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Request for Interpretation
API Spec 6A

Background Information:

This interpretation request is related to how equipment design, covered by API 6A - Specification for Wellhead and Christmas Tree Equipment, Nineteenth Edition, addresses material properties of a product. It is generally recognized that material properties of most steels may change through the cross section of a part. Some product design documentation accounts for this by assuming lower actual material properties than the product specification. The second point of the request relates to the application of different material designations in Table 4, when a part has multiple functional areas or pressure ratings. For example a single part may consist of a body and integral flanged end connections with different pressure ratings. The design method clauses 4.3.1 & 4.3.3 and material requirement clauses 5.4.1 a) & b) which, define standard and non-standard material designations and properties are considered relevant to the interpretation. Material requirements are thought to include material designations, in Table 4 for strength, in Table 5 for toughness and Table 6 for ductility.

Request for interpretation are as follows:

Question 1: Do Flanges designed by API and specified in API 6A require that standard or non-standard material properties, in clause 5.4.1 a) & b), are achieved throughout the cross section? If not, what criterion was applied for API designed Flanges?

Response 1: **NO** - Assumptions concerning material properties throughout the cross section of production parts are outside the scope of Spec 6A. API Specification 6A requires that the specified material properties are satisfied by testing of specimens taken from a QTC or a prolongation, and that the specified hardness testing of both QTC and production parts meet the specified acceptance criteria.

Question 2a: Can a manufacturer's design for Bodies, Bonnets and other End Connections use materials or processes that possess properties not meeting the minimum requirements of standard or non-standard materials in clause 5.4.1 a) & b) throughout the cross section (Figure 2 (B),?

Response 2a: **YES** - For large parts of varying cross-section, it may not be possible to achieve the specified minimum properties throughout, especially when it is necessary to meet hardness restrictions defined by ISO 15156/NACE MR0175 for low alloy steel.

Question 2b: If yes, should design documentation substantiate assumptions for the center "core" material requirements as a result of thermal response across the cross-section?

Response 2b: Not necessarily - depending on the shape and loading of the part, it may not be required. It is not intended that Specification 6A neither define all facets of design practice, nor that it replace the expertise of the designer. The manufacturer has the responsibility to determine what design methods are appropriate; and what level of detail is required in the design analysis.

Question 2c: Does the design methodology of clause 4.3 apply to designs when the actual "core" material strength, toughness and/or impact value (15 ft*lb) is less than what is defined for a standard material?

Response 2c: The manufacturer has the responsibility to determine what design methods of Subclause 4.3 are applied, what locations/sections of the part are analyzed, and whether reduced material properties and acceptance criteria are applicable at a given location.

Question 3a: All Bodies and Bonnets will have an integral End Connection. However, Table 5 treats material designations for Bodies separately from integral End Connections. Consider a Body with integral End Connections in Figure 3. Can it be assumed that component design takes into account the predictability of thermal response of a specified material only locally achieving the material designation properties for each region of the product?

Response 3a: YES - Where the size and configuration of the part and thermal response of the material would typically result in non-homogeneous properties, the design should take that into consideration. However, it is intended that a part manufactured from a single piece of material would have only one material designation.

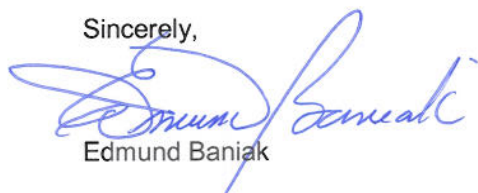
Question 3b: Or must the design utilize homogeneous properties based on the critical function of the part, as shown in (B)?

Response 3b: NO

Question 4: Combining the three questions above, there are several possible combinations of material designations and depth to which properties are designed. What combinations of material designation and material properties through a cross-section are required?

Response 4: Specification 6A does not address combinations of material designation in a single part, except where weldment construction is employed (e.g., a 60k body section with 45k weld-neck flanges attached).

Sincerely,



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