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| IDM UID 8U6VJU |
| VERSION CREATED ON / VERSION / STATUS 03 Apr 2023 / 2.2 / Approved |
| EXTERNAL REFERENCE / VERSION |

Report

Arrangement 5 - CVNB Chemical Additive Skid(26CVNB-SFU-3010) Equipment Summary

This document provides a summary of CVNB Chemical Additive Skid(26CVNB-SFU-3010)

| <i>Approval Process</i> | | | |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <i>Name</i> | <i>Action</i> | <i>Affiliation</i> |
| <i>Author</i> | Kanda K. | 03 Apr 2023:signed | IO/DG/CNST/PLD/MID/TCWS |
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| <i>Reviewers</i> | Berruyer F. Ciampichetti A. Gao J. Ghirelli N. Ricou E. Van hove W. | 04 Apr 2023:recommended 05 Apr 2023:recommended 03 Apr 2023:recommended | IO/DG/CNST/PLD/MID/TCWS IO/DG/CNST/PLD/MID/CMW IO/DG/CORP/FPD/PCD/CAL IO/DG/CNST/PLD/MID/TCWS IO/DG/CNST/PLD/MID/TCWS ORNL - Oak Ridge National Laborator... |
| <i>Approver</i> | Loice D. | 07 Apr 2023:approved | IO/DG/CNST/PLD/MID/TCWS |
| <i>Document Security: Internal Use</i> | | | |
| <i>RO: Loice Donato</i> | | | |
| <i>Read Access</i> | LG: Arrangement 5 Cost Estimation, LG: USDA Arrangement 5, LG: Management, GG: IO DDGs (and Senior Advisors), AD: IO_Director-General, AD: External Management Advisory Board, AD: OBS - Project Control Office (PCO), AD: IDM_Controller, AD: OBS - Procurement & Contracts Division (PCD), AD: Auditors, p... | | |

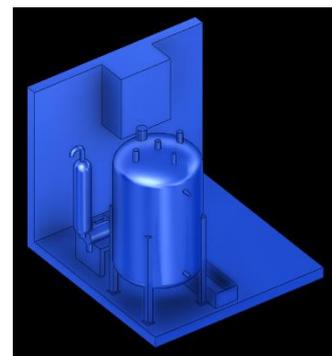
Change Log

Arrangement 5 - CVNB Chemical Additive Skid(26CVNB-SFU-3010) Equipment Summary (8U6VJU)

| <i>Version</i> | <i>Latest Status</i> | <i>Issue Date</i> | <i>Description of Change</i> |
|----------------|----------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------|
| v0.0 | In Work | 10 Mar 2023 | |
| v1.0 | Signed | 12 Mar 2023 | The first version for review. |
| v2.0 | Signed | 27 Mar 2023 | Updated based on the reviewer's comment. |
| v2.1 | Signed | 29 Mar 2023 | Updated based on the reviewer's comment. The native word file with revision track with respect to the first version is attached. |
| v2.2 | Approved | 03 Apr 2023 | The type of operation is changed to intermittent. |

OPERATIONAL NARRATIVE

CVNB Chemical additive skid SFU-3010 injects diluted carbohydrazide (oxygen scavenger) into the primary circuit of IBED (Integrated loop of Blanket, ELM-VS, and Divertor) and NBI (Neutral Beam Injector) PHTS (Primary Heat Transfer System) to control water chemistry.



Disclaimer:

- Contents of this document have been assembled, reviewed and approved as for Information Only,
- May not be used for purchasing, fabrication or construction,
- May not be used as verified input to any document (may be used as unverified assumption).

PHYSICAL ATTRIBUTES

| | |
|--------------------------------------|--------------------------------------------------------------------------------------------------------|
| <i>Commodity Type:</i> | Chemical injection skid |
| <i>Number of equipment:</i> | 1 unit |
| <i>Approx. Footprint:</i> | 1.2 m x 1.2 m (entire skid) |
| <i>Approx. Height:</i> | 1.5 m (entire skid) |
| <i>Approx. Weight:</i> | 2 500 kg (wet) |
| <i>Service Fluid:</i> | 2% Carbohydrazide solution |
| <i>Material Notes (wetted part):</i> | 304L / 316L with composition requirement: cobalt <0.20 wt%, Niobium < 0.1 wt% and Tantalum < 0.05 wt%. |
| <i>Anchoring system</i> | Platform / Bolting |
| <i>Component configuration</i> | Assembly mounted on skid |
| <i>Design Life Time:</i> | 20 years |

ENVIRONMENTAL CONDITIONS

| | |
|---------------------------------------------|----------------|
| <i>Integrated Dose Rate 20yrs:</i> | ≤ 10 Gy |
| <i>Magnetic Field:</i> | ≤ 35 mT |
| <i>Normal temperature</i> | 5 – 35 °C |
| <i>Normal Humidity</i> | 40 – 60 % |
| <i>Normal Pressure relative to atm:</i> | -0.14 kPa |
| <i>Accidental Temperature</i> | 130 °C |
| <i>Accidental Pressure relative to atm:</i> | -5 to +100 kPa |
| <i>Accidental Humidity</i> | 100 % |

WBS: Chemical & Volume Control System

PBS: 26CVNB / GBS: 14-L4-21

Functional Reference: 26CVNB-SFU-3010

REFERENCE DOCUMENTS

Sizing calculation: ITER_D_WVZ79G_v7.4

PID: ITER_D_XJ36P5_v2.4

DESIGN CODES AND SHIPPING

| | |
|------------------------------------------------------|----------------------------------------------------------|
| <i>French Law Pressure Category / Nuclear Class:</i> | Non ESPN / NC |
| <i>European Law:</i> | PED |
| <i>Fluid Type / Fluid group</i> | Liquid / Group 2 |
| <i>Conformity Assessment Module:</i> | SEP |
| <i>Construction Codes:</i> | ASME VIII Div2 |
| <i>Safety Class:</i> | SIC-1 |
| <i>Quality Class:</i> | QC-1 |
| <i>Seismic Class:</i> | SC1 (S) |
| <i>Fire:</i> | Eurocode 2h |
| <i>Shipping Information:</i> | Oversea packing per ASME NQA-1 Level C, DAP at ITER site |

CVNB – Chemical Additive Skid (26CVNB-SFU-3010)

PARAMETERS

| Parameter | Value |
|-----------------------------------|--------------|
| Nominal Temperature (°C) | 18-35 |
| Design Temperature (°C) | 100 |
| Design Pressure (MPa,abs) | 1.20 |
| Type of operation | Intermittent |
| Thermal insulation thickness (mm) | 50 |

PROCESS CONNECTION

| I.D. | DN / Schedule | Service |
|------|---------------|--------------------|
| 1 | 25 / 40S | Chemical loading |
| 2 | 25 / 40S | Chemical injection |
| 3 | 25 / 40S | Local vent |
| 4 | 25 / 40S | Local drain |

CHEMICAL INJECTION PUMP

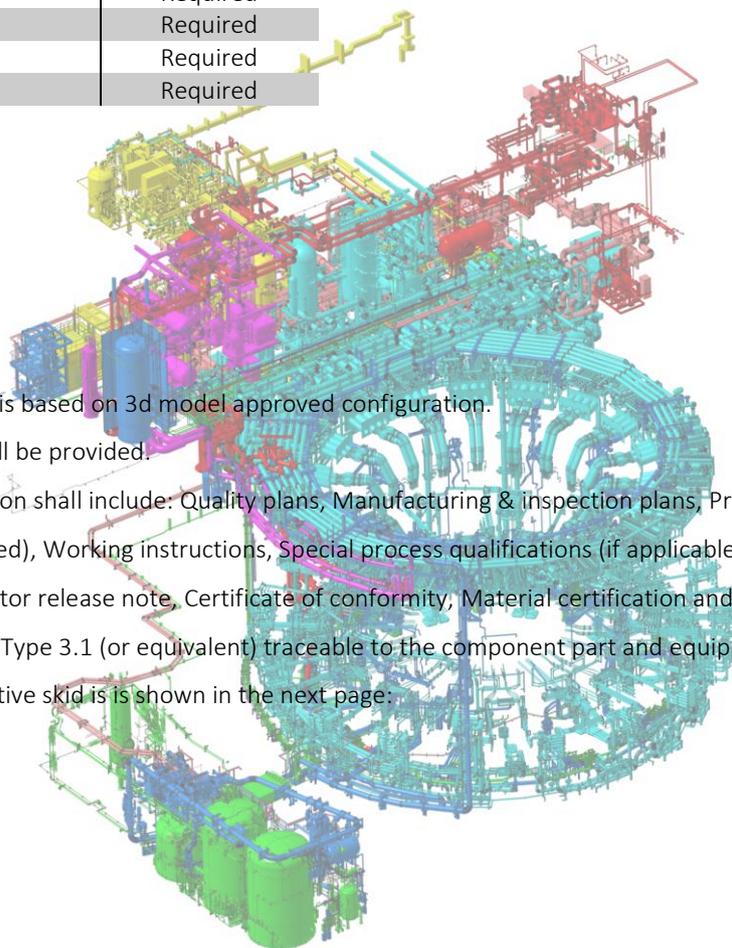
| Parameter | Value |
|---------------------------------------|-----------------------|
| Type of pump | Positive displacement |
| Reference standard | API 675 |
| Pressure at dosing point #1 (MPa,abs) | 0.7 |
| Dosing rate for dosing point #1 (L/h) | 0.46 |
| Pressure at dosing point #2 (MPa,abs) | 0.4 |
| Dosing rate for dosing point #2 (L/h) | 0.20 |
| Shaft power (kW) | 1 |
| Discharge pressure transmitter | Required |
| Overpressure protection valve | Required |
| Pressure regulating valve | Required |
| Motor Voltage (V)/Phase(-)/Cycle (Hz) | 400 / 3 / 50 |

CHEMICAL ADDITIVE TANK

| Parameter | Value |
|------------------------------|----------|
| Tank capacity (L) | 110 |
| Retention basin for spillage | Required |
| Level transmitter | Required |
| Pressure transmitter | Required |
| Rapture disk for tank | Required |

Notes:

1. Approximate footprint is based on 3d model approved configuration.
2. Calibration column shall be provided.
3. Minimum documentation shall include: Quality plans, Manufacturing & inspection plans, Procedures, Calculation note (where design is involved), Working instructions, Special process qualifications (if applicable), Operator qualifications, As-built drawings, Contractor release note, Certificate of conformity, Material certification and inspection documents according to EN 10204 Type 3.1 (or equivalent) traceable to the component part and equipment.
4. P&ID for chemical additive skid is shown in the next page:



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