivalence is crucial for engineers, manufacturers, and quality assurance professionals who rely on precise material specifications for safety, performance, and manufacturing efficiency. In this comprehensive review, we delve into the properties, applications, and ASTM equivalents of AISI 4145 steel, providing detailed insights that facilitate informed decision-making in industrial contexts.

Introduction to AISI 4145 Steel

Overview of AISI 4145 Steel AISI 4145 is a low-alloy steel known for its high strength, toughness, and good wear resistance. It belongs to the family of 4000-series steels characterized by their alloying elements, primarily chromium and molybdenum, which enhance hardness, tensile strength, and overall durability. This steel grade is often employed in applications requiring high fatigue strength and good machinability, such as gears, shafts, and components subjected to cyclic loads. Its composition strikes a balance between toughness and hardenability, making it a versatile choice for demanding engineering applications.

Key Properties of AISI 4145

Chemical Composition: Carbon (C): 0.43%–0.50% Manganese (Mn): 0.60%–0.90% Chromium (Cr): 0.80%–1.10% Molybdenum (Mo): 0.15%–0.25% Other elements in trace amounts, such as nickel and vanadium, may be present.

Mechanical Properties: Tensile strength: approximately 930–1100 MPa (135–160 ksi) Yield strength: around 750 MPa (109 ksi) Hardness after heat treatment: 248–302 HB Toughness: High impact resistance suitable for cyclic loading.

Heat Treatment: Typically quenched and tempered to attain desired mechanical properties. Can be normalized or annealed depending on application requirements.

Understanding ASTM Standards and Material Classification

What are ASTM Standards? ASTM International (originally the American Society for Testing and Materials) develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services. For steels, ASTM provides specifications that define chemical composition, mechanical properties, testing methods, and manufacturing processes. These standards ensure consistency, safety, and interchangeability of materials across different manufacturing and application sectors worldwide.

Significance of ASTM Equivalents ASTM equivalents facilitate global commerce and manufacturing by enabling engineers and suppliers to specify materials without

ambiguity. When a steel grade like AISI 4145 is referenced, identifying its ASTM equivalent ensures that the selected material meets the required standards for mechanical strength, chemical composition, and performance.

ASTM Equivalents of AISI 4145 Steel

Primary ASTM Specification for AISI 4145

The most relevant ASTM designation for AISI 4145 steel is ASTM A29 / A29M ? "Standard Specification for Steel Bars, Alloy, Standard Quality." Within this specification, AISI 4145 generally corresponds to ASTM A29 Grade 4145. This grade covers alloy steel bars suitable for machining, forging, and heat treatment, with properties similar to those specified in AISI 4145.

Comparison of Chemical Composition

Element	AISI 4145	ASTM A29 Grade 4145
Carbon (C)	0.43?0.50%	0.43?0.50%
Manganese (Mn)	0.60?0.90%	0.60?0.90%
Chromium (Cr)	0.80?1.10%	0.80?1.10%
Molybdenum (Mo)	0.15?0.25%	0.15?0.25%
Other elements	Trace	Trace

The close match in chemical composition indicates that ASTM A29 Grade 4145 is the primary ASTM standard equivalent.

Mechanical and Heat Treatment Standards

ASTM A29 Grade 4145 specifies mechanical properties and heat treatment procedures similar to those outlined for AISI 4145 steel. This includes:

- Quenching and tempering to achieve specified hardness and strength
- Machinability requirements
- Testing procedures for tensile, hardness, and impact properties

Other Relevant ASTM Standards and Cross-References

While ASTM A29 Grade 4145 is the main equivalent, other standards may also be relevant depending on application specifics:

- ASTM A193 / A193M ? for alloy steel bolts and studs made from similar compositions
- ASTM A320 / A320M ? for alloy steel bolting materials, including 4145 variants

Manufacturers and engineers may reference these standards for specific components such as fasteners and fittings.

Global Material Standards and Cross-References

Comparison with Other International Standards

Apart from ASTM, several other standards organizations define equivalent grades for AISI 4145 steel, including:

- EN (European Norms): EN 10083-3 42CrMo4 (similar alloy steel)
- JIS (Japanese Industrial Standards): SNCM439 (chromium molybdenum steel)
- ISO Standards: ISO 683-2 42CrMo4

These grades share similar chemical compositions and mechanical properties, allowing for cross-reference in international procurement and engineering.

Summary of International Equivalents

Standard	Grade	Composition Similarity	Typical Applications
ASTM A29 Grade 4145	4145	High	Gears, shafts, structural components
EN 10083-3 42CrMo4	42CrMo4	Very High	Heavy-duty machinery, automotive parts
JIS SNCM439	SNCM439	High	Gear wheels, axles, crankshafts
ISO 683-2 42CrMo4	42CrMo4	Very High	Heavy equipment, machine parts

Understanding these cross-references is vital for international projects, where compliance with multiple standards is required.

Applications and Suitability of AISI 4145 and Its ASTM Equivalent

Industrial Applications

AISI 4145 steel and its ASTM equivalent are prized for their mechanical strength, toughness, and heat treatment flexibility. Typical applications include:

- Gear manufacturing:** high fatigue strength and wear resistance make it suitable for gear teeth and hubs.
- Shafts and axles:** where high tensile strength and impact resistance are critical.
- Heavy machinery components:** such as crankshafts, connecting rods, and pinions.
- Oil and gas industry:** for drill bits and downhole tools due to toughness.

Advantages of Using ASTM Standards for Material Selection

Global acceptance: ASTM standards are recognized worldwide, facilitating international trade.

Consistent quality: specifications ensure uniform chemical composition and mechanical

properties. Design confidence: engineers can rely on documented properties for safety margins. Ease of procurement: standardized grades simplify sourcing from multiple suppliers. Limitations and Considerations Heat treatment variability: different heat treatment practices may lead to variations in properties. Manufacturing tolerances: adherence to ASTM tolerances is critical for performance. Material availability: not all suppliers may stock ASTM Grade 4145, requiring careful specification. Conclusion and Future Outlook The equivalence between AISI 4145 steel and ASTM A29 Grade 4145 underscores the importance of standardization in the global steel industry. Recognizing these standards enables engineers and manufacturers to select appropriate materials with confidence, ensuring performance, safety, and interoperability. As industries evolve, so too will material standards, with increased emphasis on sustainability, advanced heat treatments, and alloy innovations. Continuous research aims to enhance the properties of low-alloy steels like 4145, expanding their applications and improving their manufacturing processes. In conclusion, whether specified by AISI, ASTM, or international standards, AISI 4145 steel remains a vital alloy in heavy-duty engineering applications, with ASTM equivalents providing a reliable reference framework for global procurement and engineering design. Understanding these equivalences is essential for achieving optimal performance in demanding industrial environments. References ASTM International Standards AISI Steel Data Sheets European Norms (EN) Specifications JIS Steel Standards Industry Publications on Alloy Steels Technical Guides on Heat Treatment and Mechanical Testing

Question Answer

What is the ASTM equivalent of AISI 4145 steel?

The ASTM equivalent of AISI 4145 steel is ASTM A29 4145H, which is a high-strength alloy steel used for similar applications.

What are the main properties of AISI 4145 steel that are reflected in its ASTM equivalent?

Both AISI 4145 and its ASTM equivalent possess high tensile strength, toughness, and good wear resistance, making them suitable for heavy-duty applications such as gears and shafts.

Is AISI 4145 steel the same as ASTM 4145H?

While both are similar, ASTM 4145H specifically refers to a high-strength, quenched and tempered grade of 4145 steel, aligning with AISI 4145's properties, but always verify specific requirements for your application.

Can AISI 4145 steel be substituted with ASTM 4145H in manufacturing?

Yes, ASTM 4145H is considered an equivalent and can generally be substituted for AISI 4145 steel in manufacturing, provided specifications and heat treatment processes are matched.

What are the typical applications of AISI 4145 steel and its ASTM equivalent?

Both are commonly used in the manufacturing of gears, shafts, and other components requiring high strength, toughness, and wear resistance.

Where can I find more detailed chemical composition and mechanical properties of ASTM 4145H?

Detailed information can be found in ASTM A29 standards and material datasheets, which provide comprehensive chemical and mechanical property data for ASTM 4145H steel.

Related keywords: aisi 4145 steel, astm 4145, 4145 alloy steel, 4145 steel properties, 4145 steel hardness, astm alloy standards, alloy steel grades, 4145 steel composition, heat treatable steel, alloy steel specifications

Astm a572 grade 50 equivalent

ASTM A572 Grade 50 Equivalent Understanding the ASTM A572 Grade 50 equivalent is crucial for engineers, fabricators, and procurement specialists involved in structural steel projects. This steel grade is renowned for its high strength, excellent weldability, and versatility in various applications. Recognizing its international counterparts ensures seamless project execution across different regions and adherence to local standards. In this comprehensive guide, we explore what ASTM A572 Grade 50 entails, its equivalents worldwide, and factors to consider when selecting a suitable substitute.

What is ASTM A572 Grade 50? ASTM A572 Grade 50 is a high-strength, low-alloy structural steel primarily used in construction and engineering applications. Its defining characteristics include:

- Key Features of ASTM A572 Grade 50**
- High Strength:** Yield strength of 50,000 psi (345 MPa), making it suitable for heavy-duty structural components.
- Good Weldability:** Designed to facilitate welding without compromising structural integrity.
- Versatility:** Used in bridges, buildings, and other infrastructure projects.
- Corrosion Resistance:** When properly coated or treated, it performs well in various environments.

ASTM A572 Grade 50's composition typically includes carbon, manganese, phosphorus, sulfur, and small amounts of other elements, optimized for strength and weldability.

Global Equivalents of ASTM A572 Grade 50 Since standards vary across countries, understanding the equivalents of ASTM A572 Grade 50 in international standards is essential for global projects. Below, we detail the most common counterparts.

European Standard:

S355JR / S355J2 The European standard EN 10025-2 specifies several grades of structural steel:

S355JR: Structural steel with a minimum yield strength of 355 MPa, suitable for general structural purposes.

S355J2: Similar to S355JR but with improved toughness at low temperatures.

Comparison with ASTM A572 Grade 50:

Parameter	ASTM A572 Grade 50	EN 10025-2 S355JR	EN 10025-2 S355J2
Yield Strength	345 MPa	355 MPa	355 MPa
Tensile Strength	450-620 MPa	470-630 MPa	470-630 MPa
Application	Structural, bridges, buildings	Structural purposes	Structural purposes

[Note: S355 grades are widely accepted as equivalents, but check specific project requirements and mechanical properties.]

Japanese Standard: JIS G3106 SM490 In Japan, the JIS G3106 standard covers hot-rolled structural steel:

SM490: A structural steel with a minimum yield strength of 490 MPa, higher than ASTM A572 Grade 50.

Comparison: SM490 offers higher yield strength; thus, it can be used as an equivalent where higher strength is needed.

Mechanical properties such as toughness and weldability are comparable, but detailed testing is recommended.

Chinese Standard: Q235B / Q345B Chinese steel standards often use the following grades:

Q235B: Equivalent to low to medium strength steel with yield strength around 235 MPa.

Q345B: Higher strength, with yield strength approximately 345 MPa, aligning more closely with ASTM A572 Grade 50.

Summary: Q345B can be considered a direct equivalent to ASTM A572 Grade 50 in terms of strength. Both are used in structural applications, with similar mechanical properties.

Australian Standard: AS 3679-300 Australia's AS 3679 specifies structural steel grades:

G350: Yield strength of 350 MPa.

Comparison: G350 aligns closely with ASTM A572 Grade 50, making it an appropriate substitute in structural applications.

Factors to Consider When Choosing an Equivalent

Selecting the right steel grade as an equivalent involves more than just matching yield strength. Consider the following factors:

- Mechanical Properties**
 - Yield strength
 - Tensile strength
 - Elongation and ductility
 - Impact toughness
- Chemical Composition**
 - Carbon content
 - Manganese and other alloying elements
- Corrosion-resistant treatments or coatings**
- Weldability and Fabrication**
 - Ease of welding
 - Formability
 - Heat treatment requirements
- Environmental and Service Conditions**
 - Exposure to corrosive environments
 - Temperature extremes
 - Structural load requirements
- Compliance and Certification**
 - Ensure the steel meets local standards and certifications.
 - Availability from certified suppliers.

Applications of ASTM A572 Grade 50 and Its Equivalents

Understanding where ASTM A572 Grade 50 and its equivalents are used helps in making informed decisions:

- Bridges:** High strength-to-weight ratio for load-bearing components.
- Buildings and Skyscrapers:** Structural frameworks requiring durability and weldability.
- Industrial Equipment:** Frames, supports, and heavy machinery parts.
- Transportation Infrastructure:** Railways, ports, and heavy-duty transport structures.
- Shipbuilding and Marine Applications:** When combined with protective coatings, suitable for marine environments.

Advantages of Using ASTM A572 Grade 50 Equivalents

Utilizing the correct equivalent steel grade offers multiple benefits:

- Cost-Effectiveness:** Availability from local suppliers reduces transportation costs.
- Matching local standards:** avoids additional certification expenses.
- Design Flexibility:** Similar mechanical properties allow for interchangeable use in designs.
- Ensures structural integrity and safety compliance.**
- Ease of Procurement and Fabrication:** Availability of steel grades with known properties simplifies procurement.
- Familiarity with fabrication techniques:** accelerates project timelines.

Conclusion

The ASTM A572 Grade 50 steel

grade is a vital component in modern structural engineering, offering high strength, weldability, and versatility. Its international equivalents such as EN S355JR/S355J2, JIS SM490, Q345B, and AS G350 allow for global application and sourcing flexibility. When selecting an equivalent, it's essential to consider mechanical properties, chemical composition, fabrication requirements, environmental conditions, and compliance standards. Properly matching these factors ensures the structural integrity, safety, and longevity of your project. By understanding the nuances of these standards and their equivalents, engineers and procurement specialists can make informed decisions that meet project specifications, optimize costs, and adhere to local regulations. Always consult with steel suppliers and standards organizations to confirm the suitability of an alternative grade for your specific application.

ASTM A572 Grade 50 Equivalent: An In-Depth Analysis of Material Standards and Applications

In the realm of structural steel and construction materials, the classification and standardization of steel grades are fundamental to ensuring safety, durability, and performance. Among these, ASTM A572 Grade 50 stands out as a widely used high-strength, low-alloy structural steel. However, given the global nature of construction projects and manufacturing, engineers, fabricators, and procurement specialists often seek to understand the equivalent materials across different standards and regions. This investigative review delves into the details of ASTM A572 Grade 50 and explores its equivalents, providing a comprehensive guide for industry professionals.

Understanding ASTM A572 Grade 50

Before exploring equivalents, it is vital to understand what ASTM A572 Grade 50 entails. This grade is part of ASTM International's A572 specification, which covers high-strength, low-alloy structural steels suitable for riveted, bolted, or welded construction.

Key Characteristics of ASTM A572 Grade 50

Chemical Composition: The grade typically contains:

- Carbon (C): $\leq 0.26\%$
- Manganese (Mn): $0.60-1.35\%$
- Phosphorus (P): $\leq 0.035\%$
- Sulfur (S): $\leq 0.045\%$

Other elements such as Ni, Cu, Cr, and Mo may be present in small quantities to enhance properties.

Mechanical Properties:

- Yield Strength (Min): 50 ksi (345 MPa)
- Tensile Strength: 65-85 ksi (448-586 MPa)
- Ductility: Adequate elongation for forming and welding applications

Applications: Structural frames, bridges, shipbuilding, and other heavy engineering structures.

Advantages of ASTM A572 Grade 50

- High strength-to-weight ratio
- Excellent weldability
- Good notch toughness
- Cost-effective compared to higher alloy steels

Why Do Equivalents Matter?

In the global steel industry, various regions and standards govern material specifications, often with differing chemical compositions, mechanical properties, and testing procedures. When sourcing materials internationally or substituting grades, understanding equivalent specifications helps ensure that the steel will perform as expected.

Key reasons for establishing equivalents include:

- Facilitating international procurement
- Ensuring compliance with local building codes
- Reducing costs by leveraging locally available materials
- Maintaining safety and performance standards

Standards and Their Corresponding Equivalents

Several national and international standards define steel grades comparable to ASTM A572 Grade 50. The most prominent among these are:

- EN (European Norm) Standards
- JIS (Japanese Industrial Standards)
- DIN (German Standards)
- BS (British Standards)
- ISO (International

Organization for Standardization)Each standard employs its own grade designations, chemical composition limits, and mechanical property requirements.ASTM A572 Grade 50 and EN StandardsIn Europe, structural steels are classified under EN 10025 series. The most relevant grades are:EN 10025-2 S355: This grade is often considered the closest equivalent to ASTM A572 Grade 50.Comparison Table: ASTM A572 Grade 50 vs. EN 10025-2 S355| Property | ASTM A572 Grade 50 | EN 10025-2 S355 ||-----|-----|-----|| Chemical Composition | C ? 0.26%, Mn 0.60-1.35%, others as specified | C ? 0.20%, Mn 1.3-1.6%, others as specified || Yield Strength | ? 50 ksi (345 MPa) | ? 355 MPa || Tensile Strength | 65?85 ksi (448?586 MPa) | 470?630 MPa || Notch Toughness | Good | Good |Note: While the yield strength is similar, the chemical compositions differ slightly, but the mechanical properties are comparable for structural applications.ASTM A572 Grade 50 and JIS StandardsJapanese Industrial Standards (JIS) categorize high-strength steels as:JIS G 3106 SM490: Structural steel with a yield strength of approximately 490 MPa (~71 ksi).Comparative Insights:| Property | ASTM A572 Grade 50 | JIS G 3106 SM490 ||-----|-----|-----|| Chemical Composition | Similar to A572 | Slightly different but comparable in strength || Yield Strength | ? 345 MPa | ? 490 MPa || Tensile Strength | 448?586 MPa | 490?620 MPa |Observation: SM490 exceeds the yield strength of ASTM A572 Grade 50, but for certain applications, SM490 can serve as an equivalent, especially when mechanical properties are prioritized.ASTM A572 Grade 50 and DIN StandardsIn Germany, DIN standards specify steels such as:DIN 17100 St 52-3: A common structural steel with a yield strength of approximately 355 MPa.DIN EN 10025 S355: Similar to EN standards, as discussed above.Key Points:St 52-3 has a yield strength of about 355 MPa, slightly above ASTM A572 Grade 50.S355 offers a yield strength of 355 MPa, comparable to the lower end of ASTM A572 Grade 50.Thus, DIN S355 can be considered an approximate equivalent for many structural purposes.British Standards (BS) and ASTM A572 Grade 50In the UK, the relevant standards include:BS 5950: Structural steel grades.BS EN 10025 S355: Similar to European standards.Summary of Equivalents| Standard | Grade | Approximate Mechanical Properties | Remarks ||-----|-----|-----|-----|| ASTM | A572 Grade 50 | Yield ? 50 ksi (345 MPa), Tensile 448?586 MPa | High-strength, low-alloy steel || EN | S355 | Yield ? 355 MPa, Tensile 470?630 MPa | Widely used in Europe || JIS | SM490 | Yield approximately 490 MPa | Slightly higher yield strength || DIN | S355 | Yield ? 355 MPa | Similar to EN S355 || BS | S355 | Yield ? 355 MPa | Compatible with European standards |Critical Factors in Selecting EquivalentsWhile the above comparisons provide a general guide, selecting an equivalent material requires careful consideration of several factors:Mechanical PropertiesEnsure the yield strength and tensile strength meet the project specifications.Verify ductility and toughness requirements, especially for seismic or dynamic load applications.Chemical CompositionConfirm that chemical elements such as carbon, manganese, and alloying elements fall within acceptable limits to ensure weldability and corrosion resistance.Manufacturing and ProcessingConsider differences in welding procedures, heat treatment, and fabrication processes.Some standards specify additional requirements, such as impact toughness or specific testing procedures.Certification and TraceabilityConfirm that the supplier provides appropriate certification documents aligning with the applicable standards.Traceability ensures compliance and quality control.Regional Standards and Code

Compliance Verify local building codes and standards for compatibility. Some regions may require specific grades or testing protocols.

Real-World Applications and Case Studies

Structural Steel in Bridge Construction

Many bridges constructed across different countries utilize grades comparable to ASTM A572 Grade 50. For instance:

- In Europe, S355 steel is frequently used in steel bridges, providing similar strength properties.
- In Japan, SM490 steel has been adopted for similar structural purposes, with performance comparable to ASTM Grade 50.

Shipbuilding and Heavy Machinery

High-strength low-alloy steels like ASTM A572 Grade 50 are favored in shipbuilding due to their strength and weldability. Equivalent materials such as S355 or SM490 are often employed in regions where ASTM standards are not prevalent.

Industrial and Commercial Buildings

Skyscrapers and industrial facilities worldwide often specify ASTM A572 Grade 50 or its equivalents, depending on local standards, ensuring structural integrity.

Conclusion: Navigating Material Equivalency for Structural Steel

Understanding the ASTM A572 Grade 50 equivalent is essential for engineers, fabricators, and project managers engaged in international projects. While ASTM A572 Grade 50 offers a robust set of properties suitable for various structural applications, its equivalents in other standards—such as EN S355, JIS SM490, DIN S355, and BS S355—provide comparable performance metrics that meet global construction demands. However, selecting an appropriate substitute goes beyond matching yield strengths; it requires a holistic review of chemical compositions, mechanical properties, fabrication processes, and regulatory compliance. Consulting with steel suppliers, performing material testing, and adhering to project-specific standards are critical steps in ensuring that the chosen steel material performs reliably throughout its service life. In conclusion, the landscape of structural steel standards is diverse but interconnected. Recognizing and understanding its equivalents enables seamless cross-border collaborations, cost-effective procurement, and the realization of safe,

Question Answer

What is the ASTM A572 Grade 50 equivalent in other international standards?

ASTM A572 Grade 50 is equivalent to ASTM A36, S235JR (EN 10025), and Q235B (Chinese standard), though slight differences in chemical composition and mechanical properties may exist.

Can ASTM A572 Grade 50 be substituted with Q235B steel in structural applications?

While Q235B shares similar properties and can often be used as a substitute, it is important to verify specific project requirements and local codes before replacement, as material standards differ slightly.

What are the key mechanical properties of ASTM A572 Grade 50?

ASTM A572 Grade 50 has a minimum yield strength of 50 ksi (345 MPa) and a tensile strength of 65-80 ksi (450-550 MPa), making it suitable for structural applications requiring high strength and toughness.

Is ASTM A572 Grade 50 suitable for welding and fabrication?

Yes, ASTM A572 Grade 50 is highly weldable and commonly used in structural fabrication, provided that proper welding procedures are followed to ensure strength and integrity.

What are the common applications of ASTM A572 Grade 50 steel?

It is widely used in bridges, building frames, towers, and other structural components that require high strength and durability.

How does the chemical composition of ASTM A572 Grade 50 compare to its equivalents?

ASTM A572 Grade 50 contains specific amounts of carbon, manganese, phosphorus, sulfur, and other elements, which are similar but may vary slightly from equivalents like Q235B or S235JR, affecting properties like weldability and strength.

What are the main advantages of using ASTM A572 Grade 50 steel?

Its high strength-to-weight ratio, excellent weldability, and toughness make it ideal for structural applications, reducing material costs and enhancing safety.

Are there any specific standards or certifications required when sourcing ASTM A572 Grade 50 equivalent steel?

Yes, steel should meet relevant standards such as ASTM, EN, or GB certifications, and suppliers should provide material test reports to verify chemical composition and mechanical properties.

Can ASTM A572 Grade 50 be used in corrosive environments?

While it has good strength and toughness, ASTM A572 Grade 50 is not inherently corrosion-resistant. For corrosive environments, additional coatings or alloying elements are recommended, or consider using stainless steel as an alternative.

Related keywords: ASTM A572 Grade 50, steel equivalent, A36 steel, structural steel, grade 50 steel, high-strength steel, carbon steel, A514 steel, steel standards, structural grade steel

Astm a668 class c steel equivalent

astm a668 class c steel equivalent When it comes to selecting the right steel for industrial applications, understanding the specifications and equivalents of various steel grades is crucial. One such grade that often comes into consideration is ASTM A668 Class C steel. Recognized for its durability and versatility, ASTM A668 Class C steel is widely used in manufacturing, construction, and engineering sectors. However, engineers, procurement specialists, and manufacturers often need to identify equivalent steels across different standards to ensure compatibility, compliance, and optimal performance. This article provides a comprehensive overview of the ASTM A668 Class C steel equivalent, exploring its properties, comparable standards, and key considerations for selection and application.

Understanding ASTM A668 Class C Steel

Before delving into equivalents, it's essential to understand what ASTM A668 Class C steel entails.

What is ASTM A668?

ASTM A668 is a standard specification established by ASTM International that covers carbon and alloy steel castings intended for general engineering applications. It specifies chemical compositions, mechanical properties, and heat treatment requirements for different classes of cast steels.

Class C Steel: Key Features

ASTM A668 Class C is characterized by:

- Chemical composition:** Typically includes carbon, manganese, and other alloying elements within specified limits.
- Mechanical properties:** Moderate tensile strength, good ductility, and impact resistance.
- Heat treatment:** Usually supplied in a normalized or stress-relieved condition.
- Applications:** Suitable for machinery parts, valves, pump bodies, and other industrial components.

Chemical Composition Highlights:

- Carbon (C):** 0.20% max
- Manganese (Mn):** 0.60-1.00%
- Phosphorus (P):** 0.040% max
- Sulfur (S):** 0.050% max

Mechanical Properties:

- Tensile strength:** Approximately 55,000 to 75,000 psi (380-520 MPa)
- Yield strength:** Around 35,000 psi (240 MPa)

Common Equivalents of ASTM A668 Class C Steel

Identifying steel equivalents involves comparing chemical compositions, mechanical properties, and heat treatment standards. The goal is to find steels that can substitute ASTM A668 Class C in various applications without compromising performance.

European and International Standards Equivalents

Many European and international standards define similar cast steels, often with comparable chemical and mechanical specifications.

EN Standards (European Standards)

- EN 1561: GG25, GG30, GG40, GG50:** Gray cast iron grades with similar mechanical properties but not directly equivalent to steel grades.
- EN 10293: S235JR, G2:** Structural steel, but not cast steel.
- EN 1563: GG10, GG15, GG20, GG25:** Gray cast iron grades.

European equivalents are more often found in standards like EN 10293 and EN 10200, which specify cast steels.

Since ASTM A668 is steel castings, the closest European equivalents are generally Cast Steel Grades such as:

- EN 10293 GS-50 (1.0503):** General purpose cast steel, similar in chemical composition and mechanical properties to ASTM A668 Class C.
- EN 10293 G20Mn5 (1.0601):** Medium manganese cast steel, comparable in strength and ductility.

ASTM Standards (Other Grades)

- ASTM A27/A27M Grade 70-50:** Carbon steel castings with similar strength characteristics.
- ASTM A216 Grade WCB:** Carbon steel casting used in pressure vessels and valves, with comparable properties.

JIS Standards (Japanese Industrial Standards)

- JIS G5502: FC200, FC250:** Cast steels with similar chemical compositions.
- JIS G5502: FC300:** Comparable in strength to ASTM A668 Class C.

ASME Standards

ASME often references ASTM standards; ASME B16.34 covers cast steel valves made

from ASTM A216 WCB, which aligns with ASTM A668 Class C properties for some applications.

Standard/Grade	Chemical Composition (approximate)	Tensile Strength	Yield Strength
ASTM A668 Class C	C: 0.20% max, Mn: 0.60-1.00%	55-75 ksi	~35 ksi
EN 10293 GS-50	C: 0.20-0.25%, Mn: 0.60-1.00%	Similar to ASTM	Similar to ASTM
ASTM A27 Grade 70-50	C: 0.20%, Mn: 0.60%	70 ksi	50 ksi
JIS FC300	C: 0.20-0.25%, Mn: 0.60-1.00%	Approx. 50 ksi	Approx. 32 ksi

Notes: General purpose cast steel. Similar strength, often used for castings. Japanese standard, comparable in many applications. Note: Exact chemical compositions and mechanical properties can vary slightly depending on manufacturing processes and heat treatments.

Factors to Consider When Finding Equivalents

- Chemical Composition:** Ensure the substitute steel has similar carbon and alloying element ranges to match strength and ductility.
- Mechanical Properties:** Confirm that yield strength, tensile strength, and impact resistance meet or exceed application requirements.
- Heat Treatment and Processing:** Compatibility with heat treatment processes to ensure performance consistency.
- Standards and Certification:** Verify that the equivalent steel complies with relevant standards and certifications for your region and application.
- Application Specifics:** Consider corrosion resistance, wear resistance, and operational environment when selecting substitutes.

Applications of ASTM A668 Class C Steel and Its Equivalents

ASTM A668 Class C steel and its equivalents are used across various industries, including:

- Manufacturing of machinery parts
- Valve and pump components
- Industrial castings and fittings
- Construction equipment
- Automotive components

The selection of a suitable equivalent depends on the specific application requirements, including mechanical loads, temperature conditions, and environmental exposure.

Conclusion: Finding the Best ASTM A668 Class C Steel Equivalent

In summary, ASTM A668 Class C steel is a versatile cast steel grade with properties suitable for a wide range of industrial applications. Its equivalents, such as EN 10293 GS-50, ASTM A27 Grade 70-50, and JIS FC300, offer similar chemical compositions and mechanical properties, making them suitable substitutes depending on regional standards and specific application needs. When selecting an equivalent, it's essential to consider not only the standard specifications but also the manufacturing processes, heat treatments, and service environment. Consulting with steel suppliers and industry experts can help ensure you choose the best substitute that guarantees performance, durability, and compliance. By understanding the similarities and differences among these standards, engineers and procurement professionals can make informed decisions, optimize costs, and ensure the reliability of their projects and products.

ASTM A668 Class C Steel Equivalent: A Comprehensive Guide

When working within the realm of

industrial steel standards, understanding the equivalences between different specifications is crucial for engineers, procurement specialists, and fabricators. One such important material is ASTM A668 Class C steel, a versatile alloy often utilized in applications requiring moderate strength, good weldability, and corrosion resistance. Recognizing its equivalents across international standards and alternative grades can streamline sourcing, ensure compatibility, and optimize project costs. This guide provides a detailed breakdown of ASTM A668 Class C steel equivalent, exploring its composition, properties, and comparable materials used worldwide.

What is ASTM A668 Class C Steel?ASTM A668 is an American standard specification that covers carbon-molybdenum alloy steel plates primarily used in the manufacture of pressure vessels, boilers, and other structural applications. It is classified into various classes (A, B, C, etc.) based on chemical composition and mechanical properties. Class C of ASTM A668 represents a specific grade designed for applications demanding a balance of strength, toughness, and weldability. It typically features:

- Moderate carbon content
- Molybdenum additions for enhanced strength and hardenability
- Good weldability and machinability
- Suitable for elevated temperature service

Key Mechanical and Chemical Properties of ASTM A668 Class CBefore delving into equivalents, understanding the core properties of ASTM A668 Class C steel is essential:

Chemical Composition (approximate):

- Carbon (C): 0.20% - 0.30%
- Molybdenum (Mo): 0.20% - 0.30%
- Manganese (Mn): 0.60% - 1.00%
- Silicon (Si): 0.10% - 0.35%
- Phosphorus (P): Max 0.035%
- Sulfur (S): Max 0.040%

Mechanical Properties (typical):

- Tensile Strength: 70-90 ksi (480-620 MPa)
- Yield Strength: 40-60 ksi (275-415 MPa)
- Hardness: Moderate, suitable for welding and machining
- Impact Resistance: Good at ambient and elevated temperatures

Why are Equivalents Important?Knowing the equivalent steel grades allows engineers and procurement teams to:

- Source materials internationally without compromising specifications
- Simplify supply chain management
- Ensure compatibility in welding, fabrication, and operational performance
- Optimize costs by considering locally available or more economical options

International Steel Standards and Their EquivalentsDifferent countries have their own steel standards, but many are harmonized or have recognized equivalences. Here's a detailed look at common standards and their potential equivalents to ASTM A668 Class C.

European Standards: EN 10219 & EN 10025

European standards often designate steel grades based on chemical composition and mechanical properties, with a focus on structural applications.

EN 10219 (Cold-formed welded structural steel tubes): Grades such as S275JR, S355JR

EN 10025 (Hot-rolled structural steels): Grades like S235JR, S275JR, S355JR

Equivalent Grades:

ASTM A668 Class C	European Standard Grade	Notes
ASTM A668 Class C	S275JR / S355JR	S275JR is generally comparable, but may lack the molybdenum content
Equivalent for molybdenum alloy	P355GH (EN 10216-2)	P355GH contains molybdenum and is used for pressure vessels, similar to A668 C

Summary:While there isn't an exact European equivalent to ASTM A668 Class C, EN 10216-2 P355GH is closely aligned for pressure vessel applications due to its molybdenum content and mechanical properties.

Japanese Standards: JIS

Japanese Industrial Standards (JIS) classify steels based on their chemical and mechanical characteristics.

JIS G3106 (High-strength steel for welded structures): Grade SS400, SM490

JIS G3462 (Pressure vessel steels): Grades like SGV410, SGV480

Equivalent Grades:

ASTM A668 Class C	JIS Grade	Remarks
ASTM A668 Class C	SGV410	

/ SGV480 | Similar chemical composition, suitable for pressure vessels || Additional | SS490 | For structural purposes, not necessarily pressure vessels |Summary:For pressure vessel applications, JIS G3462 SGV410 or SGV480 are considered close equivalents, especially when molybdenum is involved.Chinese Standards: GB and Q/B SeriesChinese standards designate steel grades with alphanumeric codes based on chemical composition.GB/T 1591 (High-strength low-alloy structural steels): Grades like Q345R, Q370RQ/B 235 series (Pressure vessel steels): Q345R, Q370REquivalent Grades:| ASTM A668 Class C | Chinese Standard Grade | Remarks ||-----|-----|-----|| ASTM A668 Class C | Q345R / Q370R | Widely used pressure vessel steels with similar strength and alloying elements |Summary:Q345R and Q370R are considered suitable equivalents for ASTM A668 Class C, especially in pressure vessel manufacturing.ASTM and ASME Standards: Additional Recognized EquivalentsASME SA 516 Grade 70: A carbon steel plate used for pressure vessels with good weldability and decent strengthASTM A537 Class 1 & 2: Pressure vessel plates with molybdenum content, suitable for similar applicationsWhile these are not exact matches, they are often used in similar contexts, especially when molybdenum content is a key factor.Factors to Consider When Choosing an EquivalentAlthough standards and grades might seem interchangeable, always verify the following:Chemical Composition: Ensure the alloying elements match or are within acceptable ranges, especially molybdenum, carbon, manganese, and others.Mechanical Properties: Confirm tensile strength, yield strength, toughness, and hardness are comparable.Weldability: Compatibility with welding procedures is essential, especially when molybdenum is involved.Application Requirements: Consider pressure ratings, temperature endurance, and corrosion resistance.Manufacturing and Fabrication: Ensure the material's formability and machinability align with project needs.Practical Steps to Find the Right EquivalentConsult Material Suppliers: Many suppliers provide cross-reference charts for steel grades across standards.Check Material Data Sheets: Obtain detailed chemical and mechanical property data.Perform Material Testing: When in doubt, conduct testing to verify material performance.Engage with Standards Experts: Consult with metallurgists or standards organizations for guidance specific to your application.Summary: Key TakeawaysASTM A668 Class C steel is a molybdenum-alloyed carbon steel suitable for pressure vessel applications.Its equivalent grades vary across international standards, with EN P355GH, JIS SGV410, and Q345R being notable counterparts.Always verify chemical composition and mechanical properties before substituting materials.Consider application-specific requirements such as temperature, pressure, and corrosion when selecting an equivalent.Proper documentation and testing ensure that the chosen material meets all safety and performance standards.Final ThoughtsUnderstanding the ASTM A668 Class C steel equivalent empowers engineers and procurement teams to make informed decisions, ensuring material compatibility, safety, and cost-effectiveness. While standards may differ globally, the underlying metallurgical properties often align, allowing for seamless substitution when properly verified. Always prioritize thorough analysis, testing, and consultation with experts to achieve optimal results in your projects.Disclaimer: This guide provides general information and should not replace detailed material specifications or engineering judgment. Always refer to the latest standards and consult with material specialists for critical applications.

QuestionAnswer

What is ASTM A668 Class C steel and what are its main applications?

ASTM A668 Class C steel is a low-alloy, high-strength steel used primarily in manufacturing pressure vessels, tanks, and structural applications due to its good toughness and weldability.

What are the common equivalents to ASTM A668 Class C steel in international standards?

Common equivalents include EN 10028-3 P265GH, DIN 17155 HII, and JIS G3106 SS400, though exact chemical compositions and mechanical properties should be verified.

How do I determine the chemical composition of ASTM A668 Class C steel?

The chemical composition typically includes specific ranges for elements like carbon, manganese, phosphorus, sulfur, etc., as specified in the ASTM A668 standard; consult the material datasheet or standard for precise details.

Is ASTM A668 Class C steel suitable for welding applications?

Yes, ASTM A668 Class C steel is known for its good weldability, making it suitable for various fabrication and welding processes.

Can ASTM A668 Class C steel be used in high-temperature environments?

It is generally suitable for moderate high-temperature applications, but for very high temperatures, specialized steels may be required; always consult material specifications.

What is the typical mechanical property range for ASTM A668 Class C steel?

The steel typically exhibits tensile strength around 70-90 ksi (480-620 MPa) and yield strength approximately 50-70 ksi (345-480 MPa), with good toughness and ductility.

Where can I purchase ASTM A668 Class C steel or its equivalents?

It can be purchased from steel suppliers and distributors worldwide; ensure the material meets ASTM standards or its equivalent in your region.

Are there any specific standards or certifications required for ASTM A668 Class C steel?

Yes, the steel must conform to ASTM A668 specifications, and certifications such as mill test reports (MTRs) are typically provided to verify compliance.

How does the cost of ASTM A668 Class C steel compare to its international equivalents?

Pricing varies depending on supplier, region, and market conditions, but generally, ASTM A668 Class C steel is competitively priced compared to international equivalents, with variations based on supply chain factors.

Can ASTM A668 Class C steel be substituted with other low-alloy steels for specific projects?

Yes, substitution is possible if the alternative steel meets the required mechanical and chemical properties; always verify compatibility with project specifications.

Related keywords: ASTM A668 Class C steel, ASTM A668 steel grades, Class C steel properties, ASTM A668 specifications, equivalent steel grades, carbon steel standards, alloy steel equivalents, ASTM steel classification, low alloy steel, steel material comparison

Astm a283 grade c bs equivalent

ASTM A283 Grade C BS Equivalent: A Comprehensive GuideWhen it comes to selecting the appropriate steel plates for structural applications, understanding the specifications and equivalents across different standards is crucial. One common query among engineers and procurement specialists is the ASTM A283 Grade C BS equivalent. This article aims to provide an in-depth overview of ASTM A283 Grade C, its properties, and its international equivalents, particularly focusing on British Standards (BS). By the end, you will have a clear understanding of how ASTM A283 Grade C compares to BS standards and how to select the right material for your project.

What is ASTM A283 Grade C?ASTM A283 Grade C is a carbon steel plate specification designed for general structural purposes. It belongs to the ASTM A283 series, which covers low to moderate tensile strength carbon steel plates used in a variety of industries including construction, manufacturing, and engineering.

Key Characteristics of ASTM A283 Grade C:

- Material Type:** Carbon steel
- Application:** Structural applications, general fabrication
- Tensile Strength:** Approximately 50-70 ksi (345-485 MPa)
- Yield Strength:** Approximately 30 ksi (205 MPa)
- Thickness Range:** 6 mm to 50 mm (0.25 to 2 inches)
- Corrosion Resistance:** Moderate, often used with protective coatings
- Weldability:** Good, suitable for welding

Properties of ASTM A283 Grade CUnderstanding the mechanical and

chemical properties of ASTM A283 Grade C is essential for proper application and ensuring safety standards are met.

Property	Value	Notes
Tensile Strength	50-70 ksi (345-485 MPa)	Typical range
Yield Strength	30 ksi (205 MPa)	Minimum
Elongation	? 20%	In 2 inches or 50 mm
Modulus of Elasticity	~29,000 ksi (200 GPa)	

Standard for steel

Chemical Composition	Element	Content (%)	Max Limit	Purpose
Carbon (C)	?	0.20%		Provides hardness and strength
Manganese (Mn)	0.60-0.90%			Improves tensile strength and toughness
Phosphorus (P)	?	0.035%		Enhances weldability
Sulfur (S)	?	0.045%		Affects machinability and weldability

Applications of ASTM A283 Grade C

ASTM A283 Grade C is widely used in:

- Construction of bridges, buildings, and other infrastructure
- Manufacturing of pressure vessels and tanks
- Machinery parts and structural supports
- General fabrication where moderate strength and good weldability are required

International Equivalents of ASTM A283 Grade C

When sourcing materials internationally, it is vital to understand how ASTM standards compare to other national standards such as the British Standards (BS), European Standards (EN), or Japanese Standards (JIS). Here, we focus on the BS equivalents of ASTM A283 Grade C.

BS Standards and Their Steel Plate Grades

The British Standards (BS) provide specifications for structural steels, including plates, sections, and bars. The most relevant BS standard for comparison is BS 1452 and BS EN 10025.

BS 1452: Specification

Overview

Grade	Commonly known as
250	(commonly known as S275)
355	(S355)
430	(S430)
460	(S460)

These grades are categorized based on their minimum yield strength (in MPa).

BS EN 10025:2019

This European standard, adopted into UK standards, classifies steels into:

- S275 (yield strength 275 MPa)
- S355 (yield strength 355 MPa)
- S460 (yield strength 460 MPa)

The grades S275 and S355 are most commonly used as equivalents to ASTM A283 grades.

BS Equivalent to ASTM A283 Grade C

Based on chemical composition, mechanical properties, and typical applications, the BS 1452 Grade 250 and BS EN 10025 S275 are considered the primary equivalents to ASTM A283 Grade C.

Specification	ASTM A283 Grade C	BS/EN Equivalent	Comments
Yield Strength	? 30 ksi (205 MPa)	S275 (275 MPa)	Slightly higher minimum yield strength in BS S275
Tensile Strength	50-70 ksi (345-485 MPa)	S275 (410-530 MPa)	Overlap in tensile properties
Chemical Composition			Similar carbon and manganese levels
Thickness Range	6 mm to 50 mm		Similar
Applications			Suitable for similar applications

[Note: While ASTM A283 Grade C and BS S275 are similar, precise matching depends on specific mechanical and chemical requirements.]

Key Differences Between ASTM A283 Grade C and BS Equivalents

Property Variations: BS grades typically have higher minimum yield strengths, which can influence design and safety factors.

Chemical Composition Standards: Slight differences in allowable elements, but generally comparable.

Manufacturing Standards: Certification and testing procedures may vary between ASTM and BS standards.

Selecting the Right Material: Factors to Consider

When choosing between ASTM A283 Grade C and its BS equivalent, consider:

- Project Specifications and Standards Compliance: Ensure the material meets the standards mandated by your project or client.
- Mechanical Requirements: Confirm the yield and tensile strengths meet your structural needs.
- Corrosion Resistance Needs: For corrosive environments, additional coatings or alloying elements may be necessary.
- Availability and Cost: Availability of materials in your region can

influence choice. **Welding and Fabrication:** Ensure compatibility with fabrication processes. **How to Confirm Material Equivalence** To verify that the material you intend to use is equivalent across standards, follow these steps: **Check Chemical Composition:** Ensure compositions align within specified limits. **Compare Mechanical Properties:** Confirm yield and tensile strengths meet project requirements. **Review Certification Documents:** Material test reports should specify compliance with relevant standards. **Consult Material Suppliers:** Suppliers often provide standard conversion charts and certifications. **Summary** In conclusion, ASTM A283 Grade C BS equivalent primarily corresponds to BS EN 10025 S275 or BS 1452 Grade 250. Both standards are designed for structural steel plates with similar mechanical and chemical properties suitable for general structural applications. While minor differences exist, these grades are generally interchangeable when specifications align. **Choosing the appropriate steel grade** involves understanding the specific project requirements, local standards, and material availability. Proper verification and certification ensure safety, compliance, and longevity of structures built with these steel plates. **Final Thoughts** Understanding the equivalency between ASTM and BS standards empowers engineers and procurement professionals to make informed decisions and maintain compliance across international projects. Always consult with steel suppliers and testing agencies to verify the material's conformity to the required standards before proceeding with fabrication or construction. **Remember:** Correct material selection not only ensures structural integrity but also optimizes cost-efficiency and project timelines. **Keywords:** ASTM A283 Grade C, BS standards, BS EN 10025 S275, structural steel, steel plate equivalents, low alloy steel, mechanical properties, chemical composition, international steel standards

ASTM A283 Grade C BS Equivalent: A Comprehensive Guide for Engineers and Material Specialists When selecting structural steel for various engineering applications, understanding the equivalence of standards across different regions is essential. One such common query is: "What is the BS equivalent of ASTM A283 Grade C?" This article aims to provide a detailed analysis of ASTM A283 Grade C, its properties, and its equivalent standards in the British Standards (BS), primarily focusing on BS EN 10025 and BS 1449 specifications. By the end of this guide, you'll have a clear understanding of how ASTM A283 Grade C aligns with British standards, enabling informed material selection for your projects. **What is ASTM A283 Grade C?** ASTM A283 Grade C is a popular carbon steel plate specification under the ASTM International standards. It is commonly used in structural applications due to its good weldability, machinability, and reasonable strength. ASTM A283 covers low to intermediate tensile strength carbon steel plates intended for general structural purposes. **Key characteristics of ASTM A283 Grade C:** **Chemical Composition:** Contains carbon, manganese, phosphorus, sulfur, and sometimes small amounts of other elements like copper and nickel. **Mechanical Properties:** Moderate yield strength (typically around 32 ksi or 220 MPa), with tensile strengths generally in the range of 44-70 ksi (305-485 MPa). **Thickness Range:** Usually available in thicknesses from 6 mm to 50 mm. **Applications:** Structural components in bridges, ships, pressure vessels, and general fabrication. **Understanding British Standards Equivalents** The British

Standards (BS) have their own classifications and grades for carbon steels and structural steels, primarily outlined in BS EN 10025 and BS 1449. To find an equivalent to ASTM A283 Grade C, we need to look at the chemical composition, mechanical properties, and typical applications.

Standards Relevant to ASTM A283 Grade C

BS EN 10025-2:2019: Covers hot-rolled structural steels, including non-alloy and fine-grain steels.

BS 1449 (Part 2):1983: Historically covered carbon steel plates, but has been superseded by EN standards.

BS EN 10210 and BS EN 10219: For hollow sections, less relevant in this context.

For the purpose of equivalence, BS EN 10025-2:2019 is the most current and relevant standard for structural steels similar to ASTM A283 Grade C.

Chemical Composition Comparison

Element	ASTM A283 Grade C	BS EN 10025-2 Grade S235JR / S275JR
Carbon (C)	Max 0.17%	Max 0.17% (S235JR), Max 0.23% (S275JR)
Manganese (Mn)	0.60-0.90%	0.50-1.60%
Phosphorus (P)	Max 0.04%	Max 0.035%
Sulfur (S)	Max 0.04%	Max 0.035%
Copper, Nickel, etc.	Minor	Usually minimal or specified

Note: ASTM A283 Grade C's chemical composition aligns closely with the S235JR grade in BS EN 10025-2, which is a common low-strength structural steel.

Mechanical Properties Comparison

Property	ASTM A283 Grade C	BS EN 10025-2 Grade S235JR / S275JR
Yield Strength (Min)	205 MPa	235 MPa (S235JR), 275 MPa (S275JR)
Tensile Strength (Min)	370 MPa	360-510 MPa (S235JR), 410-560 MPa (S275JR)
Elongation (on 5.65S)	23%	23% (S235JR), 25% (S275JR)
Impact Test (Charpy)	Not specified	Not always specified, but similar grades have Charpy V-notch impact testing standards

Interpretation: ASTM A283 Grade C's mechanical properties are comparable to BS EN 10025-2 Grade S235JR, with some grades like S275JR offering higher strength.

Thickness and Formability

ASTM A283 Grade C is available typically up to 50 mm thickness, similar to BS EN 10025-2 steels, which are also suitable for plates up to 100 mm thick, depending on the steel grade and manufacturing process.

Formability and weldability are comparable, making these steels interchangeable in many applications, provided the specific project requirements align.

Practical Equivalence Summary

Based on the chemical and mechanical properties, ASTM A283 Grade C is most closely equivalent to: BS EN 10025-2 Grade S235JR

Key points: Both are low carbon steels suitable for general structural purposes. Chemical compositions are similar, with minor differences. Mechanical properties are aligned, with S235JR being a common, widely used grade. Both steels are readily available, weldable, and suitable for fabrication.

Additional Considerations for Material Selection

While the above comparison provides a general equivalence, consider the following before finalizing your steel choice:

- Project Specifications:** Always refer to the project-specific standards or client requirements.
- Material Certification:** Ensure the steel supplier provides proper certification aligning with the standards.
- Environmental Conditions:** For corrosive environments, consider additional coatings or alloyed steels.
- Welding and Fabrication:** Confirm welding procedures are compatible with the selected steel grade.
- Availability:** Check local suppliers for availability of the equivalent grades.

Summary: ASTM A283 Grade C BS Equivalent

Standard / Grade	Approximate British Standard Equivalent	Typical Applications
ASTM A283 Grade C	BS EN 10025-2 Grade S235JR	General structural steel

10025-2 Grade S235JR | Structural components, bridges, general fabrication || ASTM A283 Grade C | BS EN 10025-2 Grade S275JR | Higher strength requirements | In conclusion, ASTM A283 Grade C can be reliably replaced with BS EN 10025-2 Grade S235JR in many structural applications, ensuring compliance with regional standards without compromising performance. Final Thoughts Understanding the equivalence between ASTM and BS standards is crucial for global projects, cross-border procurement, and ensuring compliance with local regulations. While ASTM A283 Grade C and BS EN 10025-2 Grade S235JR are closely aligned, always consult with material experts, reference official standards, and verify certificates before procurement. Proper material selection ensures safety, durability, and cost-effectiveness in your engineering endeavors. If you have specific project requirements or need detailed material datasheets, consult with certified steel suppliers or technical consultants to ensure optimal material choice.

Question Answer

What is the ASTM A283 Grade C steel grade and its typical applications?

ASTM A283 Grade C is a low to moderate tensile strength carbon steel plate used primarily in welded construction, bridges, and structural applications where good strength and corrosion resistance are required.

What is the BS equivalent of ASTM A283 Grade C?

The BS equivalent of ASTM A283 Grade C is BS 1452 Grade C, which also refers to mild steel plates suitable for general structural purposes.

How do the chemical compositions of ASTM A283 Grade C and BS 1452 Grade C compare?

Both steels have similar chemical compositions, with carbon content around 0.2%, manganese around 0.9%, and similar levels of phosphorus and sulfur, making them comparable in strength and weldability.

Are mechanical properties of ASTM A283 Grade C and BS 1452 Grade C similar?

Yes, both grades typically exhibit comparable mechanical properties, including yield strength of approximately 25 ksi (172 MPa) and tensile strength of 45-60 ksi (310-415 MPa).

Can ASTM A283 Grade C steel be used interchangeably with BS 1452 Grade C in projects?

In many cases, yes, but it is essential to verify specific project requirements, local regulations, and approval from engineers to ensure compatibility and compliance.

What are the common standards and specifications for ASTM A283 Grade C steel?

ASTM A283 Grade C is specified under ASTM A283/A283M, which covers carbon steel plates of structural quality for general application.

How do the welding properties of ASTM A283 Grade C compare to those of BS 1452 Grade C?

Both steels have good weldability, but proper welding procedures and filler materials should be used to ensure strength and integrity, following relevant standards.

What are the typical thickness ranges of ASTM A283 Grade C steel plates?

ASTM A283 Grade C steel plates are typically available in thicknesses from 6 mm to 50 mm, suitable for various structural and fabrication applications.

Where can I source ASTM A283 Grade C steel or its BS equivalent?

These steels can be sourced from steel suppliers, distributors, and manufacturers worldwide. It is advisable to specify the grade and standards required to ensure the correct material is supplied.

Related keywords: ASTM A283 Grade C, BS EN 10025 S235JR, steel plate specifications, structural steel grades, A283 steel properties, BS steel standards, low carbon steel, structural steel equivalent, steel grade comparison, mechanical properties of A283 C