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Subject: Design values for AA675 and AB675 connectors	

Geometry and Use

As shown in the following figure, the AA675 and AB675 connectors are hybrids of the standard Timberlinx connector. Each AA675 and AB675 connector uses a pair of expansion pins. The connectors are threaded for attachment to a 7/8-inch (22 mm) diameter UNC threaded rod or to the Timberlinx lag screw.

AA675 with two expansion pins

AB675 with two expansion pins

Designing with AA675

Both the CSA O86-01[1] and the AF&PA NDS[2] require fasteners to be spaced at 4*D* when loaded parallel to grain and 3*D* when loaded perpendicular to grain, where *D* is the fastener diameter. The expansion pin used in Timberlinx connectors has a bearing width of 3/4 in (19 mm). Since load is transmitted from the pin to the timber over this width, it is reasonable to treat the pin as a dowel-type fastener with 3/4-in (19 mm) diameter. For the AA675 connector, the required spacing is then 3.0-in (76 mm). The actual fastener (pin) spacing for the AA675 connector is also 3.0-in (76 mm).

The end distance on the tube, behind the second pin, is 0.5 in (13 mm). This distance is sufficuent to prevent failure of the tube by shear rupture due to bearing of the expansion pin on the tube slot. Instead net section tension rupture of the tube would occur first at a load well above the capacity of a two pin connector.

Conclusion: The tensile capacity of an AA675 connector with two expansion pins is twice that of the standard Timberlinx connector with a single pin at each end.

Designing with AB675

The actual fastener (pin) spacing for the AB675 connector is also 2.0-in (51 mm), which is equivalent to 2.67*D* for a fastener with *D* = 0.75 in (19 mm). However, both the CSA O86-01 and the AF&PA NDS are silent on use of connection hardware with fasteners oriented in different planes. Hence the fastener spacing requirement of 4*D* is not strictly applicable.

The orientation of the pins creates two separate and relatively independent failure planes. Thus, it is reasonable to expect that the two fasteners would not interact and each can carry its full capacity load without causing premature splitting of the timber due to inadequate spacing.

The end distance on the tube, behind the second pin, is 0.5 in (13 mm). This distance is sufficuent to prevent failure of the tube by shear rupture due to bearing of the expansion pin on the tube slot. Instead net section tension rupture of the tube would occur first at a load well above the capacity of a two pin connector.

Conclusion: The tensile capacity of an AB675 connector with two expansion pins is twice that of the standard Timberlinx connector with a single pin at each end.

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1. CSA Standard O86–01 *Engineering Design in Wood*, Canadian Standards Association, 178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3
2. AF&PA, NDS–2005, National Design Specification for Wood Construction, ASD/LRFD, American Forest & Paper Association, 1111 Nineteenth St., NW, Suite 800, Washington, DC 20036