外部委託業者の募集

References: IO/18/CFT/70000402/TKA

“Framework Supply Contract for CWS Ball Valves and Check Valves”

（CWS ボールバルブとチェックバルブのフレームワーク供給契約）

IO 締め切り 2018 年 8 月 8 日(水)、国内締め切り 2018 年 8 月 8 日(水)

作業範囲

この仕様では､2018 年から 2021 年までの調達時に CWS で使用されるボールバルブとチェックバルブの材料、加工、検査、試験、および試験の要求事項を定義しています。バルブ及びアクチュエータの部品表は付属書に提供されていますが、バルブの総数は CWS の各サブシステムについて設計の最終化に伴って変更されます。バルブは、指令 2014/68/EU[参考文献[2.1]]に従った圧力付属品です。

この技術仕様におけるすべての CWS 配管とバルブは、ESPN 分類[2.55][2.56]には分類されません。

供給者は、必要な付属品、予備部品、特別工具、および文書を含む本技術仕様に従ってバルブおよびアクチュエータを設計、製造、組み立て、試験および納入し、IO へ供給するものとします。

技術的要求事項

1 設計条件

CWS バルブ及びアクチュエータは、ASME B16.34[参考文献[2.23]]に従って設計されるものとします。

本仕様書に従って購入される各バルブは、本仕様書に記載されており、特別な技術的要求事項を含む詳細な設計データは、付属書 A のバルブデータシートに記載されています。バルブの材料は、ASTM A312M[参考文献[2.26]]グレード TP304L または TP316L のいずれかである CWS 配管と適合し、バルブデータシートに記載された通りの意図されたプロセス流体(付録 A を参照)です。

本体、ボンネット又はカバー、ボディジョイントボルト、ボディネット又はカバーボルトは、ASME B16.34 表 1[参考文献[2.23]]に記載された ASTM 仕様に記載された材料で構成されるものとします。これらの部品には、ASME ボイラー及び圧力容器コードに従って同一の材料を使用することもできます[参考文献[2.24]]。

2 設計/建設の詳細

バルブは、ガスケット、パッキン、エラストマー部品、潤滑材料等を除き、所定の条件で 20 年の設計寿命を有するものとします。同一型式及び大きさのバルブ成分は相互に交換することができるものとします。

3 環境条件

すべてのバルブ及びアクチュエータは、荷重仕様[参考文献[2.5]]に定義された荷重の組合せの中で動作するように設計されなければなりません。

本明細書の付録 A には、その他の環境条件が記載されています。

4 バルブ寸法

突合せ溶接端バルブおよび連結端バルブのための端部寸法および面寸法は、ASME B16.10[参考文献[参考文献[2.21]]に準拠しなければなりません。各バルブは、本項の寸法要件に適合することを確保するために試験さ

れるものとします。

5 バルブ本体

バルブ体の内部は、バルブ体の内部に起こりうる腐食生成物及びその他の発生性材料の堆積を制限するように設計されなければなりません。
これは、内部の設計で以下を省くことで実行することができます：

-鋭角部
-強力な削減
-腐食の産物の堆積物を捕捉する可能性のある空間
-保存のゾーン
-ソケット溶接
-最適な表面品質を持たない材料

特定の設置方向を必要とするバルブについては、バルブを通して必要な流れの方向を示すバルブ体の外面に矢印が設けられなければなりません。

6 ボンネット又はカバープレート

ねじ付きボンネットジョイント(ユニオンジョイント以外)を備えたバルブは使用しないでください。
ボンネット又はカバープレートの閉鎖は、ASME B31.3 308.4 項[参考文献[2.19]]に適合する少なくとも 4 つのボルトによって固定され、又はボルト、ラグ若しくはその他の実質的な手段によって附属に付着され、流体圧力が増加するに従ってガスケットの圧縮を増加させるガスケット設計を有するか、又は第 M3 の[参考文献[参考文献[2.19]]に従って製造された完全な貫通溶接によって確保されるか、又は機械的強度に応じて製造される完全な貫通溶接によって確保されるか、又は機械的強度に応じたガスケットの設計を有するもとします。

7 バルブ座

加熱及び膨張を受ける流体を捕捉することができる二重座着設計を有するバルブは、シート間に過度の圧力を蓄積することを避けるために圧力リリーフの手段を提供しなければなりません。熱流体は、冷却することも可能であり、冷却すると大気圧に導くことができます。バルブは、この状態の間、密封能力を維持しなければなりません。バルブ座の漏れ率は、ANSI/FCI70-2[参考文献[2.16]]または API598 9th edition2009[参考文献[2.17]]のクラスⅣバルブの漏れ分類の要件に適合するものとします。

8 バルブステム

バルブは、環境への漏れを防止するために特別に設計されなければなりません。バルブは、ステムシール保持ファスナー(例えば、パッキン、グランドファスナー)のみがステムを保持しないように設計されなければなりません。具体的には、設計は、ステムがバルブから除去されることができないようにするものとし、バルブは、ステムシール保持器(例えば、パッキング押え)のみを除去することによって圧力下にあるものとします。
バルブステムシールの漏れ係数は、ISO15848-1[参考文献[2.30]]の表 1 からのクラス「A」の要件に従います。

9 手動操作

ハンドホイールは、スポークが 6 個以下のスポーク設計のものであることが望ましいです。ウェブベッド又はディスクホイールは使用してはなりません。サイズ DN400 以上のバルブには、ギヤ操作を行ってください。ハンドホイールの時計回りの操作は、別段の記載がない限り、バルブの閉鎖運動を与えなければなりません。取扱説明書を操作するために必要な手動操作は、NF EN12570Section5.1[参考文献[2.34]]の要件を満たしている必要があります。タイヤの両側にスプロケットリム及びチェーンガイドを有するチェーンホイールは、地上レベルの上に配置されたバルブの操作を容易にするために設けられなければなりません。チェーンは、床より上のレベル 1.5 メートルから作動するように十分な長さでなければなりません。

10 バルブアクチュエータ

アクチュエータは、プラグのアンバランス力が急激に変化したときに、バルブステムの位置を維持するのに十分な剛性を有するものとします。アクチュエータばねをバルブストロークの 100%に等しい距離だけ圧縮するために必要な力は、付属書 1 のように、バルブデータシートにリストされた最大差圧をプラグが受けたときに、ステム上の不平衡力に対して大きくなければなりません。制御バルブアクチュエータは、電気的又は空気圧力が喪失した場合にバルブを開閉するための手動オーバライドを備えるものとします。安全上の理由から、手動クラッチ機構が含まれていることが必要です。クラッチ機構を係合させることにより、電気/空気圧から手動(ハンドホイール)への操作が変更されます。前記クラッチ機構は、不正な手動操作を防止するためのロック装置を備えることができます。ほとんどの用途では、安全のために、電気/空気駆動運転中は安全予防策として回転するべきではありません。

11 アクチュエータ・ギヤ

アクチュエータのギヤは、任意の角度で作動するために適切なオイル充填ギヤケース内に完全に封入されなければなりません。グリース潤滑は許容されません。すべてのギヤは、金属製の構造でなければなりません。設計は、ギヤケースを開放することをせず、又はバルブを使用不能にすることなく、点検又は分解のために、ギヤケースを開けることができるようにするものとします。

12 アクチュエータハウジング

アクチュエータの一部として供給されるすべての配線は、物理的及び環境的保護のために、主筐体内に含まれなければなりません。アクチュエータのモータおよびその他の内部電気要素は、端子カバーが取り外されたときに湿気やほこりが侵入するのを防ぐために保護されています。端子カバーは、端子カバーが取り外された状態で、アクチュエータと同じ進入保護定格を持つ端子室です。コンポーネント間の外部コンジット接続は受け入れられません。アクチュエータを安全に吊り上げるための手段であって、別個に又はバルブに組み立てられたものを設けるものとします。アクチュエータハウジング又はバルブ上の構成要素のいずれかを損傷することなくストラップが固定されることができる吊りラグ又は領域は、許容可能と考えられます。

13 アクチュエータ軸とベアリング

アクチュエータ軸は、非腐食性材料であることが必要であり、アクチュエータとバルブ軸とディスク組立体との間に生じる遊び、位置ずれ、又はその他の望ましくない特性が生じる可能性がないように、バルブ軸に確実

に固定されなければなりません。外部交換可能せん断キーが設けられなければならない。出力軸は、立上りステムを受け入れるために中空であり、アクチュエータのベースにボール又はローラタイプのスラスト軸受を組み込みます。軸受は、スリーブ式の寿命自己潤滑軸受でなければなりません。

14 アクチュエータ設計

アクチュエータのストローク時間およびフェイル位置は、付録 A のデータシートに記載されています。

15 アクチュエータのサイズ設定

サプライヤは、最大遮断圧力とその結果得られるトルク要求との合計に基づいて、アクチュエータのサイジング計算を実行しなければなりません。
各バルブアクチュエータは、バルブアセンブリに固有の機械的摩擦及び/又は他の制限条件を含む最も過酷な動作条件にさらされたときに、バルブを正確に着座させ、着脱させ、位置決めするための十分な電力容量を有するものとします。
供給者は、アクチュエータを取り付け、配管し、またはワイヤを配線し、必要なアクセサリをすべて標準的な「テスト」バルブに取り付け、この仕様に従ってアクチュエータをテストします。

16 アクチュエータヨーク設計

バルブアクチュエータヨークの設計は、エアセット、リミットスイッチ及び位置指示器のような、必要な付属品の取り付けを受け入れるものとする。ヨーク材は、オーステナイト系ステンレス鋼であること。

17　空気圧アクチュエータ

アクチュエータの動作は、アクチュエータデータシート[開く空気]、[空気を閉じる]、[閉じる]、または[2 倍に作用する]に示されている通りです。この制限内で、空気圧アクチュエータは、ばねとダイアフラムと、スプリング、ピストン、２重動作ピストンまたはダイアフラムとで、所定の条件に最も適したものとすることができます。
ダイヤフラムアクチュエータについては、材料は付録 A のアクチュエータデータシートに明記され、アクチュエータへの完全な供給空気圧に耐えるように設計されなければなりません。

ピストン動作は空気圧式であること。シリンダは、完全に開放された状態から完全に閉鎖された状態で空気ピストンを完全に通過させるために供給される計器空気を利用することができ、その逆も可能です。ピストン・オペレータ・リンケージの設計は、バルブの開位置から閉位置への正の位置決めを確実にするために、最適な機械的利点を利用しなければなりません。ピストンの位置が任意の位置にあるときは、ピストンのシリンダは漏れに対して密閉されていなければなりません。ピストンは、直接の直線運動を提供するために十分に支持されなければなりません。バルブを通る流れの方向に関して、又は隣接するスペース制限に関してピストンの運転の向きは、IO の承認が必要です。アクチュエータは、バルブ位置の可視的な表示を有し、オペレータのバルブ位置の評価を容易にする必要があります。

18 電動アクチュエータ

電気アクチュエータ用のモータは、磁場内で作動するように適切に設計され、保護されなければならなりません。これは、EDH Part4[参考文献[2.7]]のガイドラインに従って設置されます。

電気アクチュエータには、制御及びスイッチング要素、リミットスイッチ、トルクスイッチ、サーモスイッチ、セレクタスイッチ(ローカルリモートオフ)、および自己完結型ユニットとしてのすべてのモニタリング要素、インジケータ、位置送信機などの、制御およびスイッチング要素を含む一体的な制御装置が備えられなければなりません。

電動アクチュエータには、モータ、減速機、リミットスイッチが含まれます。
モータは、低慣性の高トルク設計を有し、クラス B の温度上昇により、クラス F で絶縁され、最大バルブトルクの少なくとも 33%の平均負荷で 40℃15 分の時間定格を与えます([参考文献[2.48]])。温度は、モータ端巻線に埋め込まれ、その制御に組み込まれるサーモスタットによって制限されます。ユニットは、トルクインを開始するために、開口方向及び閉鎖方向の両方でステムナットにトルクインパルスを付与するように設計されなければなりません。モータは、ステム荷重が発生する前にフルスピードを達成する必要があります。

バルブに必要な最大着座トルクまたは非着座トルクは定格トルクを超えないことが必要です。モータの定格の設計基準と、表形式のモータのトルクと kW 定格を正当化する計算は、供給者によって提出されるものとします。自動的な「トルクスイッチバイパス」の手段は、トルクスイッチの維持または反復制御信号の下でトルクスイッチハンマーを防止するために、バルブ座着中およびラッチ中のトルクオフを抑制するために設けられなければなりません。

19　機械的な停止

開閉位置におけるバルブの過走行を防止するために、調整可能な機械的停止が設けられなければなりません。すべての機械的停止は、全運転者のトルクを吸収するように設計されなければなりません。

20 手動演算子

すべてのバルブアクチュエータは、自己固定式の手動式の運転者を備えなければなりません。
ハンドホイール駆動は、アクチュエータの駆動機構とは機械的に無関係でなければならず、手動力により合理的な時間でバルブ操作を許容する必要があります。取扱説明書を操作するために必要な手動力は、NF EN12570Section5.1[参考文献[2.34]]の要件を満たしている必要があります。バルブを通る流れの方向に関して、又は手動操作のためのアクセシビリティを考慮した手動運転者の向きは、IO の承認を受けなければなりません。ハンドホイールの時計回りの操作は、別段の記載がない限り、バルブの閉鎖運動を与えなければなりません。

21 リミットスイッチ

リミットスイッチは、プラント制御設計ハンドブックのセクション 4.5.5[参考文献[2.8]]に記載されている IO 制御電源パラメータと電気的に互換性があるものとします。リミットスイッチは、最低でも IEEE323[参考文

献[2.41]]IEEE344 の認定基準に適合するものとします。[参考文献[2.42]]、IEEE383[参考文献[2.43]]。
さらに、リミットスイッチの資格は、環境パラメータ及び運転要件を包含するものとします。スイッチは、ANSI60529[参考文献[2.47]]に従って、IP-65 要件に準拠した気象保護エンクロージャに封入されるものとします。

リミットスイッチ又はリミットスイッチ作動機構の取付けは、スイッチ作動点の円滑な連続調整及び正確な固定を可能とするものでなければなりません。作動機構の設計は、バルブを乱すことなく、スイッチの移動を調節することを可能にしなければなりません。リミットスイッチは、パイプラインの振動によって乱されないように、バルブに固定されている必要があります。開閉バルブの位置に対応する赤色、緑色及び黄色の光は、アクチュエータディスプレイ上に設けられなければなりません。配線の詳細については、製造業者の図面に詳細な配線図の形式で記載しなければなりません。

22　ソレノイドの作動

ソレノイドは、本明細書の付録 A に明記された ITER 電源パラメータと電気的に互換性があるものとします。ソレノイドの作動については、少なくとも IEEE323[参考文献[2.41]]、IEEE344[参考文献[2.42]]及び IEEE383[参考文献[2.43]]の資格基準に適合するものとします。さらに、ソレノイドの認証は、環境パラメータ及び運転要件を包含するものとします。

23 アース

真空容器又はクライオスタットと共に配置された制御バルブアクチュエータの全ての電気伝導性成分は、EDH Part4:EMC[参考文献[2.7]]の第 8.1.1.1 節に従ってアースに電気的に接続できるようにしなければなりません。

24 ローカル制御

アクチュエータは、開、閉、止のローカル制御を組み込み、次の 3 つの位置のいずれかでローカル/ストップ/リモートモードセレクタスイッチをロック可能にします：ローカル制御のみ、停止(電気的操作なし)、リモートコントロール、ローカルストップのみ。維持された又は維持されていない局所制御を選択することが可能でなければなりません。ローカル制御装置は、アクチュエータの停止を必要とせず、バルブの移動方向を反転させることができるように配置されなければなりません。ローカル制御及び表示は、バルブ及びアクチュエータの向きに適合するように 90 度の増分を通して回転することができる必要があります。アクチュエータは、アクチュエータの様々な構成要素内の誘導効果を最小にするために、EDH Part4:EMC[参考文献[2.7]]からのガイダンスごとに設計されなければなりません。

26 ねじ付きファスナー

ねじ付きファスナーは、ASME B1.1[参考文献[2.18]]に適合する統一された直列ねじ山を有するものとします。すべてのねじ付き圧力保持ファスナーには、耐食性のある正の係止装置が設けられなければなりません。摩擦係止装置は許容されません。すべてのナット及びボルトは、特に定めがない限り、六角形の頭部を有するものとします。

27　補助接続

バイパス接続のための補助接続は、バルブと少なくとも同じ圧力-温度定格を保証するように設計、製作され、検査されなければならず、また、それらが取り付けられているバルブの前に設置されなければなりません。溶接された補助接続部はバルブの壁に直接溶接されなければならず、ソケット溶接は使用できません。接続の大きさが補強を必要とする場合には、 [参考文献[2.23] 6.3.5 項の]要件を満たすボスを追加しなければなりません。

28　バルブリフティングアタッチメント

バルブの重量機器には、ラグ又はアイボルトのような取扱い方法を設けなければなりません。

29 ポジション表示

バルブの位置指示は、表示手段の構成機器が、バルブ開位置又は閉位置を誤って示して組み立てられることがないように設計されなければなりません。

30 バルブ本体継ぎ手

バルブ本体継手は、ボンネット又はカバープレート継手以外のものは、 [参考文献[2.19] M3 07.2(b)(2)項に適合するものでなければなりません。

31　終端接続

バルブ終点は、バルブが接続されるパイプのものと同じ材料及びスケジュールの端部を有するものでなければなりません。バルブの終端接続には、ソケット溶接およびねじ接続は許可されていません。

32 突合せ溶接端

バルブの溶接端の準備の詳細は、ASME B16.25[参考文献[2.22]]に従って、ASME B16.34 の 6.2.1 項[参考文献[2.23]]に適合する内外径の公差を付しなければなりません。

33　フランジ終端

フランジの終端は、クラス 150 及び 300 バルブ用の 5.40.1 本のフランジ付き継手のための ASME B16.5[参考文献[2.20]]の要件に従って、フランジ面、ナットベアリング面、外径、厚さ、穴あけを備えて作成されなければなりません。すべてのフランジ付きバルブは、バルブの圧力-温度定格に対応するフランジを有していなければなりません。タップ穴を備えたフランジは、少なくともボルトの公称径と等しい長さに対して、面取りされたねじを含まない完全に有効なねじ係合を提供しなければなりません。

34 溶接

溶接の溶接加工及び熱処理は、ASME B16.34para2.1.6(b)[参考文献[2.23]]に従って行わなければなりません。

35　表面準備要件

塗料の選定、適格性確認及び塗布は、鉄鋼構造審議会(SSPC)の規格に該当するものとします。
表面準備作業は、次の基準又は勧告された慣行に従って、適用されます：SSPC SP1[参考文献[2.36]]、SSPC SP2[参考文献[2.37]]、SSPC SP5[参考文献[2.38]]、および SSPC SP10[参考文献[2.39]]
その他の被覆、試験及び検査の活動は、ASTM D4285[参考文献[2.27]]、ASTM D4417[参考文献[2.28]]、ASTM D5162[参考文献[2.29]]、NACE SP0188[参考文献[2.32]]、NACE RP0287[参考文献[2.31]]、及び SSPC PA2[参考文献[2.35]]に準拠しなければなりません。すべてのコーティングシステムは、供給者の勧告に従って適用されなければなりません。ブラスト洗浄した表面は、発破後 4 時間以内及び錆が発生する前に、ベースコートでコーティングしなければなりません。すべての表面準備及び塗装作業は、IO の承認を受けなければなりません。色の選択は、トップコートの適用前に、IO の承認を受けなければなりません。

36 コーティング材

IO は、注文書のバルブに対してコーティング材料の要求事項を提供します。
供給者は、審査及び承認のために、表面準備及びコーティング塗布を IO に詳細に記載したコーティング手順を提出しなければなりません。

37 必要なドキュメント

供給者は、使用されるコーティング製造業者、プライマーのブランド名、仕上げコート、色を示す、各機器に金属タグを有するものを ITER –IO に供給しなければなりません。

38 銘板

バルブは、ステンレス鋼製のタグで永久的に識別されるものとし、次のものは、刻印又は化学的又は電気的にエッチングされたものとします。

- IO の供給オーダーとアイテム番号
- タグ番号
- 製造元の名前と住所
- 製造元のシリアル番号
- メーカーのモデル識別
- 製造年
- サービスの説明
- バルブタイプ
- 圧力、温度、大きさ、材料などの適用可能なデータ
- IO シリアル・ナンバー(供給者に提供される)

バルブの本体にステンレス鋼製のタグを付けるか、又は耐食性のステンレス鋼線を使って取り付けなければなりません。

39「CE」適合性及び適合性の宣言

「CE」マーキングは、PED[参考文献[2.1]]及び ESP[参考文献[2.2]]の範囲内のバルブに対して必要とされます。

バルブが PED[参考文献[2.1]]に適合することを証明する適合性宣言が作成され署名されなければなりません。

40　PED 分類

PED 分類の場合、参照[2.57]を参照してください。CCWS1 の配管とバルブは、Sound Engineering Practice(SEP)に分類されますが、大きい(DN350 以上)はカテゴリー-1 に分類されます(DN300 以上)。CCWS-2A のパイプとバルブは、DN250 までの直径を持つパイプとバルブは SEP カテゴリーに属していますが、DN250 より大きいパイプはカテゴリー1 のパイプとなっています。CCWS-2B の場合、DN350 は SEP として分類されますが、直径(DN450 以上)の配管は区分 1 に分類されます。CCWS-2C および 2D では、DN300 は SEP に分類され、DN400 以上のパイプおよびバルブはカテゴリー1 に分類されます。CHWS-H2 では、DN300 までの小径の配管とバルブは、Sound Engineering Practice(SEP)に分類されますが、大きいもの(DN350 以上)は、Category-1 に分類されます。CHWS -H1 では、DN400 までの小径の配管とバルブは、Sound Engineering Practice(SEP)に分類されますが、大きい方のもの(dn450 以上)は、カテゴリー1 に分類されます。

41 材料仕様

41.1 化学組成

バルブの材料は、バルブデータシートに記載されているように、ASTM A312M[参考文献[2.26]]グレード TP304L 又は TP316L のいずれかである CWS 配管と互換性があるものとします。

41.2　禁止材料

水銀は、バルブ部の金属又はその蒸気へのばく露を生じさせるバルブの建設を含むいかなる場合でも、使用することはできません。作業流体と接触する鉛又はその他の低融点金属を使用することは禁止されています。
作動流体に露出した窒化表面を使用することは禁止されています。
赤色鉛黒鉛鉱物油、二硫化モリブデン潤滑剤、ハロゲン化物、硫黄、銅、亜鉛及びリンによるバルブ材料の汚染がないように注意が払われるべきです。
テフロン及び同様のエラストマーは使用しないことが望まれます。
ハロゲン系製品の使用は禁止されています。
石綿又は PCB を含有する材料の使用は禁止されています。

42　試験の要求事項

バルブの建設に使用されるすべての材料は、ASME B16.34 表 1、材料グループ 2.3[参考文献[参考文献[2.23]]に記載されている ASME/ASTM 材料規格に従って、または ASME BPVC に従って、ASME BPVC、セクション II[参考文献[2.24]]に従って、化学的及び物理的性質を試験するためのミル試験を受けなければなりません。
ソースで必要なテストが実行されたことを示す証明書(テスト・レポート)を提出する必要があります。
主圧力保持材料については、EN10204[参考文献[2.33]]の型式 3.1 の証明書を記載してください。
引張試験及び衝撃試験の ISO 規格を用いなければならなりません。

43 衝撃試験と引張試験

機械的特性は、材料の仕様によって必要とされる材料の最終熱処理条件を表す試験片から得られるものとします。

他の基準に従って他の値が必要とされない限り、標準的手順によって実施される引張試験において、破断後の伸びは 14%以上であり、ISO V 試験片上で測定された曲げ破断エネルギーは、20℃以下で最低予定運転温度より高くない温度では、27J 以上です。
引張試験及び衝撃試験の ISO 規格を用いなければなりません。

44 硬度試験

バルブに使用されるゴム部品のショア硬度試験を行い、ゴム成分の適合性証明書を提出してください。

45　シェルリークテスト

シェルリーク試験は、ASME B16.34 セクション 7.1[参考文献[2.23]]及び API598[参考文献[2.17]]の要件に従って、各バルブに対して行われます。

46 バックシート試験

バックシートの特徴(グローブバルブ及びゲートバルブの場合に適用される)を有するバルブについては、API598[参考文献[2.17]]の要件に従って、バックシート試験を実施しなければなりません。
バックシート試験は、ボンネット又はシャフトのシールがボンネットに損傷を及ぼすことを防止するために、シェル試験の前に行われるものとします。

47 バルブ閉鎖試験と漏洩防止試験

各バルブには,ASME B16.34Section7.2[参考文献[2.23]]及び API598[参考文献[2.17]]の要件に従って閉鎖試験を実施しなければなりません。ボールバルブのために、金属製のシートには、ANSI/FCI70-2[参考文献[2.16]]または API6D[参考文献[2.49]]があります。閉鎖性試験の必要事項は、附属書 A のバルブデータシートに定める必要事項に適合するものとします。

48 動力作動バルブの追加試験

電力操作バルブについては、IEEE382 に従ってアクチュエータのタイプ試験を付録 A に明記されている通りに実施しなければなりません。各アクチュエータは性能試験されなければならず、個々の試験証明書が供給されなければなりません。試験装置は、典型的なバルブ荷重を模擬し、アクチュエータの出力速度、運転時間などの各種パラメータを記録しなければなりません。トルク試験は、すべてのアクチュエータに対して行われます。
電気アクチュエータは、フル負荷で定格電圧の 80%で試験してください。
モータ及び制御配線の高電圧試験を 1500V で 1 分間行わなければなりません。また、試験証明書には、手動・自動運転の歯車比、閉方向、配線図コード番号等の仕様の詳細を記録してください。各バルブは、バルブ座漏れをチェックするためにアクチュエータと共に試験され、バルブの適切な機能が試験されなければなりません。開閉時間を記録してください。バルブは、圧力に対して開放され、最低 3 回閉鎖されます。電動アクチュエー

タの場合、モータによって引き起こされる電流は、開閉の際に測定されなければなりません。リミットスイッチの機能が確認されなければなりません。

49 機能テスト

全ての動力バルブは、附属書 A に記載されているように、設計サービス圧力で機能的資格試験を受けるものとします。全ての動力バルブを試験する前に、リミットスイッチ、機械的ストッパー、位置指示等の設定を含めて、すべての動力バルブを十分に校正しなければなりません。バルブの操作中には、リミットスイッチの設定も確認しなければなりません。運転エア供給は、VSS に示されるように、制限をもって使用されるものとします。動力駆動バルブは、動力及び性能を考慮した上で、アクチュエータを用いて運転しなければなりません。バルブの開閉時間を記録しておく必要があります。

【※　詳しくは添付の英語版技術仕様書「**TECHNICAL SPECIFICATION FOR CWS BALL VALVES、TECHNICAL SPECIFICATION FOR CWS CHECK VALVES**」をご参照ください。】
ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overviewからもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

china eu india japan korea russia usa
Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

To:
Domestic Agencies

Date: 16 July 2018

Reference: IO/18/CFT/70000402/TKA

Subject: Call for Nominations – Framework Supply Contract for CWS Ball Valves and Check Valves

Dear Colleagues,

The ITER Organization (IO) invites the Domestic Agencies to nominate companies, institutions or other entities that are capable of supplying Ball Valves and Check Valves.

Please find enclosed the Technical Specifications for:

- Ball Valves (ref ITER_D_WCHDBV version 1.4)
- Check Valves (ref ITER_D_WDS3BP version 1.3)

The potential Candidates should have a recognized level of expertise, skills and demonstrated experience in the field mentioned above, as well the financial capability.

Therefore, could you please kindly provide Procurement and Contracts Division with a list of suitable potential Candidates, mentioning their up-to-date contract details using the attached excel template?

Please kindly send your proposals by e-mail to Takakazu.Kimura@iter.org in copy to Irina.Daufresne@iter.org by latest 8 August 2018.

The tentative schedule of procurement is as follows:

- Call for tender issuance: August 2018
- Contract Award: October 2018
- Delivery of valves at ITER site: From April 2019

Contact: Takakazu KIMURA - Procurement & Contract Division
Tel. +33 4 42 17 85 73 e-mail: Takakazu.Kimura@iter.org

china eu india japan korea russia usa
Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France

After the Domestic Agencies nominate the potential Candidates to the IO, the IO will issue a Call for Tender (CFT) Package to those Candidates.

To answer to such Package, the Candidate will be expected to submit:
1) Questionnaire (attached) and
2) Technical and financial offer

The detailed instructions will be given to the nominated Candidates by the IO later with regards to modalities and requirements of CFT offer submission, however, please note the IO plans to accept the offers of those Candidates who may satisfy the attached questionnaire.

At the time of Call for Nominations, the interested suppliers are not requested to submit the questionnaire but please be reminded that the questionnaire will be sent to the nominated Candidates later by the IO. Therefore, we request that only those who can satisfy the attached questionnaire should request nominations to each relevant Domestic Agency.

Thank you in advance for your kind cooperation.

Yours faithfully,

Françoise FLAMENT
Head of Procurement and Contracts Division

Annexes:

- Nominations template in Excel
- Questionnaire
- Technical Specifications for Ball Valves (ref ITER_D_WCHDBV version 1.4)
- Technical Specifications for Check Valves (ref ITER_D_WDS3BP version 1.3)

Contact: Takakazu KIMURA - Procurement & Contract Division
Tel. +33 4 42 17 85 73 e-mail: Takakazu.Kimura@iter.org

Questionnaire to be completed by the nominated Candidate at the time of Call for Tender invitation

IO/17/CFT/70000402/TKA

Framework Contract for Ball valve and Check valve.

After the Domestic Agencies nominate the potential Candidates to the IO, the IO will issue a Call for Tender (CFT) Package to those Candidates.

To answer to such Package, the Candidate will be expected to submit:

1) Questionnaire (below) and
2) Technical and financial offer

The detailed instructions will be given to the nominated Candidates by the IO later with regards to modalities and requirements of CFT offer submission, however, please note the IO plans to accept the offers of only those Candidates who satisfy the questionnaire.

At the time of Call for Nominations, the interested suppliers are not requested to submit the questionnaire but please be reminded that the below questionnaire will be sent to the nominated Candidates later by the IO. Therefore, we request that only those who can satisfy the below questionnaire should request nominations to each relevant Domestic Agency.

Questionnaire - Demonstration of Experience and Capability (Technical and Financial)

No	Question	Answer by Supplier
Question 1	Have you supplied ball valves in the size range of DN 15 to DN 300 in the last 10 years	Yes/No
Question 2	Have you supplied ball valves in accordance with ASME B16.34 or equivalent standard in the last 10 years?	Yes/No
Question 3	Have you supplied check valves in the size range of DN 15 to DN 300 in the last 10 years?	Yes/No
Question 4	Have you supplied check valves in accordance with ASME B16.34 or equivalent standard in the last 10 years?	Yes/No
Question 5	Please attach your project reference list to support your answers above.	Attached / Not attached
Question 6	Please confirm that your average annual turnover in the last 3 years exceeds 1,000K EUR.	Yes/No

IDM UID
WCHDBV
VERSION CREATED ON / VERSION / STATUS
15 Jun 2018 / 1.4 / Approved
EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

TECHNICAL SPECIFICATION FOR CWS BALL VALVES

This purpose of this document is to support the PR release, the appendix A will be integrated in next version.

TECHNICAL SPECIFICATION FOR CWS BALL VALVES

TABLE OF CONTENTS

1. Scope of Work

This specification defines the material, fabrication, inspection, examination, and testing requirements for ball valves used in the CWS under procurement from the year 2018 to 2021. The bill of materials of valves and actuators will be provided in the Appendix, but the total number of valves is subject to change with the finalization of design for each subsystem of CWS.
The valves are pressure accessories in accordance with DIRECTIVE 2014/68/EU [Ref.[2.1]]. All the CWS valves in this technical specification are not classified for ESPN classification [2.55] [2.56]. The Supplier shall design, fabricate, assemble, test and deliver the valves and actuators in accordance with this technical specification including required accessories, spare parts, special tools, and documentation to the IO.

2. Reference Codes, Standards, and Requirements

The revisions of the following codes, standards, and regulatory requirements that apply to this specification are provided for below in the "Codes and Standards". The documents provided for in the "General References" are documents that will be provided by the IO to the Supplier as requirements that shall be respected during the planning and execution of the Specification. Any conflict between requirements shall be brought to the attention of IO for resolution.

General References

[2.1] DIRECTIVE 2014/68/EU of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment – EN (RZ6PAK v1.0)
[2.2] French Decree 2015-799 , and Article R557 of the French Environmental Code
[2.3] Compliance ASME B16.34 and ESP/ESPN (33YHTZ v1.1)
[2.4] NA
[2.5] Load Specification for Cooling Water System (3YGYH7 v4.0)
[2.6] EDH Guide A: Electrical Installations for SSEN Client Systems (2EB9VT v2.4)
[2.7] EDH Part 4: Electromagnetic Compatibility (EMC) (4B523E v3.0)
[2.8] Plant Control Design Handbook (27LH2V v7.0)
[2.9] ITER Procurement Quality Requirements (ITER_D_22MFG4)
[2.10] Order dated 7 February 2012 relating to the general technical regulations applicable to INB - EN (7M2YKF)
[2.11] Procurement Requirements for Producing a Quality Plan (ITER_D_22MFMW)
[2.12] Requirements for Preparing and Implementing a Manufacturing and Inspection Plan (ITER_D_22MDZD)
[2.13] Procedure for management of Nonconformities (22F53X v7.0)
[2.14] Procedure for the management of Deviation Request (2LZJHB v5.5)
[2.15] Quality Assurance for ITER Safety Codes Procedure (258LKL)

Codes and Standards

[2.16] ANSI/ FCI 70-2-2013, "Control Valve Seat Leakage"
[2.17] API 598 9th edition 2009
[2.18] ASME B1.1-2003, "Unified Inch Screw Threads, UN and UNR Thread Form"
[2.19] ASME B31.3-2010, "Process Piping"

[2.20] ASME B16.5-2013, “Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard”
[2.21] ASME B16.10-2009, “Face-to-Face and End-to-End Dimensions of Valves”
[2.22] ASME B16.25-2012, “Butt welding Ends”
[2.23] ASME B16.34-2013, “Valves – Flanged, Threaded and Welding End”
[2.24] ASME B&PV Code Section II, “Materials”, 2013 Edition
[2.25] ASME QME-1-2012, “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants.”
[2.26] ASTM A312M, “Standard Specification for Seamless, Welded, and Heavy Cold Worked Austenitic Stainless Steel Pipes”
[2.27] ASTM D4285-12, “Standard Test Method for Indicating Oil or Water in Compressed Air”
[2.28] ASTM D4417-14, “Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel”
[2.29] ASTM D5162-08, “Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates”
[2.30] ISO 15848-1:2006, “Industrial Valves – Measurement, Test, and Qualification Procedures for Fugitive Emissions – Part 1: Classification System and Qualification Procedures for Type Testing of Valves”
[2.31] NACE RP0287-02, “Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape”
[2.32] NACE SP0188-06, “Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates”
[2.33] NF EN 10204: 2005, “Metallic Products – Types of Inspection Documents”
[2.34] NF EN 12570:2001, “Industrial Valves: Method for Sizing the Operating Element”
[2.35] SSPC-PA-2, “Procedure for Determining Conformance to Dry Coating Thickness Requirements”
[2.36] SSPC-SP-1, “Solvent Cleaning”
[2.37] SSPC-SP-2, “Hand Tool Cleaning”
[2.38] SSPC-SP-5, “White Metal Blast Cleaning”
[2.39] SSPC-SP-10, “Near-White Blast Cleaning”
[2.40] ASME NQA-1-2012, “Quality Assurance Requirements for Nuclear Facility Applications”
[2.41] IEEE 323-2004, “Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations”
[2.42] IEEE 344-2013, “IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations”
[2.43] IEEE 383-04, “IEEE Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations”
[2.44] IEEE 382-2007, “IEEE Standard for Qualification of Safety-Related Actuators for Nuclear Power Generating Stations”
[2.45] ANSI/MSS SP-55-2011, “Quality Standard for Steel Castings for Valves, Flanges, Fittings, and Other Piping Components – Visual Method for Evaluation of Surface Irregularities”
[2.46] ANSI/MSS SP-25-2013 - Standard Marking System for Valves, Fittings, Flanges, and Unions
[2.47] ANSI 60529-04 -Degrees of Protection Provided by Enclosures (IP Code)
[2.48] NEMA MG 1-2011-Motors and Generators
[2.49] API 6D-latest, “Specification for Pipeline Valves”
[2.50] Provisions for implementation of the generic safety requirements by the external interveners (SBSTBM v1.1)

[2.51] Propagation of the Defined Requirements for Protection Important Components Through the Chain of External Interveners (BG2GYB v3.3)
[2.52] List of ITER-INB Protections Important Activities (PSTTZL v2.2)
[2.53] Safety Important Functions and Components Classification Criteria and Methodology (347SF3 v1.8)
[2.54] Chemical composition and impurity requirements for materials (REYV5V v2.3)
[2.55] System Design Description Document (DDD) of CCWS (9K984A v2.1)
[2.56] System Design Description Document (DDD) of CHWS-H2 (TL6YM4 v1.1)
[2.57] PED Hazard Categorization of Piping and Valves (CCWS, CHWS and HRS) (QCKABL v1.2)

3. Abbreviations

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASN	Autorité de Sûreté Nucléaire
ASTM	American Society for Testing and Materials
API	American Petroleum Institute
CWS	Cooling Water System
CCWS	Component Cooling Water System
DM	Demineralized Water
EDH	Electrical Design Handbook
ESPN	Equipements Sous Pression Nucléaire
INB	*Installation nucléaire de base*, Basic Nuclear Installation.
IAEA	International Atomic Energy Agency
IEEE	Institute of Electrical and Electronics Engineers
IDM	ITER Document Management
IO	ITER Organization
ISO	International Organization for Standardization
MIP	Manufacturing and Inspection Plan
MQP	Management and Quality Program
PED	Pressure Equipment Directive
PIA	Protection Important Activity
PIC	Protection Important Component
QA	Quality Assurance
QCR	Quality Control Review
QP	Quality Plan
SEP	Sound Engineering Practice
SIC	Safety Important Class
SRD	System Requirement Document
SSC	Structures, Systems and Components
SSPC	Steel Structures Painting Council

4. Functions and Boundaries

The valve's primary function is to provide positive shutoff or to control flow of the process fluid. The process fluid will be as described in the Valve Data Sheets (see Appendix A).

Boundaries of jurisdiction shall be the valve ends where the valve's pressure boundary connects to the adjoining piping. The valves are pressure accessories in accordance with DIRECTIVE 2014/68/EU [Ref.[2.1]].

5. Technical Requirements

5.1 Design Conditions

The CWS valves and actuators shall be designed to ASME B16.34 [Ref. [2.23]]. Each valve purchased in accordance with this Specification is described in, and its detailed design data, including special technical requirements, are provided in the Valve Data Sheets of Appendix A.

The material of the valve shall be compatible with the CWS piping, which is either ASTM A312M [Ref. [2.26]] grade TP304L or TP316L and the intended process fluid as described in the Valve Data Sheets (see Appendix A).

The body, bonnet or cover, body joint bolting, and body-bonnet or cover bolting, shall be constructed of materials as listed in the respective ASTM specifications referred to in ASME B16.34 Table 1 [Ref. [2.23]]. Identical materials in accordance with the ASME Boiler and Pressure Vessel Code, Section II [Ref. [2.24]] may also be used for these parts.

5.2 Design/ Construction Details

The valve shall have a design life of 20 years at the specified conditions, excluding items such as gaskets, packing, elastomer parts, and lubrication materials. Valve components of the same type and size shall be mutually interchangeable.

5.3 Environmental Conditions

All valves and actuators shall be designed to operate during the combination of the loads as defined in the Load Specification [Ref. [2.5]]. Additional environmental conditions are provided for in Appendix A of this Specification.

5.4 Valve Dimensions

End-to-end dimensions and face-to-face dimensions for butt welding-end valves and for flanged-end valves shall be in accordance with ASME B16.10 [Ref. [2.21]]. Each valve shall be examined to ensure it meets the dimensional requirements of this section.

5.5 Valve Body

The internals of the valve body shall be designed to limit the deposition of possible corrosion product and other erogenous materials inside the valve body. This may be performed by in the design of the internals eliminating:

- sharp angles
- strong reductions
- spaces likely to trap the deposits of products of corrosion
- zones of retention

- socket welds
- materials which do not have an optimum surface quality

For valves that require a certain installation orientation, an arrow shall be provided on the external surface of the valve body depicting the required flow direction through the valve.

5.6 Bonnet or Cover Plate

Valves having threaded bonnet joints (other than union joints) shall not be used. Bonnet or cover plate closures shall be: flanged, secured by at least four bolts with gasketing conforming to ASME B31.3 para. 308.4 [Ref. [2.19]], or proprietary, attached by bolts, lugs, or other substantial means, and having a gasket design that increases gasket compression as fluid pressure increases; or secured with a full penetration weld made in accordance with para. M311 [Ref. [2.19]]; or secured by a straight thread sufficient for mechanical strength, a metal-to-metal seat, and a seal weld made in accordance with paragraph M311 [Ref. [2.19]], all acting in series.

5.7 Valve Seat

Valves with double seated designs that can trap fluid subjected to heating and expansion shall provide a means of pressure relief to avoid excessive pressure build up between the seats. Hot fluid could also be trapped and lead to sub-atmospheric pressure when it cools down. The valve shall maintain its sealing capacity during this condition.

The valve seat leakage rate shall conform to the requirements of Class IV – valve leakage classification per ANSI/FCI 70-2 [Ref. [2.16]] or API 598 9th edition 2009 [Ref. [2.17]].

5.8 Valve Stem

Valve shall be specially designed to prevent stem leakage to the environment. Valves shall be designed so that the stem seal retaining fasteners (e.g., packing, gland fasteners) alone do not retain the stem. Specifically, the design shall be such that the stem shall not be capable of removal from the valve, while the valve is under pressure, by the removal of the stem seal retainer (e.g. gland) alone.

The leak tightness of the valve stem seal shall follow the requirements of class “A” from table 1 of ISO 15848-1 [Ref. [2.30]].

5.9 Manual Operator

Hand-wheels shall be of spoke design preferably with not more than six spokes. Webbed or disc hand-wheels shall not be used. Valves of sizes DN400 and above shall be provided with gear operation. Clockwise operation of the hand-wheel shall give closing movement of the valve, unless stated otherwise. The manual force required to operate the manual operator shall meet the requirements of NF EN 12570 Section 5.1 [Ref. [2.34]].

Chain wheel with sprocket rim and chain guides on both sides of the wheel shall be provided to facilitate operation of valves located above ground level. The chain shall be of adequate length so as to operate from a level 1.5 meter above the floor.

5.10 Valve Actuator

The actuator shall be stiff enough to maintain the valve stem position when the unbalanced forces on the plug change suddenly. The force necessary to compress the actuator spring a distance equal to 100% of the valve stroke, under bench conditions, shall be large relative to

the unbalanced force on the stem when the plug is subjected to the maximum differential pressure listed on the Valve Data Sheets as in the Annex 1.

Control valve actuators shall be furnished with a manual override to open or close the valve in the event of loss of electric or pneumatic power. For safety reasons, it is required that a manual declutch mechanism be included. Engaging the declutch mechanism changes the operation from electrical/ pneumatic powered to manual (handwheel) operation. The declutch mechanism may be provided with a locking device to prevent unauthorized manual operation. In most applications, the handwheel should not turn while in electrical/ pneumatic powered operation as a safety precaution.

5.11 Actuator Gearing

Actuator gearing shall be totally enclosed within the oil-filled gear case suitable for operation at any angle. Grease lubrication is not permissible. All gearing must be of metallic construction. The design shall be such as to permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service.

5.12 Actuator Housing

All wiring supplied as part of the actuator shall be contained within the main enclosure for physical and environmental protection. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site for cabling, the terminal compartment having the same ingress protection rating as the actuator with the terminal cover removed. External conduit connections between components will not be accepted.

A means for safely hoisting the actuator, either separately or assembled to the valve, shall be provided. Lifting lugs or areas where straps may be secured without damaging any of the components on the actuator housing or valve will be considered acceptable.

5.13 Actuator Shaft and Bearings

The actuator shaft shall be of a noncorrosive material and shall be securely fastened to the valve shaft in a manner such that there is no possibility of play, misalignment, or other undesirable characteristics occurring between the actuator and valve shaft and disc assembly. An external replaceable shear key shall be provided. The output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator.

The shaft bearing shall be lifetime self-lubricating bearings of the sleeve type.

5.14 Actuator Design

The stroke time and the fail position of the actuator are provided for in the data sheet in Appendix A.

5.15 Actuator Sizing

The Supplier shall perform the sizing calculation for the actuator based upon the sum of the maximum shut-off pressure and resulting torque requirements.

Each valve actuator shall have ample power capacity for accurately seating, unseating, and positioning the valve when subjected to the most severe operating condition, including any mechanical friction and/or other restrictive conditions that are inherent in the valve assembly.

The Supplier shall install, pipe and/or wire the actuator and all required accessories on a typical "test" valve and test the actuator per this specification.

5.16 Actuator Yoke Design

The valve actuator yoke design shall be such that it will accept installation of required accessories such as the air set, limit switches and position indicator. The yoke material shall be austenitic stainless steel.

5.17 Pneumatic Actuators

The actuator action shall be as indicated on the Actuator Data Sheets [air to open, air to close, or double acting]. Within this limitation the pneumatic actuator may be spring and diaphragm, spring and piston or double acting piston or diaphragm whichever is the most suitable for the specified conditions.

For diaphragm actuators, the material shall be specified in the Actuator Data Sheets of Appendix A and shall be adequately designed to withstand the full supply air pressure to the actuator.

Piston operators shall be of the pneumatic type. The cylinders shall be capable of utilizing the instrument air supplied to give full travel of the air piston from fully open to fully closed and vice versa. The design of the piston operator linkage shall utilize the optimum mechanical advantage to ensure positive positioning of the valve from open to the closed position. The piston cylinder shall be sealed against leakage when the piston is in any position. Actuators shall be provided with self-lubricated piston rings and stem seals. The piston shall be adequately supported to provide direct linear-motion. Orientation of the piston operators with respect to flow direction through the valve or to adjacent space limitations shall be subject to IO's approval. The actuators shall have a visible indication of the valve position, to facilitate operator's assessment of valve position.

5.18 Electric Actuators

The motors for the electric actuators shall be properly designed and protected to operate within the magnetic field, it is to be installed per the guidelines in the EDH Part 4 [Ref.[2.7]].

The electric actuators shall be provided with integral controls including control and switching elements, all electrical components such as limit switches, torque switches, thermo switches, selector switches (Local-Remote-Off), and all monitoring elements, indicators, position transmitters etc. as a self-contained unit.

The Electric Actuator shall include a motor, reduction gearing and limit switches. The motor shall have a low inertia high torque design, class F insulated with a class B temperature rise, giving a time rating of 15 minutes at 40°C at an average load of at least 33% of maximum valve torque [Ref. [2.48]]. The temperature shall be limited by thermostats embedded in the motor end windings and integrated into its control. The unit shall be so designed that a torque impulse is imparted to the stem nut in both opening and closing direction to start the disc in motion. The motor shall attain full speed before the stem load is encountered.

The maximum seating or unseating torque required by the valve shall not exceed the rated torque. The design basis of rating of motor and calculations justifying torque and kW rating of the motors in tabular form shall be submitted by the Supplier. A means for automatic 'torque switch bypass' shall be provided to inhibit torque-off during valve unseating and latching to prevent torque switch hammer under maintained or repeated control signals.

5.19 Mechanical Stops

Adjustable mechanical stops shall be provided to prevent over-travel of the valve in the open and closed position. All mechanical stops shall be designed to absorb the full operator torque.

5.20 Manual Operators

All valve actuators shall be provided with manual operators that shall be self-locking. The hand-wheel drive must be mechanically independent of the drive mechanism of the actuators and shall permit valve operation in a reasonable time with manual force. The manual force required to operate the manual operator shall meet the requirements of NF EN 12570 Section 5.1 [Ref. [2.34]]. Orientation of the manual operators with respect to the direction of flow through the valves or accessibility for manual operation shall be subject to the IO's approval. Clockwise operation of the hand-wheel shall give closing movement of the valve, unless stated otherwise.

5.21 Limit Switches

The limit switches shall be electrically compatible with the IO control power parameters provided in the Plant Control Design Handbook section 4.5.5 [Ref.[2.8]]. The limit switches shall, as a minimum, meet the qualification standards of IEEE-323 [Ref. [2.41]], IEEE-344 [Ref. [2.42]], and IEEE-383 [Ref. [2.43]]. Furthermore, the qualification of the limit switches shall encompass the environmental parameters and operating requirements. The switches shall be enclosed in weather proof enclosures conforming to IP-65 requirements as per ANSI 60529 [Ref. [2.47]].

The mounting of the limit switches or limit switch actuating mechanism shall be such as to permit smooth continuous adjustment and exact fixing of the switch actuating point. The design of the actuating mechanism shall permit the adjustment of switch over travel without disturbing the valve. The limit switch should be rigidly mounted on the valve such that it does not get disturbed by pipe line vibrations. Red, green and yellow lights corresponding to open, closed and intermediate valve positions shall be provided on the actuator display. Contact wiring details shall be shown in the manufacturer's drawings in the form of detailed wiring diagram.

5.22 Operating Solenoids

The solenoids shall be electrically compatible with the ITER power supply parameters specified in Appendix A of this Specification. The solenoid operators shall, as a minimum, meet the qualification standards of IEEE-323 [Ref. [2.41]], IEEE-344 [Ref. [2.42]], and IEEE-383 [Ref. [2.43]]. Furthermore, the qualification of the solenoids shall encompass the environmental parameters and operating requirements.

5.23 Earthing

All electrical conducting components of the control valve actuator located with the vacuum vessel or cryostat shall be able to be electrically connected to earth in accordance with Section 8.1.1.1 of EDH Part 4: EMC [Ref. [2.7]].

5.24 Local Controls

The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator. The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

5.25 Induction Effects

The actuators shall be designed per guidance from EDH Part 4: EMC [Ref.[2.7]], to minimize the induction effects within the various components of the actuators.

5.26 Threaded Fasteners

Threaded fasteners shall have unified series screw threads conforming to ASME B1.1 [Ref. [2.18]]. All threaded pressure retaining fasteners shall be provided with corrosion resistant positive locking devices. Frictional locking devices are not acceptable. All nuts and bolts shall have hexagonal heads unless otherwise specified.

5.27 Auxiliary Connections

Auxiliary connections, e.g., for bypass connections, shall be designed, fabricated, and examined so as to warrant at least the same pressure-temperature ratings as the valve and shall be installed prior to the test of the valve to which they are attached.

Welded auxiliary connections shall be butt welded directly to the wall of the valve, socket welding shall not be used. If the size of the connection requires reinforcement, then a boss shall be added satisfying the requirements of para. 6.3.5 [Ref. [2.23]].

5.28 Valve Lifting Attachments

Heavy components of valves shall be provided with a method of handling, such as lugs or eye-bolts.

5.29 Position Indication

The position indication of the valve shall be designed such that components of the indicating means cannot be assembled to falsely indicate the valve open or closed position.

5.30 Valve Body Joints

Valve body joints, other than bonnet or cover plate joints, shall conform to para. M307.2(b)(2) [Ref. [2.19]].

5.31 End Connections

Valve ends shall have ends that are of the same material and schedule as of the pipe to which the valve will connect. Socket welded and threaded connections are not permitted for the end connections of the valves.

5.32 Buttweld Ends

The details for the welding end preparation for valves shall be in accordance with ASME B16.25 [Ref. [2.22]] with the tolerances for the inside and outside diameter conforming to ASME B16.34 para. 6.2.1 [Ref.[2.23]].

5.33 Flanged Ends

Flanged ends shall be prepared with flange facing, nut-bearing surfaces, outside diameter, thickness, and drilling in accordance with ASME B16.5 [Ref. [2.20]] requirements for

5.40.1 Flanged fittings for Class 150 and 300 valves

All flanged valves shall have flanges corresponding to the pressure-temperature rating of the valves. Flanges furnished with tapped holes, shall provide full effective thread engagement, not including the chamfered thread, for a length at least equal to the nominal diameter of the bolt thread.

5.34 Welding

Weld fabrication and heat treatment of welds shall be performed in accordance with ASME B16.34 para 2.1.6(b) [Ref. [2.23]].

5.35 Surface Preparation Requirements

Selection, qualification, and application of coating materials shall be in accordance with applicable sections of the Steel Structures Painting Council (SSPC) specifications. Surface preparation activities shall be in accordance with the following standards or recommended practices as applicable:

SSPC-SP-1 [Ref. [2.36]], SSPC-SP-2 [Ref. [2.37]], SSPC-SP-5 [Ref. [2.38]], and SSPC-SP-10 [Ref. [2.39]]

Other coating, testing, and inspection activities shall be in accordance with the following standards or recommended practices as applicable:

ASTM D 4285 [Ref. [2.27]], ASTM D 4417 [Ref. [2.28]], ASTM D 5162 [Ref. [2.29]], NACE SP0188 [Ref. [2.32]], NACE RP0287 [Ref. [2.31]], and SSPC-PA-2 [Ref. [2.35]]

All coating systems must be applied in accordance with the Supplier's recommendations. The blast-cleaned surfaces shall be coated with the base coat within 4 hours after blasting and before rusting occurs. All surface preparation and painting work shall be subject to the approval of IO. Colour selection shall be subject to the approval of IO prior to application of the topcoat.

5.36 Coating Material

IO will provide the coating material requirements for the valves in the Purchase Order.

The Supplier shall submit his coatings procedure, detailing surface preparation and coatings application to IO for review and approval.

5.37 Required Documentation

The Supplier shall supply ITER-IO with metal tags on each piece of equipment, indicating the following information: coating manufacturer used, brand name of primer and finish coat, and colour.

5.38 Nameplate

The valve shall be permanently identified with a stainless steel tag, with the following stamped or chemical, mechanical, or electrical etched:

- The IO's Supply Order and Item Numbers
- Tag Number
- Manufacturer's Name and Address
- Manufacturer's Serial Number
- Manufacturer's Model Identification
- Year of Manufacture
- Service Description
- Valve type
- Applicable data such as pressure, temperature, size, material, etc
- IO Serial Number (to be provided to Supplier)

The stainless steel tag shall be firmly attached to the main body of the valve or attached with a corrosion resistant stainless steel wire.

5.39 "CE" Marking and Declaration of Conformity

"CE" marking is required for valves in the scope of PED [Ref.[2.1]] and ESP [Ref.[2.2]].A declaration of conformity shall be drawn up and signed certifying that the valves comply with the PED [Ref.[2.1]].

5.40 PED classification

For PED classification refers to Reference [2.57]. The piping and valves of CCWS-1 up to DN 300 are classified as Sound Engineering Practice (SEP), whereas the larger ones (DN 350 and above) are classified as Category-1. CCWS-2A pipes and valves having diameter up to DN 250 are under SEP category, whereas the larger than DN 250 are of Category-1. For CCWS-2B up to DN 350 is categorized as SEP, whereas for larger diameters (DN 450 and above) piping are classified as Category-1. In CCWS 2C and 2D up to DN 300 is classified as SEP, from DN 400 and above pipes and valves are categorized as Category-1. For CHWS-H2, the piping and valves of smaller diameter up to DN 300 are classified as Sound Engineering Practice (SEP) whereas the larger ones (DN 350 and above) are classified as Category-1. For CHWS-H1, the piping and valves of smaller diameter up to DN 400 are classified as Sound Engineering Practice (SEP) whereas the larger ones (dn 450 and above) are classified as Category-1.

5.41 Material Specifications

5.41.1 Chemical Composition

The material of the valve shall be compatible with the CWS piping, which is either ASTM A312M [Ref. [2.26]] grade TP304L or TP316L as described in the Valve Data Sheets (see Appendix A).

5.41.2 Prohibited Materials

Mercury shall not be used in any manner, including construction of the valve, which can result in exposure of valve parts to the metal or its vapour. The use of lead or other low melting point metals in contact with the working fluid is prohibited. The use of nitrided surfaces exposed to the working fluid is prohibited. Care shall be taken to prevent contamination of valve material by red lead-graphite-mineral oil, molybdenum disulphide lubricants, halides, sulphur, copper, zinc and phosphorus. Teflon and similar elastomers may not be used. The use of Halogen products is prohibited. The use of materials containing asbestos or PCBs shall be prohibited.

5.42 Testing Requirements

All materials used in the construction of the valve shall be subject to mill tests for chemical and physical properties as required by the ASME/ASTM material standard listed in ASME B16.34 Table 1, Material group 2.3 [Ref. [2.23]] or an identical material in accordance with ASME BPVC, Section II [Ref. [2.24]]. Certificates (test reports) showing that required tests have been carried out at the source should be submitted. Type 3.1 certificate of EN 10204 [Ref. [2.33]] shall be provided for main pressure retaining materials.

ISO standards for tensile and impacting testing shall be used.

5.43 Impact and Tensile Testing

Mechanical properties shall be obtained from test specimens that represent the final heat-treated condition of the material required by the material specification.

Unless other values are required in accordance with other criteria that shall be taken into account, a material is considered as sufficiently ductile if, in a tensile test carried out by a standard procedure, its elongation after rupture is no less than 14 % and its bending rupture energy measured on an ISO V test-piece is no less than 27 J, at a temperature not greater than 20 °C but not higher than the lowest scheduled operating temperature.

ISO standards for tensile and impacting testing shall be used.

5.44 Hardness Test

Shore hardness test of the rubber parts used in the valve, shall be carried out and certificate of compliance for the rubber components shall be submitted.

5.45 Shell leak Test

Shell leak test shall be conducted on each valve in accordance with the requirements of ASME B16.34 Section 7.1 [Ref. [2.23]] and API 598 [Ref. [2.17]]. Testing shall be performed prior to any painting or coating of the valves.

5.46 Backseat Test

Backseat test shall be conducted on each valve, which has the backseat feature (applies in the case of globe valve and gate valve), in accordance with the requirements of API 598 [Ref. [2.17]]. The backseat test shall be conducted prior to the shell test to prevent the damage of the seal of stem or shaft to bonnet.

5.47 Valve Closure and Leak Tightness Test

Each valve shall be given a closure test in accordance with the requirements of ASME B16.34 Section 7.2 [Ref. [2.23]] and API 598 [Ref. [2.17]].

For ball valve, metal to metal seat, the maximum allowable leakage rates for the closure test refer to Class IV of ANSI/FCI 70-2 [Ref.[2.16]], or API 6D [Ref.[2.49]].

The closure and leak tightness test requirements shall conform to the requirements specified in the Valve Data Sheets in Appendix A.

5.48 Additional tests in power operated valves

For power operated valves, type tests on actuators as per IEEE 382 shall be carried out as specified in Appendix A.
Each actuator must be performance tested and individual test certificates shall be supplied. The test equipment shall simulate a typical valve load and the various parameters including actuator output speed, operating time etc. shall be recorded. Torque tests shall be carried out on all actuators. Electric actuator shall be tested for capability to start at 80% of rated voltage with full load. High voltage test on motor and control wiring at 1500 V for 1 minute shall be carried out. In addition, the test certificate shall record the details of specification such as gear ratios for both manual and automatic drive, closing direction, wiring diagram code number etc.
Each valve shall be tested along with its actuator to check valve seat leakage, and proper functioning of the valve. Opening and closing times shall be recorded. Valve shall be opened against pressure and closed for minimum three times.
For electric actuators, current drawn by the motor shall be measured during opening and closing. Functioning of limit switches shall be checked.

5.49 Functional Testing

All power operated valves shall be subjected to functional qualification test at the design service pressure as stated in Appendix A.
Before testing all power operated valves shall be fully calibrated including setting of limit switches, mechanical stoppers, position indication etc. as applicable. During valve operation, the limit switch setting shall also be checked. Operating air supply shall be used with limits as indicated in VSS. Power operated valves shall be operated with actuator with the help of motive power and performance to be checked. The opening and closing time of valves has to be recorded.

6. Analysis and Qualifications

6.1 Seismic Qualification by analysis

The Supplier is responsible for assuring the identified valve(s) in the Valve Data Sheets operate under the seismic conditions specified herein. All valves shall maintain their pressure boundary integrity after a seismic event.

The valve(s) shall be made to withstand an equivalent simultaneous seismic static loading, as described in the Load Specification for Cooling Water System [Ref. [2.5]]. The load shall be applied at the center of gravity of each component or part. Appendages shall be considered as separate pieces of equipment, mounted in place, for analysis and design. The allowable working stress range of materials involved will not be increased for the required seismic loadings. The methodology for seismic qualification of valves can be obtained from ASME QME-1 Non mandatory Appendix QR-A [Ref. [2.25]]. The Supplier shall prepare and submit a Seismic Qualification by analysis report.

6.2 Seismic Qualification by experimental test

[The following requirements under Section 6.2 shall be considered optional and will be applicable when defined so in the Supply Order.]

If the integrity or functional capability of items cannot be demonstrated with a reasonable degree of confidence by analysis, the experimental test is needed to verify or to assist in seismic qualification. The Supplier is responsible to make the experimental test to simulate the operation conditions and simultaneous seismic static loading, as described in the Load Specification for Cooling Water System [Ref. [2.5]]. The Supplier shall submit a Seismic Qualification by experimental report.

6.3 Weak Link Analysis

A weak link analysis shall be performed on the valve and its various components to determine the maximum loads they can be subjected to. The analysis will review each component in the valve to determine the maximum load the weakest component can safely sustain. The backseat shall be included in weak link analysis. All weak link analyses shall use the same coefficient of friction (COF). Weak link evaluation shall distinguish between torque and thrust limitations.

6.4 Environmental Qualification

An environmental qualification of the non-metallic components of valves shall be performed at the bounding environmental conditions, as specified in the Valve Data Sheets, to evaluate the function of the valve component whose failure could prevent the valve from performing the intended function. The qualification shall meet the requirements of ASME QME-1 Non-mandatory Appendix QR-B [Ref. [2.25]]. The material environment capabilities shall be identified, including references to the verification documentation.

6.5 Non-destructive Examination

Non-destructive examinations shall be performed on the cast, forged, rolled, wrought, or fabricated material after heat treatment required by the material specification either prior to or after the finish machining if it is indicated in materials procurement specifications. Surfaces shall be clean and free of surface conditions that may mask unacceptable indications.

6.5.1 Radiography (RT)

6.5.1.1 Castings

The radiographic procedures and acceptance standards to be used shall be in accordance with ASME B16.34 para. 8.3.1.1 and Mandatory Appendix I [Ref. [2.23]].

6.5.1.2 Forgings, Bars, Plates, and Tubular Products

Forgings, bars, plates, and tubular products are radiographically examined in accordance with the procedure and standards in ASME B16.34 Mandatory Appendix I and para. 8.3.2.1 [Ref. [2.23]].

6.5.2 Surface Examination

All exterior and all accessible interior surfaces of bodies, bonnets, and covers shall be given a surface examination. For surface examination, liquid penetrant examination shall be used. Liquid penetrant examination shall be in accordance with the procedure and acceptance standards of ASME B16.34 Mandatory Appendix III [Ref. [2.23]].

6.5.3 Ultrasonic Examination

6.5.3.1 Castings

For castings, ultrasonic examination is performed in accordance with ASME B16.34 para. 8.3.1.3 [Ref. [2.23]].

6.5.3.2 Forgings, Bars, Plates, and Tubular Products

For forgings, bars, plates, and tubular products, ultrasonic examination shall be performed in accordance with ASME B16.34 Mandatory Appendix IV and para. 8.3.2.1 [Ref. [2.23]]. If during the examination, ultrasonic indications are not interpretable due to, for example, grain size, the material shall be radiographed using the procedure requirements of para. 8.3.1.1 [Ref. [2.23]].

6.5.4 Weld Examination

All fabrication welds of bodies and bonnets consisting of an assembly of welded segments of castings, forgings, and bars, tubular products, or plates, or combinations thereof, shall receive non-destructive examination in accordance with the ASME B16.34 para. 2.1.6(c) [Ref. [2.23]].

6.5.5 Visual Examination

The rubber parts used in the valve shall be visually inspected for any nicks, gouges, cuts, or any discontinuities that may compromise the physical integrity or function of the part. A complete visual inspection of the pressure boundary parts on all valves is required before final assembly and on accessible pressure boundary parts without disassembly after hydrostatic testing. The purpose of the visual inspection is to verify all surfaces are free of cracks, hot tears, arc strikes, prod marks and/or other detrimental discontinuities. All finished welds shall be subject to visual examination.

6.5.6 Wall Thickness Measurements

Wall thickness measurement requirements are supplementary to Code requirements. The Supplier shall submit its procedure and drawings for wall thickness measurements, with the critical dimensions to be measured specified, to ITER-IO for approval. Wall thickness measurements shall be performed after machining operations have been completed. As a minimum, the wall thickness shall be measured at 4 points 90 degrees apart on each nozzle and on the neck of the valve. Flange thickness of the bonnet and the thickness of the nozzle flanges in the case of flanged-end valves shall be measured at 4 points 90 degrees apart. Supplier shall

take several measurements in a general area, giving special attention to suspect locations and shall record the location of the measurements on the drawings.

7. Other requirements

7.1 Material requirement in high radiation zone

[The following requirements under Section 7.1 shall be considered optional and will be applicable when defined so in the Supply Order.]

The majority of CWS valves are normally installed in low radiation area outside the bio-shield, but the exception is for the ones located in the Port Cells which are in high radiation zone. The supplier shall provide material with radiation resistant for valve bodies and actuators in these zones. The material shall comply with the requirement of Section 7.2 in Reference [2.54].

For specific austenitic steel in high radiation zone shall with a low level (0.05% compared with the standard 0.25%) of cobalt (Co).

7.2 Material requirement in high magnetic field

[The following requirements under Section 7.2 shall be considered optional and will be applicable when defined so in the Supply Order.]

The supplier shall provide material of valve bodies and actuators with proper magnetic compatibility in some high magnetic fields in Tokamak Complex. The pneumatic actuators for the valves shall be in austenitic stainless steel material (e.g. AISI 304L or 316L) and/or in material with low relative magnetic permeability (e.g. from 1.003 to 1.005)

7.3 PERFORMANCE GUARANTEE

The Supplier shall guarantee that all valves and any accessories furnished therewith are entirely suitable for the service conditions indicated in this specification and meet the performance requirement called for in this specification, and applicable regulations in the France where the valves will be installed and operated.

If performance test results deviate from the guaranteed values, the Supplier shall correct the deficiencies or replace the valve with the one that meets guaranteed values at no extra cost to the IO.

Guarantee Period shall be 20 years. If the subject valve or any part thereof is found defective during the stipulated guarantee period, the Supplier shall replace the same with new one at no extra cost to the IO.

The Supplier shall obtain similar guarantees from each of his sub-vendors. However, the overall responsibility shall lie with the Supplier.

7.4 SPARE PARTS AND MAINTENANCE TOOLS

The Supplier shall furnish a list of recommended spare parts adequate for three years of operation. The Supplier shall also furnish a list of special tools and tackles necessary for maintenance/operation of individual valve/equipment. The list shall be complete with quantities and unit prices. The IO shall have the option to increase or decrease the quantities of spare parts as required.

7.5 CLEANING, PROTECTION AND PAINTING

All valves shall be free of mill scale. The inside surface of the valve shall be degreased and then flushed with clean filtered water (preferably demineralised). It shall be visibly clean, free of sand, dirt and any other foreign matter.

A sack containing silica gel desiccant shall be firmly attached to the inner surface on the cover of one end of each valve.

For the valves having welded ends, the ends should be properly cleaned and treated with a suitable rust preventive other than grease and then securely fitted with plastic or wooden caps.

For power operated valves, actuators and positioners shall be painted with a coat of paint to protect them against corrosion.

It should be the intention of the Supplier o despatch valves to ITER site as part of piping spools, wherever possible.

The outside surface of the valves shall be applied with two coats of red lead primer or approved equivalent primer as required to prevent corrosion. Final painting shall be carried out as per painting requirements.

7.6 PACKING AND MARKING

For valves having welded ends, the ends shall be properly cleaned and treated with a suitable rust preventive other than grease and then securely fitted with plastic or wooden caps. A method of moisture control shall be provided for with the packaging of the valves, using silica desiccant gel firmly attached to the inner surface of the cover for the valve end. The desiccant shall be non-corrosive and shall not liquefy under saturated conditions. The valve shall then be enclosed in a clean heavy-duty plastic and openings tightly sealed. Small openings such as coupling, threadolets, and nipples shall be sealed by use of small light corrosion resistant stainless steel or plastic inserts pressed in and retained with a seal of waterproof tape.

The IO may require inspecting and approving of the packing before the items are dispatched. However, the Supplier shall be entirely responsible for ensuring that the packing is suitable for the mode of shipment and such inspection will not exonerate the Supplier from any loss or damage due to faulty packing.

The valve body and attached plate shall be marked with the information called for in MSS SP-25 [Ref. [2.45]].

At least following data concerning the valve shall be shown on the valve or on the permanent stainless steel name plate attached to the valve.

1. Valve tag number
2. Body size
3. Body material
4. Type
5. Service for which the valve is used
6. Primary pressure and temperature ratings
7. Manufacturer’s name, year of manufacture

For power operated valves, at least following data concerning the actuator shall be shown. The actuator name plate may be combined with the valve name plate.

1. Actuator Tag number
2. Size
3. Type
4. Air supply pressure (maximum air pressure for operation) for pneumatic
5. actuators
6. For electric actuators, the details of electric motor such as Motor kW rating, motor time rating, motor supply voltage, nominal motor phase current, auxiliary switch rating etc.
7. Maximum torque setting

8. Actuator type, wiring diagram number/catalogue number, actuator serial number etc.
9. Manufacturer's name, year of manufacture

Each valve shall be attached with an identification tag with corrosion resistant wire. The identification tag shall show purchase order number, valve identification etc. The same numbers shall appear on any loose accessories packaged and shipped with the valve.

All parts shall be properly packed, boxed, gated or otherwise protected for preventing any possible damage during transportation. Following general instructions shall be followed for packing.

1. The interior of the valve shall be clean and dry.
2. All exterior finished or machined carbon steel surfaces shall be protected against corrosion with a liberal coating of an approved and easily removable compound.
3. All machined surfaces shall be protected against mechanical damage.
4. All openings shall be adequately sealed.
5. The construction and lining of the boxes shall provide protection for their contents.

The packaging shall also include adequate cushioning, blocking, bracing, skidding, hoisting and the tie-down provisions. The packaging shall be subject to the approval of the IO.

7.7 VALVE SPECIFICATION SHEETS

Valve Specification Sheets are attached along with this specification, see Appendix A.

7.8 SHIPMENT

No valves or materials shall be dispatched without prior consent (acceptance certificate) of the IO . The Supplier shall be responsible for loading the packing on the board of ship.

7.9 DATA/DOCUMENTS TO BE SUBMITTED AFTER PLACEMENT OF SUPPLY ORDER

The Supplier shall be required to submit following documents/drawings after placement of the Supply Order.

1. Detailed activity schedule covering submission of drawings, procedures, MIP, procurement of material and sub orders, manufacture, inspection, type tests, routine tests, submission of instruction manuals and test reports, packing, shipment etc.
2. Mutually agreed detailed Manufacturing and Inspection Plan (MIP)
3. Dimensioned cross-section drawings of valves with part list and MOCs
4. Manufacturer's drawings, data sheets, catalogues
5. Welding and weld repair procedures
6. Heat Treatment procedures
7. NDE procedures
8. Hydrostatic body and seat test procedures
9. Air leak body and seat test procedures
10. Leakage test of air/motor for power operated valves
11. Static and dynamic performance test procedures for control valves
12. Seismic analysis and test procedures
13. Valve characteristic curves
14. Sizing calculations/curves for actuator selection
15. Order placement of bought out items of requirement
16. Cleaning, painting, paint testing, packing procedures

17. Any document/drawing/procedure that needs prior approval by the IO as mentioned elsewhere in this specification.

7.10 DATA/DOCUMENTS TO BE SUBMITTED ALONG WITH THE DELIVERY/AT FINAL STAGE BEFORE SHIPMENT

The Supplier shall be required to submit following documents/drawings along with the delivery of the valves.

1. Bound History dockets five sets each comprising following documents:
   a. Copy of Supply Order
   b. CE -Declaration of Conformity
   c. Approved as-built drawings
   d. Valve characteristics
   e. Approved MIPs
   f. Approved Procedures
   g. Material test certificates
   h. NDE reports
   i. Radiography films (if applicable)
   j. Stress relief Time-Temperature charts
   k. Welding procedures and Welder's Qualification certificates/reports
   l. Hydrostatic (body and seat) test reports
   m. Air leak (body and seat) test reports
   n. Performance test procedure and performance test reports with curves
   o. Dimensional reports
   p. Shipping release copies
   q. All design concession reports if any
   r. Guarantee and compliance certificates
2. Five hard and soft copies/sets of Operation and Maintenance Manuals
3. Five numbers of reproducible copies for every drawing on magnetic media, preferably CDs
4. Five hard and soft copies of approved Seismic Qualification Reports, if applicable

7.11 Deliverables Summary

The deliverables shall be based on the above section 7.9 and 7.10, and will be further clarified under each Supply Order.

8. Quality Assurance

Quality Requirements shall be in accordance with the “ITER Procurement Quality Requirements” [Ref.[2.9]]. The ITER Quality Assurance Program shall be applied to all the work under this Contract. The ITER QA Program is based on IAEA Safety Standard GS-R-3 and on conventional QA principles and integrates the requirements of the INB Order dated 7 February 2012 [Ref.[2.10]] on the quality of design, construction and operation in Basic Nuclear Installation. For this purpose, the Supplier and Subcontractors carrying out contracts placed under this Contract shall be in compliance with the QA requirements under the relevant ITER QA classifications, the requirements of the INB Order and shall have an IO approved QA Program or an ISO 9001 accredited quality system, complemented with the above mentioned requirements.

Prior to commencement of any work under this Contract, a “Quality Plan” (QP) [Ref.[2.11]] shall be produced by the Supplier and Subcontractors and submitted to the IO for approval, describing how they will implement the ITER Procurement Quality Requirements.

Prior to commencement of any manufacturing, a “Manufacturing and Inspection Plan” (MIP) [Ref.[2.12]] shall be produced by the Supplier and Subcontractors and approved by the IO, who will mark up any intended intervention point. MIPs are used to monitor Quality Control and acceptance tests during the execution of the Contract. It should be noted that interventions additional to those required in this Technical Specification may be included on the MIP by the IO. The right of the IO listed above shall apply in relation to any Subcontractor and in this case the IO will operate through the Supplier. The overseeing of the quality control operation by the IO shall not release the Supplier from his responsibility in meeting any aspect of this Technical Specification.

Subcontractors not performing Critical Quality Activities (i.e. activities that if not performed correctly may affect safety, functionality or reliability) may be exempted from the requirement to supply Quality Plans and Manufacturing & Inspection Plans, subject to agreement by the IO.

All requirements of this Technical Specification and subsequent changes proposed by the Supplier during the course of execution of this Contract are subject to the Deviation Request process described in [Ref.[2.13] [2.14]].

Documentation developed as the result of this Contract shall be retained by the Supplier for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with “Quality Assurance for ITER Safety Codes Procedure” [Ref.[2.15]].

9. Safety requirements

ITER is a nuclear facility (an “INB”, for *Installation nucléaire de base*, “Basic nuclear installation” in French regulation) identified in France by the number “INB no. 174” [2.10].

The supplier must comply with the all requirements expressed in Reference [2.50]. For each requirement, the external intervener must explain in its quality system the dispositions taken to implement the requirements stipulated in Reference [2.50]. The chemical composition and impurity requirements for materials and components must comply with the Reference [2.54].

In every contract involving PIA and PIC, it must be clearly stated that defined requirements on PIC and PIA have to be fulfilled. For PIC and their defined requirement, the procedure [2.51] applies. For PIA and their defined requirement, the document [2.52] applies. The classification corresponding to the graduated approach of PIC is specified in Reference [2.53].

Safety Importance Class (SIC) describes a classification scheme for structures, systems and components (SSC) of ITER that perform a safety function and contribute towards meeting the General Safety Objectives at ITER during incident/accident situations. Components classified SIC are divided into:

- **SIC-1** are those required to bring to and to maintain ITER in a safe state;
- **SIC-2** are those used to prevent, detect or mitigate incidents or accidents, but not SIC-1 (not required for ITER to reach a safe state).
- All other components are described as “**non-SIC**”. However, some components, while not being SIC, may have some relevance to safety. These components are labelled “**Safety Relevant**”, **SR**. They are not credited in the safety analysis and their failure would not impact any safety function.

The CWS valves in this technical specification can be classified to SIC-2, SR and Non-SIC for different systems, buildings and zones.

Appendix A

A.1 Valve Data Sheets

To be defined in the Supply Order.

A.2 Total Quantity of Valves summary

The following quantities are estimated, and are subject to change with the finalization of design for each subsystem of CWS.

Valve type	DN	Actuator Type	Safety Class	Seismic Class	Quality Class	Quantity
Ball valve	15	Manual	SIC-2	SC-1(S)	QC-1	174
		Pneumatic	SIC-2	SC-1(S)	QC-1	7
	20	Manual	SIC-2/SR	SC-1(S)/SC-2/NSC	QC-1/QC-2	52
	25	Manual	SR	SC-2/NSC	QC-2	128
		Pneumatic	SIC-2	SC-1(S)	QC-1	3
		Motorized	SIC-2/SR	SC-1(S)/SC-2/NSC	QC-1/QC-2	39
	40	Manual	SIC-2/SR/NON-SIC	SC-1(S)/SC-2/NSC	QC-1/QC-2	390
		Pneumatic	SIC-2/SR/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	121
		Motorized	SIC-2/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	23
	50	Manual	SR/NON-SIC	SC-2/NSC	QC-2	9
		Pneumatic	SIC-2/SR/NON-SIC	SC-2/NSC	QC-1/QC-2	15
		Motorized	SIC-2/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	11
	65	Manual	SR	SC-2	QC-2	3
	80	Manual	SR/NON-SIC	SC-2/NSC	QC-2	18
		Pneumatic	SIC-2/SR/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	35
		Motorized	SIC-2/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	9
	100	Manual	NON-SIC	NSC	QC-2	4
		Pneumatic	SIC-2/SR/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	33
		Motorized	NON-SIC	NSC	QC-2	3
	150	Manual	SIC-2/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	31
		Pneumatic	SIC-2/SR/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	22
		Motorized	SIC-2/NON-SIC	SC-1(S)/NSC	QC-1/QC-2	5
	200	Manual	NON-SIC	NSC	QC-2	4
		Pneumatic	SIC-2	SC-1(S)	QC-2	3
	Total					1142

IDM UID
WDS3BP
VERSION CREATED ON / VERSION / STATUS
15 Jun 2018 / 1.3 / Approved
EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

TECHNICAL SPECIFICATION FOR CWS CHECK VALVES

This purpose of this document is to support the PR release, the appendix A will be integrated in next version.

TECHNICAL SPECIFICATION FOR CWS CHECK VALVES

TABLE OF CONTENTS

1. Scope of Work

This specification defines the material, fabrication, inspection, examination, and testing requirements for check valves used in the CWS under procurement from the year 2018 to 2021. The bill of materials of valves and actuators will be provided in the Appendix, but the total number of valves is subject to change with the finalization of design for each subsystem of CWS.

The valves are pressure accessories in accordance with DIRECTIVE 2014/68/EU [Ref.[2.1]]. All the CWS piping and valves in this technical specification are not classified for ESPN classification [2.55] [2.56]. The Supplier shall design, fabricate, assemble, test and deliver the valves and actuators in accordance with this technical specification including required accessories, spare parts, special tools, and documentation to the IO.

2. Reference Codes, Standards, and Requirements

The revisions of the following codes, standards, and regulatory requirements that apply to this specification are provided for below in the "Codes and Standards". The documents provided for in the "General References" are documents that will be provided by the IO to the Supplier as requirements that shall be respected during the planning and execution of the Specification. Any conflict between requirements shall be brought to the attention of IO for resolution.

General References

[2.1] DIRECTIVE 2014/68/EU of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment – EN (RZ6PAK v1.0)
[2.2] French Decree 2015-799 , and Article R557 of the French Environmental Code
[2.3] Compliance ASME B16.34 and ESP/ESPN (33YHTZ v1.1)
[2.4] NA
[2.5] Load Specification for Cooling Water System (3YGYH7 v4.0)
[2.6] EDH Guide A: Electrical Installations for SSEN Client Systems (2EB9VT v2.4)
[2.7] EDH Part 4: Electromagnetic Compatibility (EMC) (4B523E v3.0)
[2.8] Plant Control Design Handbook (27LH2V v7.0)
[2.9] ITER Procurement Quality Requirements (ITER_D_22MFG4)
[2.10] Order dated 7 February 2012 relating to the general technical regulations applicable to INB - EN (7M2YKF)
[2.11] Procurement Requirements for Producing a Quality Plan (ITER_D_22MFMW)
[2.12] Requirements for Preparing and Implementing a Manufacturing and Inspection Plan (ITER_D_22MDZD)
[2.13] Procedure for management of Nonconformities (22F53X v7.0)
[2.14] Procedure for the management of Deviation Request (2LZJHB v5.5)
[2.15] Quality Assurance for ITER Safety Codes Procedure (258LKL)

Codes and Standards

[2.16] ANSI/ FCI 70-2-2013, "Control Valve Seat Leakage"
[2.17] API 598 9th edition 2009
[2.18] ASME B1.1-2003, "Unified Inch Screw Threads, UN and UNR Thread Form"
[2.19] ASME B31.3-2010, "Process Piping"

[2.20] ASME B16.5-2013, “Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard”
[2.21] ASME B16.10-2009, “Face-to-Face and End-to-End Dimensions of Valves”
[2.22] ASME B16.25-2012, “Butt welding Ends”
[2.23] ASME B16.34-2013, “Valves – Flanged, Threaded and Welding End”
[2.24] ASME B&PV Code Section II, “Materials”, 2013 Edition
[2.25] ASME QME-1-2012, “Qualification of Active Mechanical Equipment Used in Nuclear Power Plants.”
[2.26] ASTM A312M, “Standard Specification for Seamless, Welded, and Heavy Cold Worked Austenitic Stainless Steel Pipes”
[2.27] ASTM D4285-12, “Standard Test Method for Indicating Oil or Water in Compressed Air”
[2.28] ASTM D4417-14, “Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel”
[2.29] ASTM D5162-08, “Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates”
[2.30] ISO 15848-1:2006, “Industrial Valves – Measurement, Test, and Qualification Procedures for Fugitive Emissions – Part 1: Classification System and Qualification Procedures for Type Testing of Valves”
[2.31] NACE RP0287-02, “Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape”
[2.32] NACE SP0188-06, “Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates”
[2.33] NF EN 10204: 2005, “Metallic Products – Types of Inspection Documents”
[2.34] NF EN 12570:2001, “Industrial Valves: Method for Sizing the Operating Element”
[2.35] SSPC-PA-2, “Procedure for Determining Conformance to Dry Coating Thickness Requirements”
[2.36] SSPC-SP-1, “Solvent Cleaning”
[2.37] SSPC-SP-2, “Hand Tool Cleaning”
[2.38] SSPC-SP-5, “White Metal Blast Cleaning”
[2.39] SSPC-SP-10, “Near-White Blast Cleaning”
[2.40] ASME NQA-1-2012, “Quality Assurance Requirements for Nuclear Facility Applications”
[2.41] IEEE 323-2004, “Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations”
[2.42] IEEE 344-2013, “IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations”
[2.43] IEEE 383-04, “IEEE Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations”
[2.44] IEEE 382-2007, “IEEE Standard for Qualification of Safety-Related Actuators for Nuclear Power Generating Stations”
[2.45] ANSI/MSS SP-55-2011, “Quality Standard for Steel Castings for Valves, Flanges, Fittings, and Other Piping Components – Visual Method for Evaluation of Surface Irregularities”
[2.46] ANSI/MSS SP-25-2013 - Standard Marking System for Valves, Fittings, Flanges, and Unions
[2.47] ANSI 60529-04 -Degrees of Protection Provided by Enclosures (IP Code)
[2.48] NEMA MG 1-2011-Motors and Generators
[2.49] API 6D-latest, “Specification for Pipeline Valves”
[2.50] Provisions for implementation of the generic safety requirements by the external interveners (SBSTBM v1.1)

[2.51] Propagation of the Defined Requirements for Protection Important Components Through the Chain of External Interveners (BG2GYB v3.3)
[2.52] List of ITER-INB Protections Important Activities (PSTTZL v2.2)
[2.53] Safety Important Functions and Components Classification Criteria and Methodology (347SF3 v1.8)
[2.54] Chemical composition and impurity requirements for materials (REYV5V v2.3)
[2.55] System Design Description Document (DDD) of CCWS (9K984A v2.1)
[2.56] System Design Description Document (DDD) of CHWS-H2 (TL6YM4 v1.1)
[2.57] PED Hazard Categorization of Piping and Valves (CCWS, CHWS and HRS) (QCKABL v1.2)

3. Abbreviations

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASN	Autorité de Sûreté Nucléaire
ASTM	American Society for Testing and Materials
API	American Petroleum Institute
CWS	Cooling Water System
CCWS	Component Cooling Water System
DM	Demineralized Water
EDH	Electrical Design Handbook
ESPN	Equipements Sous Pression Nucléaire
INB	*Installation nucléaire de base*, Basic Nuclear Installation.
IAEA	International Atomic Energy Agency
IEEE	Institute of Electrical and Electronics Engineers
IDM	ITER Document Management
IO	ITER Organization
ISO	International Organization for Standardization
MIP	Manufacturing and Inspection Plan
MQP	Management and Quality Program
PED	Pressure Equipment Directive
PIA	Protection Important Activity
PIC	Protection Important Component
QA	Quality Assurance
QCR	Quality Control Review
QP	Quality Plan
SEP	Sound Engineering Practice
SIC	Safety Important Class
SRD	System Requirement Document
SSC	Structures, Systems and Components
SSPC	Steel Structures Painting Council

4. Functions and Boundaries

The valve's primary function is to provide positive shutoff or to control flow of the process fluid. The process fluid will be as described in the Valve Data Sheets (see Appendix A).

Boundaries of jurisdiction shall be the valve ends where the valve's pressure boundary connects to the adjoining piping. The valves are pressure accessories in accordance with DIRECTIVE 2014/68/EU [Ref.[2.1]].

5. Technical Requirements

5.1 Design Conditions

The CWS valves and actuators shall be designed to ASME B16.34 [Ref. [2.23]]. Each valve purchased in accordance with this Specification is described in, and its detailed design data, including special technical requirements, are provided in the Valve Data Sheets of Appendix A.

The material of the valve shall be compatible with the CWS piping, which is either ASTM A312M [Ref. [2.26]] grade TP304L or TP316L and the intended process fluid as described in the Valve Data Sheets (see Appendix A).

The body, bonnet or cover, body joint bolting, and body-bonnet or cover bolting, shall be constructed of materials as listed in the respective ASTM specifications referred to in ASME B16.34 Table 1 [Ref. [2.23]]. Identical materials in accordance with the ASME Boiler and Pressure Vessel Code, Section II [Ref. [2.24]] may also be used for these parts.

5.2 Design/ Construction Details

The valve shall have a design life of 20 years at the specified conditions, excluding items such as gaskets, packing, elastomer parts, and lubrication materials. Valve components of the same type and size shall be mutually interchangeable.

5.3 Environmental Conditions

All valves and actuators shall be designed to operate during the combination of the loads as defined in the Load Specification [Ref. [2.5]]. Additional environmental conditions are provided for in Appendix A of this Specification.

5.4 Valve Dimensions

End-to-end dimensions and face-to-face dimensions for butt welding-end valves and for flanged-end valves shall be in accordance with ASME B16.10 [Ref. [2.21]]. Each valve shall be examined to ensure it meets the dimensional requirements of this section.

5.5 Valve Body

The internals of the valve body shall be designed to limit the deposition of possible corrosion product and other erogenous materials inside the valve body. This may be performed by in the design of the internals eliminating:

- sharp angles
- strong reductions
- spaces likely to trap the deposits of products of corrosion
- zones of retention

- socket welds
- materials which do not have an optimum surface quality

For valves that require a certain installation orientation, an arrow shall be provided on the external surface of the valve body depicting the required flow direction through the valve.

5.6 Bonnet or Cover Plate

Valves having threaded bonnet joints (other than union joints) shall not be used. Bonnet or cover plate closures shall be: flanged, secured by at least four bolts with gasketing conforming to ASME B31.3 para. 308.4 [Ref. [2.19]], or proprietary, attached by bolts, lugs, or other substantial means, and having a gasket design that increases gasket compression as fluid pressure increases; or secured with a full penetration weld made in accordance with para. M311 [Ref. [2.19]]; or secured by a straight thread sufficient for mechanical strength, a metal-to-metal seat, and a seal weld made in accordance with paragraph M311 [Ref. [2.19]], all acting in series.

5.7 Valve Seat

Valves with double seated designs that can trap fluid subjected to heating and expansion shall provide a means of pressure relief to avoid excessive pressure build up between the seats. Hot fluid could also be trapped and lead to sub-atmospheric pressure when it cools down. The valve shall maintain its sealing capacity during this condition.

The valve seat leakage rate shall conform to the requirements of Class IV – valve leakage classification per ANSI/FCI 70-2 [Ref. [2.16]] or API 598 9th edition 2009 [Ref. [2.17]].

5.8 Valve Stem

Valve shall be specially designed to prevent stem leakage to the environment. Valves shall be designed so that the stem seal retaining fasteners (e.g., packing, gland fasteners) alone do not retain the stem. Specifically, the design shall be such that the stem shall not be capable of removal from the valve, while the valve is under pressure, by the removal of the stem seal retainer (e.g. gland) alone.

The leak tightness of the valve stem seal shall follow the requirements of class “A” from table 1 of ISO 15848-1 [Ref. [2.30]].

5.9 Manual Operator

Hand-wheels shall be of spoke design preferably with not more than six spokes. Webbed or disc hand-wheels shall not be used. Valves of sizes DN400 and above shall be provided with gear operation. Clockwise operation of the hand-wheel shall give closing movement of the valve, unless stated otherwise. The manual force required to operate the manual operator shall meet the requirements of NF EN 12570 Section 5.1 [Ref. [2.34]].

Chain wheel with sprocket rim and chain guides on both sides of the wheel shall be provided to facilitate operation of valves located above ground level. The chain shall be of adequate length so as to operate from a level 1.5 meter above the floor.

5.10 Valve Actuator

The actuator shall be stiff enough to maintain the valve stem position when the unbalanced forces on the plug change suddenly. The force necessary to compress the actuator spring a

distance equal to 100% of the valve stroke, under bench conditions, shall be large relative to the unbalanced force on the stem when the plug is subjected to the maximum differential pressure listed on the Valve Data Sheets as in the Annex 1.

Control valve actuators shall be furnished with a manual override to open or close the valve in the event of loss of electric or pneumatic power. For safety reasons, it is required that a manual declutch mechanism be included. Engaging the declutch mechanism changes the operation from electrical/ pneumatic powered to manual (handwheel) operation. The declutch mechanism may be provided with a locking device to prevent unauthorized manual operation. In most applications, the handwheel should not turn while in electrical/ pneumatic powered operation as a safety precaution.

5.11 Actuator Gearing

Actuator gearing shall be totally enclosed within the oil-filled gear case suitable for operation at any angle. Grease lubrication is not permissible. All gearing must be of metallic construction. The design shall be such as to permit the gear case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service.

5.12 Actuator Housing

All wiring supplied as part of the actuator shall be contained within the main enclosure for physical and environmental protection. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site for cabling, the terminal compartment having the same ingress protection rating as the actuator with the terminal cover removed. External conduit connections between components will not be accepted.

A means for safely hoisting the actuator, either separately or assembled to the valve, shall be provided. Lifting lugs or areas where straps may be secured without damaging any of the components on the actuator housing or valve will be considered acceptable.

5.13 Actuator Shaft and Bearings

The actuator shaft shall be of a noncorrosive material and shall be securely fastened to the valve shaft in a manner such that there is no possibility of play, misalignment, or other undesirable characteristics occurring between the actuator and valve shaft and disc assembly. An external replaceable shear key shall be provided. The output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator.

The shaft bearing shall be lifetime self-lubricating bearings of the sleeve type.

5.14 Actuator Design

The stroke time and the fail position of the actuator are provided for in the data sheet in Appendix A.

5.15 Actuator Sizing

The Supplier shall perform the sizing calculation for the actuator based upon the sum of the maximum shut-off pressure and resulting torque requirements.

Each valve actuator shall have ample power capacity for accurately seating, unseating, and positioning the valve when subjected to the most severe operating condition, including any mechanical friction and/or other restrictive conditions that are inherent in the valve assembly.

The Supplier shall install, pipe and/or wire the actuator and all required accessories on a typical "test" valve and test the actuator per this specification.

5.16 Actuator Yoke Design

The valve actuator yoke design shall be such that it will accept installation of required accessories such as the air set, limit switches and position indicator. The yoke material shall be austenitic stainless steel.

5.17 Pneumatic Actuators

The actuator action shall be as indicated on the Actuator Data Sheets [air to open, air to close, or double acting]. Within this limitation the pneumatic actuator may be spring and diaphragm, spring and piston or double acting piston or diaphragm whichever is the most suitable for the specified conditions.

For diaphragm actuators, the material shall be specified in the Actuator Data Sheets of Appendix A and shall be adequately designed to withstand the full supply air pressure to the actuator.

Piston operators shall be of the pneumatic type. The cylinders shall be capable of utilizing the instrument air supplied to give full travel of the air piston from fully open to fully closed and vice versa. The design of the piston operator linkage shall utilize the optimum mechanical advantage to ensure positive positioning of the valve from open to the closed position. The piston cylinder shall be sealed against leakage when the piston is in any position. Actuators shall be provided with self-lubricated piston rings and stem seals. The piston shall be adequately supported to provide direct linear-motion. Orientation of the piston operators with respect to flow direction through the valve or to adjacent space limitations shall be subject to IO's approval. The actuators shall have a visible indication of the valve position, to facilitate operator's assessment of valve position.

5.18 Electric Actuators

The motors for the electric actuators shall be properly designed and protected to operate within the magnetic field, it is to be installed per the guidelines in the EDH Part 4 [Ref.[2.7]].

The electric actuators shall be provided with integral controls including control and switching elements, all electrical components such as limit switches, torque switches, thermo switches, selector switches (Local-Remote-Off), and all monitoring elements, indicators, position transmitters etc. as a self-contained unit.

The Electric Actuator shall include a motor, reduction gearing and limit switches. The motor shall have a low inertia high torque design, class F insulated with a class B temperature rise, giving a time rating of 15 minutes at 40°C at an average load of at least 33% of maximum valve torque [Ref. [2.48]]. The temperature shall be limited by thermostats embedded in the motor end windings and integrated into its control. The unit shall be so designed that a torque impulse is imparted to the stem nut in both opening and closing direction to start the disc in motion. The motor shall attain full speed before the stem load is encountered.

The maximum seating or unseating torque required by the valve shall not exceed the rated torque. The design basis of rating of motor and calculations justifying torque and kW rating of the motors in tabular form shall be submitted by the Supplier. A means for automatic 'torque switch bypass' shall be provided to inhibit torque-off during valve unseating and latching to prevent torque switch hammer under maintained or repeated control signals.

5.19 Mechanical Stops

Adjustable mechanical stops shall be provided to prevent over-travel of the valve in the open and closed position. All mechanical stops shall be designed to absorb the full operator torque.

5.20 Manual Operators

All valve actuators shall be provided with manual operators that shall be self-locking. The hand-wheel drive must be mechanically independent of the drive mechanism of the actuators and shall permit valve operation in a reasonable time with manual force. The manual force required to operate the manual operator shall meet the requirements of NF EN 12570 Section 5.1 [Ref. [2.34]]. Orientation of the manual operators with respect to the direction of flow through the valves or accessibility for manual operation shall be subject to the IO's approval. Clockwise operation of the hand-wheel shall give closing movement of the valve, unless stated otherwise.

5.21 Limit Switches

The limit switches shall be electrically compatible with the IO control power parameters provided in the Plant Control Design Handbook section 4.5.5 [Ref.[2.8]]. The limit switches shall, as a minimum, meet the qualification standards of IEEE-323 [Ref. [2.41]], IEEE-344 [Ref. [2.42]], and IEEE-383 [Ref. [2.43]]. Furthermore, the qualification of the limit switches shall encompass the environmental parameters and operating requirements. The switches shall be enclosed in weather proof enclosures conforming to IP-65 requirements as per ANSI 60529 [Ref. [2.47]].

The mounting of the limit switches or limit switch actuating mechanism shall be such as to permit smooth continuous adjustment and exact fixing of the switch actuating point. The design of the actuating mechanism shall permit the adjustment of switch over travel without disturbing the valve. The limit switch should be rigidly mounted on the valve such that it does not get disturbed by pipe line vibrations. Red, green and yellow lights corresponding to open, closed and intermediate valve positions shall be provided on the actuator display. Contact wiring details shall be shown in the manufacturer's drawings in the form of detailed wiring diagram.

5.22 Operating Solenoids

The solenoids shall be electrically compatible with the ITER power supply parameters specified in Appendix A of this Specification. The solenoid operators shall, as a minimum, meet the qualification standards of IEEE-323 [Ref. [2.41]], IEEE-344 [Ref. [2.42]], and IEEE-383 [Ref. [2.43]]. Furthermore, the qualification of the solenoids shall encompass the environmental parameters and operating requirements.

5.23 Earthing

All electrical conducting components of the control valve actuator located with the vacuum vessel or cryostat shall be able to be electrically connected to earth in accordance with Section 8.1.1.1 of EDH Part 4: EMC [Ref. [2.7]].

5.24 Local Controls

The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator. The local controls and display shall be rotatable through increments of 90 degrees to suit valve and actuator orientation.

5.25 Induction Effects

The actuators shall be designed per guidance from EDH Part 4: EMC [Ref.[2.7]], to minimize the induction effects within the various components of the actuators.

5.26 Threaded Fasteners

Threaded fasteners shall have unified series screw threads conforming to ASME B1.1 [Ref. [2.18]]. All threaded pressure retaining fasteners shall be provided with corrosion resistant positive locking devices. Frictional locking devices are not acceptable. All nuts and bolts shall have hexagonal heads unless otherwise specified.

5.27 Auxiliary Connections

Auxiliary connections, e.g., for bypass connections, shall be designed, fabricated, and examined so as to warrant at least the same pressure-temperature ratings as the valve and shall be installed prior to the test of the valve to which they are attached.

Welded auxiliary connections shall be butt welded directly to the wall of the valve, socket welding shall not be used. If the size of the connection requires reinforcement, then a boss shall be added satisfying the requirements of para. 6.3.5 [Ref. [2.23]].

5.28 Valve Lifting Attachments

Heavy components of valves shall be provided with a method of handling, such as lugs or eye-bolts.

5.29 Position Indication

The position indication of the valve shall be designed such that components of the indicating means cannot be assembled to falsely indicate the valve open or closed position.

5.30 Valve Body Joints

Valve body joints, other than bonnet or cover plate joints, shall conform to para. M307.2(b)(2) [Ref. [2.19]].

5.31 End Connections

Valve ends shall have ends that are of the same material and schedule as of the pipe to which the valve will connect. Socket welded and threaded connections are not permitted for the end connections of the valves.

5.32 Buttweld Ends

The details for the welding end preparation for valves shall be in accordance with ASME B16.25 [Ref. [2.22]] with the tolerances for the inside and outside diameter conforming to ASME B16.34 para. 6.2.1 [Ref.[2.23]].

5.33 Flanged Ends

Flanged ends shall be prepared with flange facing, nut-bearing surfaces, outside diameter, thickness, and drilling in accordance with ASME B16.5 [Ref. [2.20]] requirements for

a) Flanged fittings for Class 150 and 300 valves

All flanged valves shall have flanges corresponding to the pressure-temperature rating of the valves. Flanges furnished with tapped holes, shall provide full effective thread engagement, not including the chamfered thread, for a length at least equal to the nominal diameter of the bolt thread.

5.34 Welding

Weld fabrication and heat treatment of welds shall be performed in accordance with ASME B16.34 para 2.1.6(b) [Ref. [2.23]].

5.35 Surface Preparation Requirements

Selection, qualification, and application of coating materials shall be in accordance with applicable sections of the Steel Structures Painting Council (SSPC) specifications. Surface preparation activities shall be in accordance with the following standards or recommended practices as applicable:

SSPC-SP-1 [Ref. [2.36]], SSPC-SP-2 [Ref. [2.37]], SSPC-SP-5 [Ref. [2.38]], and SSPC-SP-10 [Ref. [2.39]]

Other coating, testing, and inspection activities shall be in accordance with the following standards or recommended practices as applicable:

ASTM D 4285 [Ref. [2.27]], ASTM D 4417 [Ref. [2.28]], ASTM D 5162 [Ref. [2.29]], NACE SP0188 [Ref. [2.32]], NACE RP0287 [Ref. [2.31]], and SSPC-PA-2 [Ref. [2.35]]

All coating systems must be applied in accordance with the Supplier's recommendations. The blast-cleaned surfaces shall be coated with the base coat within 4 hours after blasting and before rusting occurs. All surface preparation and painting work shall be subject to the approval of IO. Colour selection shall be subject to the approval of IO prior to application of the topcoat.

5.36 Coating Material

IO will provide the coating material requirements for the valves in the Purchase Order.

The Supplier shall submit his coatings procedure, detailing surface preparation and coatings application to IO for review and approval.

5.37 Required Documentation

The Supplier shall supply ITER-IO with metal tags on each piece of equipment, indicating the following information: coating manufacturer used, brand name of primer and finish coat, and colour.

5.38 Nameplate

The valve shall be permanently identified with a stainless steel tag, with the following stamped or chemical, mechanical, or electrical etched:

- The IO's Supply Order and Item Numbers
- Tag Number
- Manufacturer's Name and Address
- Manufacturer's Serial Number
- Manufacturer's Model Identification
- Year of Manufacture
- Service Description
- Valve type
- Applicable data such as pressure, temperature, size, material, etc
- IO Serial Number (to be provided to Supplier)

The stainless steel tag shall be firmly attached to the main body of the valve or attached with a corrosion resistant stainless steel wire.

5.39 "CE" Marking and Declaration of Conformity

"CE" marking is required for valves in the scope of PED [Ref.[2.1]] and ESP [Ref.[2.2]].A declaration of conformity shall be drawn up and signed certifying that the valves comply with the PED [Ref.[2.1]].

5.40 PED classification

For PED classification refers to Reference [2.57]. The piping and valves of CCWS-1 up to DN 300 are classified as Sound Engineering Practice (SEP), whereas the larger ones (DN 350 and above) are classified as Category-1. CCWS-2A pipes and valves having diameter up to DN 250 are under SEP category, whereas the larger than DN 250 are of Category-1. For CCWS-2B up to DN 350 is categorized as SEP, whereas for larger diameters (DN 450 and above) piping are classified as Category-1. In CCWS 2C and 2D up to DN 300 is classified as SEP, from DN 400 and above pipes and valves are categorized as Category-1. For CHWS-H2, the piping and valves of smaller diameter up to DN 300 are classified as Sound Engineering Practice (SEP) whereas the larger ones (DN 350 and above) are classified as Category-1. For CHWS-H1, the piping and valves of smaller diameter up to DN 400 are classified as Sound Engineering Practice (SEP) whereas the larger ones (dn 450 and above) are classified as Category-1.

5.41 Material Specifications

5.41.1 Chemical Composition

The material of the valve shall be compatible with the CWS piping, which is either ASTM A312M [Ref. [2.26]] grade TP304L or TP316L as described in the Valve Data Sheets (see Appendix A).

5.41.2 Prohibited Materials

Mercury shall not be used in any manner, including construction of the valve, which can result in exposure of valve parts to the metal or its vapour. The use of lead or other low melting point metals in contact with the working fluid is prohibited. The use of nitrided surfaces exposed to the working fluid is prohibited. Care shall be taken to prevent contamination of valve material by red lead-graphite-mineral oil, molybdenum disulphide lubricants, halides, sulphur, copper, zinc and phosphorus. Teflon and similar elastomers may not be used. The use of Halogen products is prohibited. The use of materials containing asbestos or PCBs shall be prohibited.

5.42 Testing Requirements

All materials used in the construction of the valve shall be subject to mill tests for chemical and physical properties as required by the ASME/ASTM material standard listed in ASME B16.34 Table 1, Material group 2.3 [Ref. [2.23]] or an identical material in accordance with ASME BPVC, Section II [Ref. [2.24]]. Certificates (test reports) showing that required tests have been carried out at the source should be submitted. Type 3.1 certificate of EN 10204 [Ref. [2.33]] shall be provided for main pressure retaining materials.

ISO standards for tensile and impacting testing shall be used.

5.43 Impact and Tensile Testing

Mechanical properties shall be obtained from test specimens that represent the final heat-treated condition of the material required by the material specification.

Unless other values are required in accordance with other criteria that shall be taken into account, a material is considered as sufficiently ductile if, in a tensile test carried out by a standard procedure, its elongation after rupture is no less than 14 % and its bending rupture energy measured on an ISO V test-piece is no less than 27 J, at a temperature not greater than 20 °C but not higher than the lowest scheduled operating temperature.

ISO standards for tensile and impacting testing shall be used.

5.44 Hardness Test

Shore hardness test of the rubber parts used in the valve, shall be carried out and certificate of compliance for the rubber components shall be submitted.

5.45 Shell leak Test

Shell leak test shall be conducted on each valve in accordance with the requirements of ASME B16.34 Section 7.1 [Ref. [2.23]] and API 598 [Ref. [2.17]]. Testing shall be performed prior to any painting or coating of the valves.

5.46 Backseat Test

Backseat test shall be conducted on each valve, which has the backseat feature (applies in the case of globe valve and gate valve), in accordance with the requirements of API 598 [Ref. [2.17]]. The backseat test shall be conducted prior to the shell test to prevent the damage of the seal of stem or shaft to bonnet.

5.47 Valve Closure and Leak Tightness Test

Each valve shall be given a closure test in accordance with the requirements of ASME B16.34 Section 7.2 [Ref. [2.23]] and API 598 [Ref. [2.17]].

For ball valve, metal to metal seat, the maximum allowable leakage rates for the closure test refer to Class IV of ANSI/FCI 70-2 [Ref.[2.16]], or API 6D [Ref.[2.49]].

The closure and leak tightness test requirements shall conform to the requirements specified in the Valve Data Sheets in Appendix A.

5.48 Additional tests in power operated valves

For power operated valves, type tests on actuators as per IEEE 382 shall be carried out as specified in Appendix A.
Each actuator must be performance tested and individual test certificates shall be supplied. The test equipment shall simulate a typical valve load and the various parameters including actuator output speed, operating time etc. shall be recorded. Torque tests shall be carried out on all actuators. Electric actuator shall be tested for capability to start at 80% of rated voltage with full load. High voltage test on motor and control wiring at 1500 V for 1 minute shall be carried out. In addition, the test certificate shall record the details of specification such as gear ratios for both manual and automatic drive, closing direction, wiring diagram code number etc.
Each valve shall be tested along with its actuator to check valve seat leakage, and proper functioning of the valve. Opening and closing times shall be recorded. Valve shall be opened against pressure and closed for minimum three times.
For electric actuators, current drawn by the motor shall be measured during opening and closing. Functioning of limit switches shall be checked.

5.49 Functional Testing

All power operated valves shall be subjected to functional qualification test at the design service pressure as stated in Appendix A.
Before testing all power operated valves shall be fully calibrated including setting of limit switches, mechanical stoppers, position indication etc. as applicable. During valve operation, the limit switch setting shall also be checked. Operating air supply shall be used with limits as indicated in VSS. Power operated valves shall be operated with actuator with the help of motive power and performance to be checked. The opening and closing time of valves has to be recorded.

6. Analysis and Qualifications

6.1 Seismic Qualification by analysis

The Supplier is responsible for assuring the identified valve(s) in the Valve Data Sheets operate under the seismic conditions specified herein. All valves shall maintain their pressure boundary integrity after a seismic event.

The valve(s) shall be made to withstand an equivalent simultaneous seismic static loading, as described in the Load Specification for Cooling Water System [Ref. [2.5]]. The load shall be applied at the center of gravity of each component or part. Appendages shall be considered as separate pieces of equipment, mounted in place, for analysis and design. The allowable working stress range of materials involved will not be increased for the required seismic loadings. The methodology for seismic qualification of valves can be obtained from ASME QME-1 Non mandatory Appendix QR-A [Ref. [2.25]]. The Supplier shall prepare and submit a Seismic Qualification by analysis report.

6.2 Seismic Qualification by experimental test

[The following requirements under Section 6.2 shall be considered optional and will be applicable when defined so in the Supply Order.]

If the integrity or functional capability of items cannot be demonstrated with a reasonable degree of confidence by analysis, the experimental test is needed to verify or to assist in seismic qualification. The Supplier is responsible to make the experimental test to simulate the operation conditions and simultaneous seismic static loading, as described in the Load Specification for Cooling Water System [Ref. [2.5]]. The Supplier shall submit a Seismic Qualification by experimental report.

6.3 Weak Link Analysis

A weak link analysis shall be performed on the valve and its various components to determine the maximum loads they can be subjected to. The analysis will review each component in the valve to determine the maximum load the weakest component can safely sustain. The backseat shall be included in weak link analysis. All weak link analyses shall use the same coefficient of friction (COF). Weak link evaluation shall distinguish between torque and thrust limitations.

6.4 Environmental Qualification

An environmental qualification of the non-metallic components of valves shall be performed at the bounding environmental conditions, as specified in the Valve Data Sheets, to evaluate the function of the valve component whose failure could prevent the valve from performing the intended function. The qualification shall meet the requirements of ASME QME-1 Non-mandatory Appendix QR-B [Ref. [2.25]]. The material environment capabilities shall be identified, including references to the verification documentation.

6.5 Non-destructive Examination

Non-destructive examinations shall be performed on the cast, forged, rolled, wrought, or fabricated material after heat treatment required by the material specification either prior to or after the finish machining if it is indicated in materials procurement specifications. Surfaces shall be clean and free of surface conditions that may mask unacceptable indications.

6.5.1 Radiography (RT)

6.5.1.1Castings

The radiographic procedures and acceptance standards to be used shall be in accordance with ASME B16.34 para. 8.3.1.1 and Mandatory Appendix I [Ref. [2.23]].

6.5.1.2Forgings, Bars, Plates, and Tubular Products

Forgings, bars, plates, and tubular products are radiographically examined in accordance with the procedure and standards in ASME B16.34 Mandatory Appendix I and para. 8.3.2.1 [Ref. [2.23]].

6.5.2 Surface Examination

All exterior and all accessible interior surfaces of bodies, bonnets, and covers shall be given a surface examination. For surface examination, liquid penetrant examination shall be used. Liquid penetrant examination shall be in accordance with the procedure and acceptance standards of ASME B16.34 Mandatory Appendix III [Ref. [2.23]].

6.5.3 Ultrasonic Examination

6.5.3.1Castings

For castings, ultrasonic examination is performed in accordance with ASME B16.34 para. 8.3.1.3 [Ref. [2.23]].

6.5.3.2Forgings, Bars, Plates, and Tubular Products

For forgings, bars, plates, and tubular products, ultrasonic examination shall be performed in accordance with ASME B16.34 Mandatory Appendix IV and para. 8.3.2.1 [Ref. [2.23]]. If during the examination, ultrasonic indications are not interpretable due to, for example, grain size, the material shall be radiographed using the procedure requirements of para. 8.3.1.1 [Ref. [2.23]].

6.5.4 Weld Examination

All fabrication welds of bodies and bonnets consisting of an assembly of welded segments of castings, forgings, and bars, tubular products, or plates, or combinations thereof, shall receive non-destructive examination in accordance with the ASME B16.34 para. 2.1.6(c) [Ref. [2.23]].

6.5.5 Visual Examination

The rubber parts used in the valve shall be visually inspected for any nicks, gouges, cuts, or any discontinuities that may compromise the physical integrity or function of the part. A complete visual inspection of the pressure boundary parts on all valves is required before final assembly and on accessible pressure boundary parts without disassembly after hydrostatic testing. The purpose of the visual inspection is to verify all surfaces are free of cracks, hot tears, arc strikes, prod marks and/or other detrimental discontinuities. All finished welds shall be subject to visual examination.

6.5.6 Wall Thickness Measurements

Wall thickness measurement requirements are supplementary to Code requirements. The Supplier shall submit its procedure and drawings for wall thickness measurements, with the critical dimensions to be measured specified, to ITER-IO for approval. Wall thickness measurements shall be performed after machining operations have been completed. As a minimum, the wall thickness shall be measured at 4 points 90 degrees apart on each nozzle and on the neck of the valve. Flange thickness of the bonnet and the thickness of the nozzle flanges in the case of flanged-end valves shall be measured at 4 points 90 degrees apart. Supplier shall

take several measurements in a general area, giving special attention to suspect locations and shall record the location of the measurements on the drawings.

7. Other requirements

7.1 Material requirement in high radiation zone

[The following requirements under Section 7.1 shall be considered optional and will be applicable when defined so in the Supply Order.]

The majority of CWS valves are normally installed in low radiation area outside the bio-shield, but the exception is for the ones located in the Port Cells which are in high radiation zone. The supplier shall provide material with radiation resistant for valve bodies and actuators in these zones. The material shall comply with the requirement of Section 7.2 in Reference [2.54].

For specific austenitic steel in high radiation zone shall with a low level (0.05% compared with the standard 0.25%) of cobalt (Co).

7.2 Material requirement in high magnetic field

[The following requirements under Section 7.2 shall be considered optional and will be applicable when defined so in the Supply Order.]

The supplier shall provide material of valve bodies and actuators with proper magnetic compatibility in some high magnetic fields in Tokamak Complex. The pneumatic actuators for the valves shall be in austenitic stainless steel material (e.g. AISI 304L or 316L) and/or in material with low relative magnetic permeability (e.g. from 1.003 to 1.005)

7.3 PERFORMANCE GUARANTEE

The Supplier shall guarantee that all valves and any accessories furnished therewith are entirely suitable for the service conditions indicated in this specification and meet the performance requirement called for in this specification, and applicable regulations in the France where the valves will be installed and operated.

If performance test results deviate from the guaranteed values, the Supplier shall correct the deficiencies or replace the valve with the one that meets guaranteed values at no extra cost to the IO.

Guarantee Period shall be 20 years. If the subject valve or any part thereof is found defective during the stipulated guarantee period, the Supplier shall replace the same with new one at no extra cost to the IO.

The Supplier shall obtain similar guarantees from each of his sub-vendors. However, the overall responsibility shall lie with the Supplier.

7.4 SPARE PARTS AND MAINTENANCE TOOLS

The Supplier shall furnish a list of recommended spare parts adequate for three years of operation. The Supplier shall also furnish a list of special tools and tackles necessary for maintenance/operation of individual valve/equipment. The list shall be complete with quantities and unit prices. The IO shall have the option to increase or decrease the quantities of spare parts as required.

7.5 CLEANING, PROTECTION AND PAINTING

All valves shall be free of mill scale. The inside surface of the valve shall be degreased and then flushed with clean filtered water (preferably demineralised). It shall be visibly clean, free of sand, dirt and any other foreign matter.

A sack containing silica gel desiccant shall be firmly attached to the inner surface on the cover of one end of each valve.

For the valves having welded ends, the ends should be properly cleaned and treated with a suitable rust preventive other than grease and then securely fitted with plastic or wooden caps.

For power operated valves, actuators and positioners shall be painted with a coat of paint to protect them against corrosion.

It should be the intention of the Supplier to despatch valves to ITER site as part of piping spools, wherever possible.

The outside surface of the valves shall be applied with two coats of red lead primer or approved equivalent primer as required to prevent corrosion. Final painting shall be carried out as per painting requirements.

7.6 PACKING AND MARKING

For valves having welded ends, the ends shall be properly cleaned and treated with a suitable rust preventive other than grease and then securely fitted with plastic or wooden caps. A method of moisture control shall be provided for with the packaging of the valves, using silica desiccant gel firmly attached to the inner surface of the cover for the valve end. The desiccant shall be non-corrosive and shall not liquefy under saturated conditions. The valve shall then be enclosed in a clean heavy-duty plastic and openings tightly sealed. Small openings such as coupling, threadolets, and nipples shall be sealed by use of small light corrosion resistant stainless steel or plastic inserts pressed in and retained with a seal of waterproof tape.

The IO may require inspecting and approving of the packing before the items are dispatched. However, the Supplier shall be entirely responsible for ensuring that the packing is suitable for the mode of shipment and such inspection will not exonerate the Supplier from any loss or damage due to faulty packing.

The valve body and attached plate shall be marked with the information called for in MSS SP-25 [Ref. [2.45]].

At least following data concerning the valve shall be shown on the valve or on the permanent stainless steel name plate attached to the valve.

1. Valve tag number
2. Body size
3. Body material
4. Type
5. Service for which the valve is used
6. Primary pressure and temperature ratings
7. Manufacturer’s name, year of manufacture

For power operated valves, at least following data concerning the actuator shall be shown. The actuator name plate may be combined with the valve name plate.

1. Actuator Tag number
2. Size
3. Type
4. Air supply pressure (maximum air pressure for operation) for pneumatic
5. actuators
6. For electric actuators, the details of electric motor such as Motor kW rating, motor time rating, motor supply voltage, nominal motor phase current, auxiliary switch rating etc.
7. Maximum torque setting

8. Actuator type, wiring diagram number/catalogue number, actuator serial number etc.
9. Manufacturer's name, year of manufacture

Each valve shall be attached with an identification tag with corrosion resistant wire. The identification tag shall show purchase order number, valve identification etc. The same numbers shall appear on any loose accessories packaged and shipped with the valve.

All parts shall be properly packed, boxed, gated or otherwise protected for preventing any possible damage during transportation. Following general instructions shall be followed for packing.

1. The interior of the valve shall be clean and dry.
2. All exterior finished or machined carbon steel surfaces shall be protected against corrosion with a liberal coating of an approved and easily removable compound.
3. All machined surfaces shall be protected against mechanical damage.
4. All openings shall be adequately sealed.
5. The construction and lining of the boxes shall provide protection for their contents.

The packaging shall also include adequate cushioning, blocking, bracing, skidding, hoisting and the tie-down provisions. The packaging shall be subject to the approval of the IO.

7.7 VALVE SPECIFICATION SHEETS

Valve Specification Sheets are attached along with this specification, see Appendix A.

7.8 SHIPMENT

No valves or materials shall be dispatched without prior consent (acceptance certificate) of the IO. The Supplier shall be responsible for loading the packing on the board of ship.

7.9 DATA/DOCUMENTS TO BE SUBMITTED AFTER PLACEMENT OF SUPPLY ORDER

The Supplier shall be required to submit following documents/drawings after placement of the Supply Order.

1. Detailed activity schedule covering submission of drawings, procedures, MIP, procurement of material and sub orders, manufacture, inspection, type tests, routine tests, submission of instruction manuals and test reports, packing, shipment etc.
2. Mutually agreed detailed Manufacturing and Inspection Plan (MIP)
3. Dimensioned cross-section drawings of valves with part list and MOCs
4. Manufacturer's drawings, data sheets, catalogues
5. Welding and weld repair procedures
6. Heat Treatment procedures
7. NDE procedures
8. Hydrostatic body and seat test procedures
9. Air leak body and seat test procedures
10. Leakage test of air/motor for power operated valves
11. Static and dynamic performance test procedures for control valves
12. Seismic analysis and test procedures
13. Valve characteristic curves
14. Sizing calculations/curves for actuator selection
15. Order placement of bought out items of requirement
16. Cleaning, painting, paint testing, packing procedures

17. Any document/drawing/procedure that needs prior approval by the IO as mentioned elsewhere in this specification.

7.10 DATA/DOCUMENTS TO BE SUBMITTED ALONG WITH THE DELIVERY/AT FINAL STAGE BEFORE SHIPMENT

The SUPPLIER shall be required to submit following documents/drawings along with the delivery of the valves.

1. Bound History dockets five sets each comprising following documents:
   a. Copies of Supply Order
   b. CE -Declaration of Conformity
   c. Approved as-built drawings
   d. Valve characteristics
   e. Approved MIPs
   f. Approved Procedures
   g. Material test certificates
   h. NDE reports
   i. Radiography films (if applicable)
   j. Stress relief Time-Temperature charts
   k. Welding procedures and Welder's Qualification certificates/reports
   l. Hydrostatic (body and seat) test reports
   m. Air leak (body and seat) test reports
   n. Performance test procedure and performance test reports with curves
   o. Dimensional reports
   p. Shipping release copies
   q. All design concession reports if any
   r. Guarantee and compliance certificates
2. Five hard and soft copies/sets of Operation and Maintenance Manuals
3. Five numbers of reproducible copies for every drawing on magnetic media, preferably CDs
4. Five hard and soft copies of approved Seismic Qualification Reports, if applicable

7.11 Deliverables Summary

The deliverables shall be based on the above section 7.9 and 7.10, and will be further clarified under each Supply Order.

8. Quality Assurance

Quality Requirements shall be in accordance with the “ITER Procurement Quality Requirements” [Ref.[2.9]]. The ITER Quality Assurance Program shall be applied to all the work under this Contract. The ITER QA Program is based on IAEA Safety Standard GS-R-3 and on conventional QA principles and integrates the requirements of the INB Order dated 7 February 2012 [Ref.[2.10]] on the quality of design, construction and operation in Basic Nuclear Installation. For this purpose, the Supplier and Subcontractors carrying out contracts placed under this Contract shall be in compliance with the QA requirements under the relevant ITER QA classifications, the requirements of the INB Order and shall have an IO approved QA Program or an ISO 9001 accredited quality system, complemented with the above mentioned requirements.

Prior to commencement of any work under this Contract, a “Quality Plan” (QP) [Ref.[2.11]] shall be produced by the Supplier and Subcontractors and submitted to the IO for approval, describing how they will implement the ITER Procurement Quality Requirements.

Prior to commencement of any manufacturing, a “Manufacturing and Inspection Plan” (MIP) [Ref.[2.12]] shall be produced by the Supplier and Subcontractors and approved by the IO, who will mark up any intended intervention point. MIPs are used to monitor Quality Control and acceptance tests during the execution of the Contract. It should be noted that interventions additional to those required in this Technical Specification may be included on the MIP by the IO. The right of the IO listed above shall apply in relation to any Subcontractor and in this case the IO will operate through the Supplier. The overseeing of the quality control operation by the IO shall not release the Supplier from his responsibility in meeting any aspect of this Technical Specification.

Subcontractors not performing Critical Quality Activities (i.e. activities that if not performed correctly may affect safety, functionality or reliability) may be exempted from the requirement to supply Quality Plans and Manufacturing & Inspection Plans, subject to agreement by the IO.

All requirements of this Technical Specification and subsequent changes proposed by the Supplier during the course of execution of this Contract are subject to the Deviation Request process described in [Ref.[2.13] [2.14]].

Documentation developed as the result of this Contract shall be retained by the Supplier for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with “Quality Assurance for ITER Safety Codes Procedure” [Ref.[2.15]].

9. Safety requirements

ITER is a nuclear facility (an “INB”, for *Installation nucléaire de base*, “Basic nuclear installation” in French regulation) identified in France by the number “INB no. 174” [2.10].

The supplier must comply with the all requirements expressed in Reference [2.50]. For each requirement, the external intervener must explain in its quality system the dispositions taken to implement the requirements stipulated in Reference [2.50]. The chemical composition and impurity requirements for materials and components must comply with the Reference [2.54].

In every contract involving PIA and PIC, it must be clearly stated that defined requirements on PIC and PIA have to be fulfilled. For PIC and their defined requirement, the procedure [2.51] applies. For PIA and their defined requirement, the document [2.52] applies. The classification corresponding to the graduated approach of PIC is specified in Reference [2.53].

Safety Importance Class (SIC) describes a classification scheme for structures, systems and components (SSC) of ITER that perform a safety function and contribute towards meeting the General Safety Objectives at ITER during incident/accident situations. Components classified SIC are divided into:

- **SIC-1** are those required to bring to and to maintain ITER in a safe state;
- **SIC-2** are those used to prevent, detect or mitigate incidents or accidents, but not SIC-1 (not required for ITER to reach a safe state).
- All other components are described as “**non-SIC**”. However, some components, while not being SIC, may have some relevance to safety. These components are labelled “**Safety Relevant**”, **SR**. They are not credited in the safety analysis and their failure would not impact any safety function.

The CWS valves in this technical specification can be classified to SIC-2, SR and Non-SIC for different systems, buildings and zones.

Appendix A

A.1 Valve Data Sheets

To be defined in the Supply Order.

A.2 Total Quantity of Valves summary

The following quantities are estimated, and are subject to change with the finalization of design for each subsystem of CWS..

Valve type	DN	Actuator Type	Safety Class	Seismic Class	Quality Class	Quantity
Check valve	15	Swing/Lift	SR/NON-SIC	SC-2/NSC	QC-2	2
	25	Swing/Lift	SR/NON-SIC	SC-2/NSC	QC-2	2
	40	Swing/Lift	SR/NON-SIC	SC-2/NSC	QC-2	4
	150	Swing/Lift	SIC-2/SR/NON-SIC	SC-1(S)	QC-1	6
	200	Dual Plate	NON-SIC	NSC	QC-2	2
	250	Swing/Lift	SR	SC-2	QC-2	2
	Total					18

Nomination

IO/18/CFT/70000402/TKA
“Call for Nominations – Framework Supply Contract for CWS Ball Valves and Check Valves”

Nominating Domestic Agency:

COMPANY NAME	ADDRESS (no mailbox please)	WEB SITE	CONTACT PERSON	PHONE	FAX	E-MAIL	COMPANY INFORMATION (if any)