ADVISORY NOTE 21:

ASFP Position on Unprotected Attachments and Unprotected Secondary Members Connected to Protected Primary Members

If secondary steelwork is left unprotected, then in a fire situation, it may heat rapidly and could be a source of heat that conducts into the protected primary member to which it is attached. This may cause early failure with respect to loss of load bearing capacity of the primary section.

In the case of minor attachments, the Fire and Blast Information Group (FABIG) in their Technical Guidance Note 13, recommend that they may be left unprotected when their contact area is no greater than 3,000mm² per linear m or m² on the primary section. This guidance is for hydrocarbon fire exposures typically associated with oil and gas facilities. The ASFP has consulted with the Steel Construction Institute (SCI) who have advised that this guidance may be considered conservative to apply to a cellulosic fire condition as might occur in civil construction. As such, the ASFP recommended the same guidance.

In the case where the unprotected contact area is greater than 3,000mm², then some form of protection to the connecting member or attachment is likely to be required.

The British Constructional Steelwork Association (BCSA) document "Steel construction – Fire Protection" published in 2013 contains several references to obviate the need to protect secondary beams when the primary beam is fire protected. While this approach is sometimes adopted as part of a structural fire engineering assessment, the ASFP and others consider this simplified position to be unconservative in the absence of appropriate justification, with specific reference to the intersection of protected primary and unprotected secondary beams.

If there is no evidence to support the omission of, or reduced provision of passive fire protection from secondary steelwork then the ASFP position is to recommend that the secondary member is protected for a distance of 500mm from the primary section. The protection applied should be at the relevant thickness of protection for the primary section. This protection to the secondary member is often referred to as coat-back when reactive coatings (intumescent paints) are used, however the requirement is still necessary for other structural passive fire protection systems such as boards, mineral wool, cementitious sprays, etc.

The advice of 500mm coat-back has been the ASFP position for some time based on limited historical fire testing. It has further been verified by a numerical study and associated technical report produced by PFP Specialists (PFPS-TR-2154). The 500mm distance was found to be acceptable for primary beams protected to common industry default, conservative steel temperatures, and for fire resistance periods up to and including 120 minutes. The numerical study considered a double-sided connection of unprotected secondary framing members to a protected primary section. Consideration was also given to secondary members of different size in conjunction with common connection designs such as welded end-plates and fin-plates.

Manufacturers may have undertaken fire testing to show that a reduced coat-back distance may be sufficient, or that it may be omitted entirely. However, in these cases the ASFP recommend that designers should refer to the specific end use situation and the proprietary evidence to support it. Similarly, a fire engineering assessment may be used to define coat-back requirements. This may involve numerical heat transfer assessments and structural analysis techniques, but it is recommended that fire test evidence is used to validate any approach adopted.