

Designing with Grade 65

by Beth S. Pollak

Over the last decade, the use of W-shapes in steel A913 Grade 65 has increased, especially in high-rise-buildings, hospitals, convention centers and stadium roofs. Today there are more than 100 structures that have been constructed using Grade 65 steel.

"The weight savings that you see with Grade 65 are typically 10% to 15% for use as columns, and go directly to the project," said Georges Axmann, technical marketing manager for Arcelor International America. "Arcelor's Grade 65 comes at the same price as our Grade 50."

Arcelor supplies W-Shapes in A913 Grade 65 within the United States. Axmann says Grade 65 steel is best for use where loads are high enough to require at least 10", 49-lb columns, such as buildings of at least four to seven stories. Grade 65 also can be used in trusses, typically in short-span or heavily loaded trusses for buildings like convention centers, or long-span trusses for structures such as stadium roofs. Grade 65's strength also is used increasingly in seismic design. Following the 1994 Northridge earthquake, seismic design recommendations created a shift from Grade A36 to Grade 50 beams. Since then, Grade 65 has helped maintain the "strong column-weak beam" concept. Grade 65 avoids the upsizing required by Grade 50 for "stocky columns" as well as costly reinforcements of the panel zone in beam-to-column moment connections.

Axmann says demand is greatest for 14" columns, from 90 lb to 730 lb. Unfortunately, for process reasons, not all shapes are available in A913 Grade 65. Most large and heavy sizes are available; for more information about shapes that Arcelor offers in Grade 65 and also in Grade 50, please see the Steel Shapes Availability listing on page 53.

A prerequisite for the increased use of Grade 65 was its availability out of stock. In Arkansas, Arcelor carries an inventory of A913 Grade 65 in 14" shapes 90 lb through 730 lb and selected heavy 36", 40" and 44". Since its inception more than 10 years ago, this stock serves mainly to supply fast and small orders.

Because Grade 65 steel is a single-source product in the United States, contractors are not always confident that it is priced competitively. "Arcelor keeps working hard to get the word out that they get a readily available and competitively priced building material," Axmann said.

When to use Grade 65?

The advantages of Grade 65 steels are maximized in steel members that are not stiffness-controlled. ASTM A913 Grade

65 is especially useful in the following applications:

- ✓ Columns: gravity and lateral system.
- ✓ Trusses: long span and short-span heavy-loaded.
- ✓ Seismic: "strong column-weak beam" concept.
- ✓ Beams: short or medium span beams, where deflection is not a concern.

Design rules for structural members with A913 Grade 65

For a column in Grade 65, the buckling formula given in ASD and LRFD can be extrapolated. When the design software uses ASD or LRFD checking procedures, the design of columns and/or beams in Grade 65 easily is achieved by changing F_y to 65 ksi and F_u to 80 ksi in the properties of columns and/or beams. ★

ASTM A913 Grade 65 and Current Codes

Since 1995, ASTM A913 has been a referenced structural steel specification under the AISC specifications—ASD, LRFD and seismic. ASTM A913 is included in the Uniform Building Code (UBC 1997), International Building Code (IBC 2000 and 2003), Structural Welding Code since 1996 (AWS D1.1: 2002) and FEMA Documents 350 and 353 (2000) concerning steel moment-frames in seismic areas.