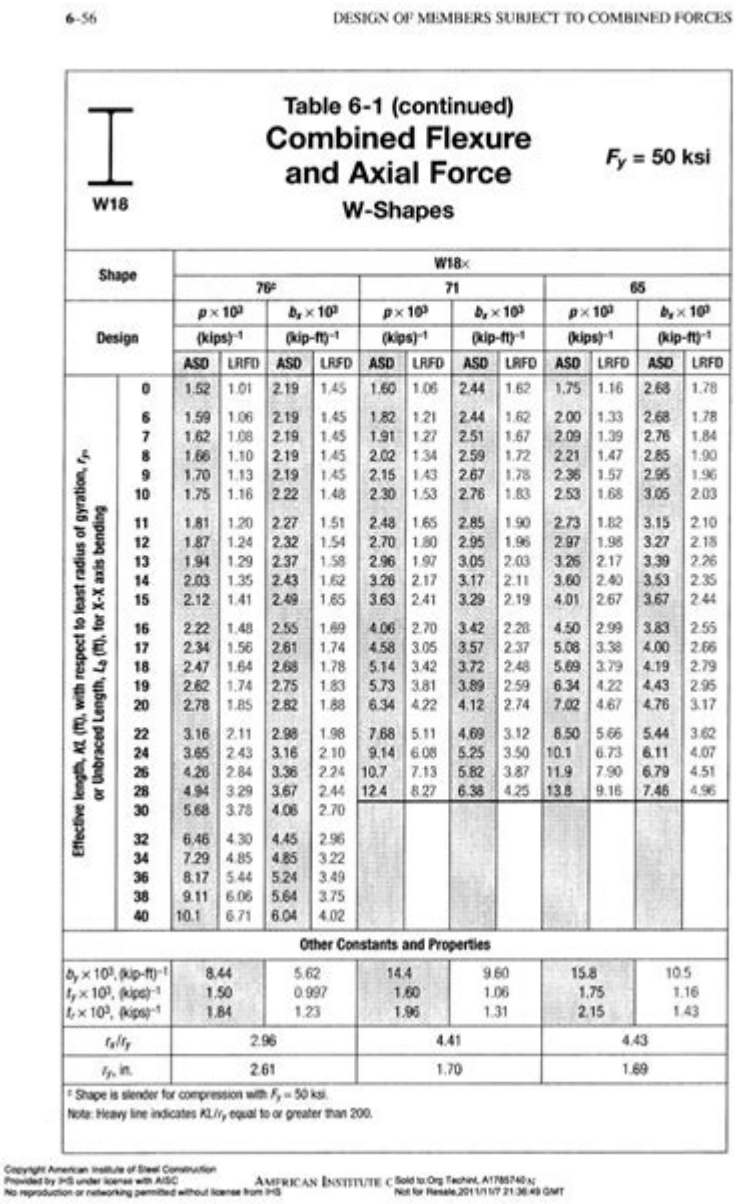
Aisc Steel Construction Manual Table 14 2



6-56 DESIGN OF MEMBERS SUBJECT TO COMBINED FORCES

Table 6-1 (continued)
Combined Flexure and Axial Force
W-Shapes

W18 $F_y = 50$ ksi

Shape		W18×											
		76[c]				71				65			
Design		$p \times 10^3$ (kips)$^{-1}$		$b_x \times 10^3$ (kip-ft)$^{-1}$		$p \times 10^3$ (kips)$^{-1}$		$b_x \times 10^3$ (kip-ft)$^{-1}$		$p \times 10^3$ (kips)$^{-1}$		$b_x \times 10^3$ (kip-ft)$^{-1}$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y, or Unbraced Length, L_b (ft), for X-X axis bending	0	1.52	1.01	2.19	1.45	1.60	1.06	2.44	1.62	1.75	1.16	2.68	1.78
	6	1.59	1.06	2.19	1.45	1.82	1.21	2.44	1.62	2.00	1.33	2.68	1.78
	7	1.62	1.08	2.19	1.45	1.91	1.27	2.51	1.67	2.09	1.39	2.76	1.84
	8	1.66	1.10	2.19	1.45	2.02	1.34	2.59	1.72	2.21	1.47	2.85	1.90
	9	1.70	1.13	2.19	1.45	2.15	1.43	2.67	1.78	2.36	1.57	2.95	1.96
	10	1.75	1.16	2.22	1.48	2.30	1.53	2.76	1.83	2.53	1.68	3.05	2.03
	11	1.81	1.20	2.27	1.51	2.48	1.65	2.85	1.90	2.73	1.82	3.15	2.10
	12	1.87	1.24	2.32	1.54	2.70	1.80	2.95	1.96	2.97	1.98	3.27	2.18
	13	1.94	1.29	2.37	1.58	2.96	1.97	3.05	2.03	3.26	2.17	3.39	2.26
	14	2.03	1.35	2.43	1.62	3.26	2.17	3.17	2.11	3.60	2.40	3.53	2.35
	15	2.12	1.41	2.49	1.65	3.63	2.41	3.29	2.19	4.01	2.67	3.67	2.44
	16	2.22	1.48	2.55	1.69	4.06	2.70	3.42	2.28	4.50	2.99	3.83	2.55
	17	2.34	1.56	2.61	1.74	4.58	3.05	3.57	2.37	5.08	3.38	4.00	2.66
	18	2.47	1.64	2.68	1.78	5.14	3.42	3.72	2.48	5.69	3.79	4.19	2.79
	19	2.62	1.74	2.75	1.83	5.73	3.81	3.89	2.59	6.34	4.22	4.43	2.95
	20	2.78	1.85	2.82	1.88	6.34	4.22	4.12	2.74	7.02	4.67	4.76	3.17
	22	3.16	2.11	2.98	1.98	7.68	5.11	4.69	3.12	8.50	5.66	5.44	3.62
	24	3.65	2.43	3.16	2.10	9.14	6.08	5.25	3.50	10.1	6.73	6.11	4.07
	26	4.26	2.84	3.36	2.24	10.7	7.13	5.82	3.87	11.9	7.90	6.79	4.51
	28	4.94	3.29	3.67	2.44	12.4	8.27	6.38	4.25	13.8	9.16	7.46	4.96
	30	5.68	3.78	4.08	2.70								
	32	6.46	4.30	4.45	2.96								
	34	7.29	4.85	4.85	3.22								
	36	8.17	5.44	5.24	3.49								
	38	9.11	6.06	5.64	3.75								
	40	10.1	6.71	6.04	4.02								
Other Constants and Properties													
$b_y \times 10^3$, (kip-ft)$^{-1}$		8.44		5.62		14.4		9.60		15.8		10.5	
$t_y \times 10^3$, (kips)$^{-1}$		1.50		0.997		1.60		1.06		1.75		1.16	
$t_r \times 10^3$, (kips)$^{-1}$		1.84		1.23		1.96		1.31		2.15		1.43	
r_x/r_y		2.96				4.41				4.43			
r_y, in.		2.61				1.70				1.69			

[c] Shape is slender for compression with $F_y = 50$ ksi.
Note: Heavy line indicates KL/r_y equal to or greater than 200.

AISC Steel Construction Manual Table 14.2 is an essential reference for engineers and designers engaged in the field of steel construction. This table is part of the American Institute of Steel Construction (AISC) Steel Construction Manual, which serves as a crucial resource for understanding the properties and behaviors of various steel shapes and connections. In this article, we will delve into the intricacies of Table 14.2, its importance, applications, and how it fits into the broader context of steel design and construction.

Understanding the AISC Steel Construction Manual

The AISC Steel Construction Manual is a comprehensive guide that provides specifications, guidelines, and design tools for structural steel design. It is widely recognized in the construction industry and is utilized by engineers, architects, and fabricators. The manual covers a broad range of topics, including:

- Design specifications for steel structures
- Material properties
- Design methods and criteria
- Connection details
- Load resistance and stability analysis

Overview of Table 14.2

Table 14.2 of the AISC Steel Construction Manual specifically addresses the "Nominal Strengths of Welded and Bolted Connections." This table provides essential data and guidelines for determining the strength of various types of connections used in steel structures. Understanding the nominal strengths is vital for ensuring that connections can adequately resist the anticipated loads and forces.

Importance of Connection Design

Connections are critical elements in steel structures, as they transfer loads between various components, such as beams, columns, and braces. The integrity and performance of a structure heavily depend on the strength and stability of these connections. Therefore, accurate design and analysis of connections are essential to ensure safety and compliance with building codes.

Key Components of Table 14.2

Table 14.2 contains various parameters essential for evaluating the strength of connections, which include the following:

1. Connection Types: The table categorizes different connection types, such as welded connections, bolted connections, and their respective configurations.

2. Nominal Strength Values: It provides nominal strength values for different connection types, which serve as the basis for design calculations.

3. Factors and Adjustments: Various factors that influence the nominal strength, such as weld size, bolt grade, and connection geometry, are also included.

4. Limit States: The table outlines the limit states that must be considered during design, such as yielding, rupture, and shear failure.

Understanding Nominal Strengths

Nominal strengths in Table 14.2 represent the theoretical maximum load that a connection can withstand under specific conditions. These values are derived from extensive testing and analysis, ensuring that they are reliable for practical applications.

- Welded Connections: The nominal strength of welded connections depends on factors such as weld size, material properties, and the type of weld used (e.g., fillet welds, groove welds).

- Bolted Connections: For bolted connections, the nominal strength is influenced by the bolt grade, hole size, and the configuration of the connection.

Using Table 14.2 in Design Calculations

To effectively utilize Table 14.2 in design calculations, follow these steps:

1. Identify Connection Type: Determine the type of connection being used (welded or bolted) and its configuration.

2. Select Appropriate Values: Reference Table 14.2 to find the nominal strength values that correspond to the selected connection type and configuration.

3. Apply Load Factors: Consider the applicable load factors as per the latest AISC specifications, including dead loads, live loads, wind loads, and seismic forces.

4. Calculate Design Strength: Use the nominal strength values along with the load factors to determine the design strength of the connection.

5. Check Against Design Requirements: Ensure that the design strength meets or exceeds the required strength based on the anticipated loads.

Practical Applications of Table 14.2

Table 14.2 is widely used in various practical applications within the field of steel construction. Some notable applications include:

- Building Construction: In commercial and residential buildings, connections between beams and columns are crucial for the overall stability and safety of the structure.

- Bridges: Steel bridges rely heavily on robust connections to transfer loads effectively and ensure structural integrity.

- Industrial Structures: Factories and warehouses often feature complex steel frameworks, where accurate connection design is essential to support heavy machinery and equipment.

- Retrofit and Rehabilitation: When retrofitting existing structures, engineers can use Table 14.2 to evaluate the adequacy of existing connections or design new ones to enhance structural performance.

Limitations and Considerations

While Table 14.2 provides valuable information, it is essential to recognize its limitations:

- Context-Specific: The nominal strength values are based on specific conditions and assumptions; deviations in material properties or connection configurations may affect actual performance.

- Quality Assurance: The quality of welding and bolting can significantly impact the strength of connections. Ensuring proper workmanship is crucial for achieving the nominal strengths outlined in the table.

- Code Compliance: Always refer to the latest AISC specifications and local building codes when using Table 14.2 for design purposes.

Conclusion

In summary, AISC Steel Construction Manual Table 14.2 serves as a vital resource for engineers and designers in the steel construction industry. By providing nominal strength values for welded and bolted connections, the table aids in ensuring that connections can safely and effectively resist the forces imposed on them. Understanding and applying the information in Table 14.2 is crucial for the successful design of steel structures, contributing to their safety, stability, and durability. As the field of steel construction continues to evolve, the importance of robust connection design and adherence to established guidelines remains paramount.

Frequently Asked Questions

What is Table 14.2 in the AISC Steel Construction Manual used for?

Table 14.2 provides information on the design properties of structural steel shapes, including moment of inertia, section modulus, and radius of gyration for various steel sections.

How can I access the AISC Steel Construction Manual Table 14.2?

The AISC Steel Construction Manual, including Table 14.2, can be accessed by purchasing a physical or digital copy from the American Institute of Steel Construction's website or through authorized distributors.

What types of steel shapes are included in Table 14.2?

Table 14.2 includes various types of steel shapes such as W-shaped beams, S-shaped beams, and C-shaped channels, providing essential design properties for structural engineers.

Is Table 14.2 applicable for both design and analysis of steel structures?

Yes, Table 14.2 is essential for both the design and analysis of steel structures, as it helps engineers determine the appropriate properties needed for strength and stability calculations.

Are there updates or changes to Table 14.2 in the latest edition of the AISC Steel Construction Manual?

Yes, with each new edition of the AISC Steel Construction Manual, there may be updates to Table 14.2, including new shapes, revised properties, or changes to design criteria; it is advisable to check the latest edition for the most current information.

Aisc Steel Construction Manual Table 14 2

AISC Home | American Institute of Steel Construction
The American Institute of Steel Construction (AISC), a not-for-profit structural steel technical institute, partners with the AEC community to develop safe and efficient steel specifications …

Home | AISC
Welcome to the AISC Learning Portal -- the premier source of information on steel design and construction topics offered in a variety of convenient formats. Whether you are looking to build …

American Institute of Steel Construction - Wikipedia
The American Institute of Steel Construction (AISC) is a not-for-profit technical institute and trade association for the use of structural steel in the construction industry of the United States.

The Essential Guide to AISC Steel: Strength, Standards, and Smart …

Discover the vital role of AISC steel in construction, ensuring safety, strength, and longevity for projects from skyscrapers to everyday structures. Learn about AISC certification, essential …

Certification | American Institute of Steel Construction - AISC
AISC's certification programs set the quality standard for the structural steel industry and are the most recognized national quality certification program.

AISC - Engineering Journal
Engineering Journal Journal Home Browse Archive Submit Content ... AISC Publications About ... Search

American Institute of Steel Construction (AISC) - StructuralWiki
Sep 8, 2006 · American Institute of Steel Construction (AISC) is a not-for-profit technical institute and trade association established in 1921 to serve the structural steel design community and …

2022 AISC Code of Standard Practice for Steel Buildings and …
The 2022 AISC Code supersedes the 2016 version (ANSI/AISC 303-16), and its preface includes a list of changes and updates. It has been approved by the AISC Committee on the Code of …

Current Standards | American Institute of Steel Construction - AISC
The AISC Specification provides the generally applicable requirements for the design and construction of structural steel buildings and other structures. The 2022 edition of the AISC …

Grantham and Smith AISC - Steelcon
Feb 25, 2025 · AISC certification remains the gold standard for structural steel fabrication and is the most recognized certification program for the structural steel industry in North America.

AISC Home | American Institute of Steel Construction
The American Institute of Steel Construction (AISC), a not-for-profit structural steel technical institute, partners with the AEC community to develop safe and efficient steel specifications …

Home | AISC
Welcome to the AISC Learning Portal -- the premier source of information on steel design and construction topics offered in a variety of convenient formats. Whether you are looking to build …

American Institute of Steel Construction - Wikipedia
The American Institute of Steel Construction (AISC) is a not-for-profit technical institute and trade association for the use of structural steel in the construction industry of the United States.

The Essential Guide to AISC Steel: Strength, Standards, and Smart …
Discover the vital role of AISC steel in construction, ensuring safety, strength, and longevity for projects from skyscrapers to everyday structures. Learn about AISC certification, essential …

Certification | American Institute of Steel Construction - AISC
AISC's certification programs set the quality standard for the structural steel industry and are the most recognized national quality certification program.

AISC - Engineering Journal
Engineering Journal Journal Home Browse Archive Submit Content ... AISC Publications About ... Search

American Institute of Steel Construction (AISC) - StructuralWiki
Sep 8, 2006 · American Institute of Steel Construction (AISC) is a not-for-profit technical institute and trade association established in 1921 to serve the structural steel design community and …

2022 AISC Code of Standard Practice for Steel Buildings and …
The 2022 AISC Code supersedes the 2016 version (ANSI/AISC 303-16), and its preface includes a list of changes and updates. It has been approved by the AISC Committee on the Code of …

Current Standards | American Institute of Steel Construction - AISC
The AISC Specification provides the generally applicable requirements for the design and construction of structural steel buildings and other structures. The 2022 edition of the AISC …

Grantham and Smith AISC - Steelcon
Feb 25, 2025 · AISC certification remains the gold standard for structural steel fabrication and is the most recognized certification program for the structural steel industry in North America.

Explore the AISC Steel Construction Manual Table 14.2 for essential insights on steel design. Learn more about its applications and improve your construction projects!

Back to Home