



C&N INDUSTRIAL GROUP LIMITED

ASTM A860 /A860M

Standard Specification for Wrought High-Strength Low-Alloy Steel Butt-Welding Fittings

GRADE

ASTM A860 / A860M WPHY42

ASTM A860 / A860M WPHY46

ASTM A860 / A860M WPHY52

ASTM A860 / A860M WPHY60

ASTM A860 / A860M WPHY65

ASTM A860 / A860M WPHY70

TYPE

ELBOWS LR, SR, BENDS, CROSSES, STUB ENDS, EQUAL TEES, UN-EQUAL TEES, CONCENTRIC REDUCERS, ECCENTRIC REDUCERS, CAPS

STANDARD

ANSI B16.9

ANSI B16.28

MSS-SP 75

MSS-SP 43

DIN 2605, 2625, 2626, 2617

BS 1640

SIZE RANGE

OD 1/2" - 72"

Chemical Requirements

Tesile Requirements & Chemical Requirements

TABLE 1 Chemical Requirements		
	Composition %	
	Heat Analysis	
Carbon	0.2(A)	All values are maximum unless a range is stated
Manganese	1.00-1.45	
Phosphorus	0.030	
Sulfur	0.010	
Silicon	0.15-0.40(B)	
Nickel	0.5 ©	
Chromium	0.3 ©	
Molybdenum	0.25©	
Copper	0.35©	
Titanium	0.05	
Vanadium	0.10	
Columbium	0.04	
Vanadium Plus Columbium	0.12	
Aluminum	0.06	
A The carbon equivalent,as calculated by the following formula,shall not exceed 0.42%.		
$CE = C + \frac{Mn}{6} + \frac{Cr + Mo +V}{5} + \frac{Ni + Cu}{15}$		
B If vacuum carbon deoxidation is used,silicon shall not exceed 0.10% by heat analysis and 0.12% by product analysis.		
C The sum of Ni + Cr +Mo +Cu shall not exceed 1.0%.		

Mechanical Requirements

Mechanical Requirements						
Property	Grade					
	WPHY 42	WPHY 46	WPHY 52	WPHY 60	WPHY 65	WPHY 70
Yield strength, min ^A 0.2 % offset, ksi [MPa]	42 [290]	46 [315]	52 [360]	60 [415]	65 [450]	70 [485]
Tensile strength, ksi [MPa]	60 [415]	63 [435]	66 [455]	75 [515]	77 [530]	80 [550]
	-85 [585]	- 88 [605]	- 91 [625]	- 100 [690]	- 102 [705]	-105 [725]
<i>Elongation:</i>						
Standard round specimen, or small-size proportional specimen, min, % in 4D	25	25	25	20	20	20
Rectangular specimen, for section thickness 5⁄16 in. [7.94 mm] and over, and for all small sizes tested in full section; min, % in 2 in. [50 mm].	32	32	32	28	28	28
Rectangular specimen for thickness less than 5⁄16 in. [7.94 mm]; min, % 2 in. [50 mm]. Width of specimen 1½ in. [40 mm].	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>
<i>Toughness:</i>						
<i>C</i> ,energy absorption ^C ; measured at -50°F [-46°C].						
	Size, mm	Average/min, ft.-lbs[J]		Lateral Expansion min, MLS[mm]		
	103 10	30/25 [40/34]		25 [0.64]		
	103 7.5	25/21 [34/28]		21 [0.53]		
	103 5	20/17 [27/23]		13 [0.33]		

^A Actual yield strength shall not exceed specified minimum by more than 15 ksi [105 MPa].

^B For each 1⁄32-in. [0.79 mm] decrease in section thickness below 5⁄16 in. [7.94 mm], a deduction of 1.5 % from the elongation value of specimens above 5⁄16 in. [7.94 mm] is permitted. When the section thickness lies between two values defined above, the minimum elongation value is determined by the following equation:

$$E \geq 48t + 15.00$$

where:

E = elongation % in 2 in. [50 mm], and

t = actual thickness of specimen.

^C These requirements are intended to minimize fracture initiation. The requirements are not intended to give assurance against fracture propagation.

Hardness Requirements

Fittings shall have a maximum hardness of 22 HRC (235 HB).