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| Fluid | Material | Material | Material |
| Boiler Blow Down | A106 Gr.B/A672 Gr.B60 | A312 TP304L |  |
| Boiler Feed Water | A106 Gr.B/A672 Gr.B60 | A312 TP304L |  |
| Cooling Water | A106 Gr.B/A672 Gr.B60 |  |  |
| LPS/LPC | A106 Gr.B/A672 Gr.B60 |  |  |
| MPS/MPC | A106 Gr.B/A672 Gr.B60 |  |  |
| Nitrogen | A106 Gr.B/A672 Gr.B60 |  |  |
| Plant Air | A106 Gr.B/A672 Gr.B60 |  |  |
| Fuel Gas | A106 Gr.B/A672 Gr.B60 |  |  |
| Natural Gas | A106 Gr.B/A672 Gr.B60 |  |  |
| Oily Water | A106 Gr.B/A672 Gr.B60 |  |  |
| Crude Methanol | A106 Gr.B/A672 Gr.B60 | A312 TP304L |  |
| Rich Methanol Liquid | A106 Gr.B/A672 Gr.B60 |  |  |
| Rich Methanol Gas | A106 Gr.B/A672 Gr.B60 | A312 TP304L |  |
| Methanol Water | A106 Gr.B/A672 Gr.B60 | A312 TP304L |  |
| Process Condensate |  | A312 TP304L |  |
| Service Water | A106 Gr.B/A672 Gr.B60 |  |  |
| Ammonia Water |  | A312 TP304L |  |
| Oxygen Scavenger |  | A312 TP304L |  |
| NAOH Solution |  | A312 TP304L |  |
| Demineralized Water |  | A312 TP304 |  |
| Turbine Condensate |  | A312 TP304 |  |
| Instrument Air |  | A312 TP304 |  |
| Lube Oil |  | A312 TP304 |  |
| Hydrogen Gas | A106 Gr.B/A672 Gr.B60 | A312 TP304 |  |
| Synthesis Gas |  | A312 TP304L |  |
| Reformed Gas | A312 TP321H | A312 TP304L | A335 P11 |
| HPS/HPC |  |  |  |
| HHPS | A106 Gr.B/A672 Gr.B60 |  | A335 P11 |
| Phosphate Solution |  | A312 TP304L |  |
| Process Oxygen | B165 N04400 | A312 TP304L |  |
| Fire Water (AG) | A106 Gr.B/A672 Gr.B60 |  |  |
| Fire Water (after filter) | A53 Gr. B/GALV |  |  |
| Fire Foam | A106 Gr.B/A672 Gr.B60 |  |  |
| Potable Water (AG) | A53 Gr. B/GALV. |  |  |
| Potable Water (UG | A53 Gr. B/GALV.  PE Coated Externally |  |  |
| Crossion Inhibitor (AG) | A312 TP316L |  |  |
| H2SO4 | A312 TP316L |  |  |
| HCL Solution (2~40%) (AG) | CPVC |  |  |
| NaClO Solution (10%) (AG) | CPVC |  |  |

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| Utility | Material |
| Boiler Blow Down | A106 Gr.B/A672 Gr.B60 |
| Boiler Feed Water | A106 Gr.B/A672 Gr.B60 |
| Cooling Water | A106 Gr.B/A672 Gr.B60 |
| LPS/LPC | A106 Gr.B/A672 Gr.B60 |
| MPS/MPC | A106 Gr.B/A672 Gr.B60 |
| Nitrogen | A106 Gr.B/A672 Gr.B60 |
| Plant Air | A106 Gr.B/A672 Gr.B60 |
| Service Water | A106 Gr.B/A672 Gr.B60 |
| Fire Foam | A106 Gr.B/A672 Gr.B60 |
| Fire Water (AG) | A106 Gr.B/A672 Gr.B60 |
| Demineralized Water | A312 TP304 |
| Instrument Air | A312 TP304 |
| Fire Water (after filter) | A53 Gr. B/GALV |
| Potable Water (AG) | A53 Gr. B/GALV. |
| Potable Water (UG | A53 Gr. B/GALV.  PE Coated Externally |
| Chemicals | Material |
| Oxygen Scavenger | A312 TP304L |
| NAOH Solution | A312 TP304L |
| Phosphate Solution | A312 TP304L |
| Crossion Inhibitor (AG) | A312 TP316L |
| H2SO4 | A312 TP316L |
| HCL Solution (2~40%) (AG) | CPVC |
| NaClO Solution (10%) (AG) | CPVC |
| Lube Oil | A312 TP304 |

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| Process Fluids | Material |
| Fuel Gas | A106 Gr. B/A672 Gr.B60 |
| Natural Gas | A106 Gr.B/A672 Gr.B60 |
| Methanol Mixtures | A106 Gr.B/A672 Gr.B60 |
| Process Oxygen | B165 N04400 /A312 TP304L |
| Process Condensate | A312 TP304L |
| Ammonia Water | A312 TP304L |
| Turbine Condensate | A312 TP304 |
| Hydrogen Gas | A106 Gr.B/A672 Gr.B60/ A312 TP304 |
| Syngas (H2+CO+CO2) | A312 TP304 |
| Reformed Gas (H2+CO+CO2) | A312 TP321H/ A312 TP304L |

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| Drum/Tank/Culmn | Fluid | Material |
| D-1001 | NG | CS |
| D-2002 | Reformed Gas | SS |
| D-2003 | Reformed Gas | SS |
| D-2004 | Reformed Gas | SS |
| D-2005 | Reformed Gas | SS |
| D-3001 | Syngas | SS |
| D-3002 | Syngas | SS |
| D-5001 | Methanol | CS |
| D-5002 | Methanol | CS |
| D-5003 | Methanol | CS |
| D-6001 | Saturated NG | SS |
| D-6002 | Flashed BD+Ammonia | SS |
| D-7001 | DMW+BFW | SS304L+CS |
| D-7002 | BD | CS |
| D-7003 | BD | CS |
| D-7004 | BD | CS |
| D-5009 | LPC | CS |
| D-2001 | BFW+Steam | CS |
| D-3003 | BFW+Steam | CS |
| D-2011 | HPC | CS |
| T-5001 | Methanol Water | CS |
| T-5002 | Methanol Water | CS |
| T-5003 | Methanol Water | CS |
| T-5004 | Vaporized Methanol  Water + CO2 | SS |
| T-6001-Shell | MPS/MPC | CS |
| TK-7001 | DMW | CS+Internal Painting |
| TK-7002 | Water + CO2 + CO + H2 | CS+liner |
| TK-5001 | Raw Methanol | CS |
| TK-5002 | Rich Methanol | CS |
| TK-5003 | Liquid-off-stream | CS |
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| --- | --- |
| Fluids | Material |
| NG | CS |
| Rich Methanol / Methanol Water | CS |
| BD | CS |
| LPC/MPC/HPC/MPS | CS |
| BFW+Steam | CS |
| Reformed Gas/ Syngas (H2+CO+CO2) | SS |
| Saturated Natural Gas | SS |
| DMW | CS+Internal Painting |
| Ammonia | SS |

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| Turbine/Compressor | Fluid | Material |
| FT-2001 | HPS/LPS | CS |
| FT-2002 | HPS/LPS | CS |
| FT-7001 | HPS/LPS | CS |
| FT-3001 | HHPS/LPS | CS |
| C-2001 | Nitrogen | CS |
| C-2002 | Hydrogen |  |
| C-3001 | Syngas | CS  T>150 SS |

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| Fluid | Material |
| HPS/LPS | CS |
| HHPS/LPS | CS |
| Nitrogen | CS |
| Syngas (H2+CO+CO2) | CS / If T>150 use SS |

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| Reactor | Fluid | Material |
| R-1001 | NG | SA-516 Gr70 |
| R-1002 | NG | SA-516 Gr70 |
| R-2003 | Reformed Gas + SNG | 2.25Cr 1Mo |
| R-2004 | Reformed Gas + SNG | 1.25Cr 0.5Mo |
| R-3001 | BFW + Steam | CS |

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| Component of Channel Side | CS | SS |
| Head | SA-516 70N | SA-240 304L |
| Shell | SA-516 70N | SA-240 304L |
| Channel Flange | SA-266 2N | SA-965 F304L/SA-182 F304 |
| Pass Partition | SA-516 70N |  |
| Nozzle | SA-105N | SA-182 F304L |
| Flange | SA-105N | SA-312 TP304L |
|  |  |  |
| Component of Heat Transfer |  |  |
| Tie Rod | SA-36 | SA-479 304 |
| Spacer | SA-179 | SA-213 TP304/SA-789/SA-312 |
| Baffle | SA-516 70N | SA-240 304 |
| Support Plate | SA-516 70N | SA-240 304L |
| Partition Plate | SA-516 70N | SA-240 304L |
| Impingement Plate | SA-516 70N | SA-240 304 |
| Tubesheet | SA-266 2N | SA-182 F304/SA-965 |
| Roller | SA-36 |  |
| Bonnet Flange Gasket | SS304+Flexible Gasket |  |
| Body Flange Gasket | SS304+Flexible Gasket |  |
| Hex Bolt | SA-193 B7 | SA-193 B7/A2-70 |
| Hex Nut | SA-194 Gr 2H | SA-194 Gr 2H/A2-70 |
| Body Flange | SA-266 2N | SA-965 F304/F304L |
| Shell Side Shell | SA-516 70N | SA-240 304/ SA-387 |
| Saddle Support | SA-516 70N/70 |  |
| Forged Nozzle | SA-105N |  |
| Flange | SA-105N |  |
| Tubes/U-Tubes | SA-179 | SA-213 TP304/SA-789 |
| Sealing Strip | SA-516 70N | SA-240 304L |
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| Suitable Fluid | Natural Gas  Cooling Water  Methanol | Demineralized Water  Reformed Gas  Process Condensate |

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| --- | --- | --- |
| Suitable Fluid | Natural Gas  Cooling Water  Methanol | Demineralized Water  Reformed Gas  Process Condensate |
| Component of Channel Side | CS | SS |
| Head | SA-516 70N | SA-240 304L |
| Shell | SA-516 70N | SA-240 304L |
| Channel Flange | SA-266 2N | SA-965 F304L/SA-182 F304 |
| Pass Partition | SA-516 70N |  |
| Nozzle | SA-105N | SA-182 F304L |
| Flange | SA-105N | SA-312 TP304L |
|  |  |  |
| Component of Heat Transfer | CS | SS |
| Tie Rod | SA-36 | SA-479 304 |
| Spacer | SA-179 | SA-213 TP304/SA-789/SA-312 |
| Baffle | SA-516 70N | SA-240 304 |
| Support Plate | SA-516 70N | SA-240 304L |
| Partition Plate | SA-516 70N | SA-240 304L |
| Impingement Plate | SA-516 70N | SA-240 304 |
| Tubesheet | SA-266 2N | SA-182 F304/SA-965 |
| Hex Bolt | SA-193 B7 | SA-193 B7/A2-70 |
| Hex Nut | SA-194 Gr 2H | SA-194 Gr 2H/A2-70 |
| Body Flange | SA-266 2N | SA-965 F304/F304L |
| Shell Side Shell | SA-516 70N | SA-240 304/ SA-387 |
| Tubes/U-Tubes | SA-179 | SA-213 TP304/SA-789 |
| Sealing Strip | SA-516 70N | SA-240 304L |

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| Fluid | Material |
| NG | SA216 WCB |
| Purge Gas | SA216 WCB |
| Syngas | SA216 WCB/A351 CF8 |
| Process Condensate | A351 CF8 |
| LPS | SA216 WCB |
| MPS | SA216 WCB |
| HPS | SA216 WCB /SA217 WC6 |
| HHPS | SA217 WC6 |
| LPC | SA217 WC6/WC9 |
| MPC | SA216 WCB |
| HPC | SA217 WC9 |
| BFW | SA216 WCB/ SA217 WC6 |
| WMW | A351 CF8 |
| Nitrogen | SA216 WCB |
| Crude Methanol | SA216 WCB |
| Flashed Methanol | A351 CF8 |
| Refined Methanol | SA216 WCB |
| Process Gas | SA216 WCB/ A351 CF8 |
| Oxygen | Monel |