RELIABLE TUBE Inc.

CLASS H SPECIFICATION

Hollow Structural Sections

CSA G40.21 50W or Metric 350W Class H

What is CSA G40.21 50W/350W Class H?

In accordance with CSA G40.21, hollow sections—welded or seamless round, square, rectangular or special-profile structural tubing—are available in two classes:

Class C

Hollow sections that are cold-formed from a section produced either by a seamless process or by an automatic electric-welding process producing a continuous weld.

Class H

(i) Hollow sections made by a seamless or furnace-butt welding (continuous welding) or automatic electric-welding process, and hot-formed to final shape; or

(ii) Hollow sections made by a seamless automatic electric-welding process producing a continuous weld, and cold-formed to final shape; subsequently stress-relieved by heating to a temperature of 450°C (850°F) or higher, followed by cooling in air.

CSA G40.21-2013

Description: General requirements for rolled or welded structural quality steel.

Intended use: General specification for plates, shapes, hollow sections, sheet, sheet piling, cold-formed channels and bars used in construction.

What are the benefits of Class H?

- ✓ Increased axial capacity in accordance with CSA S16-14
- ✓. Savings in mass up to 20%
- ✓. Produced every 2 weeks in our Harrow Plant

Why produce material to a Class H Specification?

In cold-formed HSS, residual stresses are induced in the finished product as a result of the rolling process. The process begins with a flat strip that is formed into a round shape, welded, and then shaped into a square or rectangle section.

Residual stresses are concentrated at the four corners and along the weld line. Heat treating in a furnace serves to stress-relieve the product, without altering the chemical properties of the material. While the physical properties may experience slight changes - such as a small decrease in elongation - these changes are minimal.

As shown in table 1, the properties specified for Class H are identical to those for Class C.

It is important to note that Class H is only available under the CSA G40.21 specification. It is not available for ASTM A500 in the United States.

TABLE 1	
Specification	G40.21
Strength Levels	50W/350W
Yield Strength	50,000 PSI (350 MPA) Minimum
Tensile Strength	65,000-90,000 PSI (450-630 MPa)
Elongation % in 2"	22 Minimum
Chemistry Levels	50W/350W
Carbon	.23 max
Manganese	.50-1.50
Phosphorous	.040 max
Sulphur	.050 max
Silicon	.40 max
Grain Refining Elements	.10 max

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How is Class H material produced?

Material produced for CSA G40.21 50W/350W Class H is run just CSA G40.21 50W/350W Class C is run.
This material is then moved to the furnace for heat treating. The furnace cycle begins by heating the material from the ambient temperature of the warehouse at a rate of 125°F (52°C) per hour to the maximum temperature of 890°F (476°C). Once stable at 890°F (476°C), the temperature is held for 30 minutes.
The load is then allowed to cool at a rate of 200°F (93°C) per hour from 890°F (476°C) back to ambient temperature.
The material is removed from the furnace and ready for shipment.
Tensile samples (heat-treated with the load) are pulled, and the results are recorded for each heat number, tube size and gauge.
The material is checked for straightness and surface condition.

Savings in mass of almost 20% are pssoible

CSA S16-14, Clause 13.3.1 allows for n = 2.24 when specifying CSA Class H material. This will lead to higher axial capacities than those calculated for CSA Class C or ASTM A500 (see Table 2).
This higher axial capacity could lead to using smaller sections and subsequent mass savings over Class C and A500, as much as 20%. Even though there is a cost premium for Class H over Class C and A500, the potential for mass savings will translate to project cost savings.

AXIAL CAPACITY

TABLE 2			
8 X 8 X 1/4			
	A500, GRADE C	**CSA CLASS C**	**CSA CLASS H**
KL=6m(19'-8')	829 Kn (186 kips)	920 Kn (207 kips)	1130 Kn (254 kips)

12 X 8 X 1/4			
	A500, GRADE C	**CSA CLASS C**	**CSA CLASS H**
KL=8m(26'-3")	675 Kn (152 kips)	780 Kn (178 kips)	951 Kn (214 kips)

**Source: CISC Handbook of Steel Constructions, Tenth Edition (2014)*

Class H:
36% more capacity than A500
23% more capacity than Class C

Class H:
41% more capacity than A500
20% more capacity than Class C

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