B31 Proposed Code Case 191
Cu-13Zn-1.1Ni-Si-Al Alloy Seamless Pipe and Tube
ASME B31.3
Approval Date: January 21, 2015

Inquiry: May precipitation-hardened (Temper Designation TF00) Cu-13Zn-1.1Ni-Si-Al alloy (UNS No. C69100) seamless pipe and tube conforming to the requirements of ASTM B706-00 (R2011) be used under the rules of ASME B31.3?

Reply: Yes, provided:

(a) The maximum allowable stress values for the material shall be those given in Table 1;

(b) Welded and brazed construction is not permitted;

(c) The maximum use temperature shall be 204ºC (400ºF);

(d) Certification to the ASTM B706-00 (R2011) specification requirements shall be mandatory.

Table 1
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °F	Stress, ksi		For Metal Temperature Not Exceeding, °C	Stress, MPa
100	20.0		40	*138*
150	20.0		65	*138*
200	20.0		100	*138*
250	20.0		125	*138*
300	20.0		150	*138*
350	19.9		175	*137*
400	19.5		200	*135*
			225	*132*

Note: The maximum use temperature for this alloy is 204ºC (400ºF).
The value listed at 225ºC is provided for interpolation purposes only.

B31 Case 192
Cu-13Zn-1.1Ni-Si-Al Alloy Seamless Pipe and Tubing
ASME B31.1
Approval Date: October 2, 2013

Inquiry: May precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS No. C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 (reapproved 2011) be used for non-welded construction under the rules of ASME B31.1?

Reply: It is the opinion of the Committee that precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS No. C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 may be used for non-welded construction under the rules of ASME B31.1, provided the following additional requirements are met:

(a) The tubing shall be in the precipitation-hardened condition; temper TF00 in B706.
(b) The maximum allowable stress values for the material shall be those given in Table 1. The maximum design temperature shall be 400ºF (204ºC).
(c) This Case number shall be referenced in the documentation and marking of the material and shown on the Manufacturer's Data Report.

Table 1
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °F	Stress, ksi		For Metal Temperature Not Exceeding, °C	Stress, MPa	
100	17.4		40	120	
150	17.4		65	120	
200	17.4		100	120	
250	17.4		125	120	
300	17.4		150	120	
350	17.4		175	120	
400	17.4		200	120	
			225	119	

Note: The maximum use temperature for this alloy is 400º·F (204ºC): The value listed at 225ºC is provided for interpolation purposes only.

Approval Date: September 28, 2013

Code Cases will remain available for use until annulled by the applicable Standards Committee.

Case 2783
Cu-13Zn-1.1Ni-Si-Al Alloy Seamless Tubing
Section VIII, Division 1

Inquiry: May precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 (reapproved 2011) be used for nonwelded construction under the rules of Section VIII, Division 1?

Reply: It is the opinion of the Committee that precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 may be used for nonwelded construction under the rules of Section VIII, Division 1, provided the following additional requirements are met:

(a) The pipe and tubing shall be in the precipitation-hardened condition, temper TF00 in ASTM B706.

(b) Heat treatment shall be age-hardening at 1,110°F ± 25°F (600°C ± 15°C) for 3 hr to 4 hr followed by air cooling.

(c) The physical properties for Cu-13Zn-1.1Ni-Si-Al alloy (UNS C69100) are as follows:

(1) density, 68°F (20°C): 0.307 lb/in.^{3} (8 520 kg/m^3)

(2) thermal conductivity

(-a) 212°F (100°C): 44 Btu/(h·ft·°F) (77 W/m·K)

(-b) 572°F (300°C): 59.5 Btu/(h·ft·°F) (103 W/m·K)

(3) Coefficient of thermal expansion, 10^{-6}/°F: 11 (10^{-6}/K: 19)

(d) The yield strength and tensile strength values for use in design shall be as shown in Tables 1 and 1M.

(e) The maximum allowable stress values for the material shall be those given in Tables 2 and 2M. The maximum design temperature shall be 400°F (204°C).

(f) External pressure design is prohibited.

(g) This Case number shall be shown on the Manufacturer's Data Report.

Table 1
Yield and Tensile Strength Values

For Metal Temperature Not Exceeding, °F	Yield Strength, ksi [Note (1)]	Tensile Strength, ksi [Note (2)]
100	31.0	60.0
150	30.8	60.0
200	30.8	60.0
250	30.8	60.0
300	30.4	60.0
350	29.8	60.0
400	29.2	60.0

NOTES:
(1) The tabulated values of yield strength are those that the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the yield strength values correspond to the yield strength trend curve adjusted to the minimum specified room temperature yield strength. The yield strength values do not correspond exactly to "minimum" or "average," as those terms are applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Section VIII, Division 1 requires elevated temperature testing for yield strength of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated yield strength values for ASME acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.
(2) The tabulated values of tensile strength are those that the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the tensile strength values tend toward an average or expected value, which may be as much as 10% above the tensile strength trend curve adjusted to the minimum specified room temperature tensile strength. The tensile strength values do not correspond exactly to "average" as this term is applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Section VIII, Division 1 requires elevated temperature testing for tensile strength of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated tensile strength values for ASME acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.

Table 1M
Yield and Tensile Strength Values

For Metal Temperature Not Exceeding, °C	Yield Strength, MPa [Note (1)]	Tensile Strength, MPa [Note (2)]
40	212	414
65	212	414
100	212	414
125	212	414
150	210	414
175	206	414
200	202	414
225	199	409

NOTES:
(1) The tabulated values of yield strength are those that the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the yield strength values correspond to the yield strength trend curve adjusted to the minimum specified room temperature yield strength. The yield strength values do not correspond exactly to "minimum" or "average," as those terms are applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Section VIII, Division 1 requires elevated temperature testing for yield strength of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated yield strength values for ASME acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.
(2) The tabulated values of tensile strength are those that the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the tensile strength values tend toward an average or expected value, which may be as much as 10% above the tensile strength trend curve adjusted to the minimum specified room temperature tensile strength. The tensile strength values do not correspond exactly to "average" as this term is applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Section VIII, Division 1 requires elevated temperature testing for tensile strength of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated tensile strength values for ASME acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.

Table 2
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °F	Maximum Allowable Stress Values, ksi
100	17.1
150	17.1
200	17.1
250	17.1
300	17.1
350	17.1
400	17.1

Table 2M
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °C	Maximum Allowable Stress Values, MPa
40	118
65	118
100	118
125	118
150	118
175	118
200	118
225 [Note (1)]	117

NOTE:
(1) The maximum use temperature for this alloy is 400°F (204°C). The value listed at 225°C is provided for interpolation purposes only.

Approval Date: October 23, 2013

Code Cases will remain available for use until annulled by the applicable Standards Committee.

Case 2782
Cu-13Zn-1.1Ni-Si-Al Alloy Seamless Pipe and Tubing
Section I

Inquiry: May precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 (reapproved 2011) be used for nonwelded construction under the rules of Section I?

Reply: It is the opinion of the Committee that precipitation-hardened Cu-13Zn-1.1Ni-Si-Al alloy (UNS C69100), seamless pipe and tubing conforming to the requirements of ASTM B706-00 (reapproved 2011) may be used for nonwelded construction under the rules of Section I, provided the following additional requirements are met:

(a) The pipe and tubing shall be in the precipitation-hardened condition, temper TF00 in ASTM B706.

(b) The maximum allowable stress values for the material shall be those given in Table 1 or Table 1M. The maximum design temperature shall be 400°F (204°C).

(c) External pressure design is not permitted.

(d) This Case number shall be shown on the Manufacturer's Data Report.

Table 1
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °F	Stress, ksi
100	17.1
150	17.1
200	17.1
250	17.1
300	17.1
350	17.1
400	17.1

Table 1M
Maximum Allowable Stress Values

For Metal Temperature Not Exceeding, °C	Stress, MPa
40	118
65	118
100	118
125	118
150	118
175	118
200	118
225 [Note (1)]	117

NOTE:
(1) The maximum use temperature for this alloy is 400°F (204°C). The value listed at 225°C is provided for interpolation purposes only.