Project Procedure No. 072

"Performance Test Procedure"	Project Execution

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1 Objective

Purpose of the plant performance test is to determine the performance of the combined cycle (CC) in relation to the guaranteed performances as

- Net Power output,
- Net Heat rate,

under specific operating conditions of the whole plant. The plant will be operated as designed and within normal operational parameters.

2 Scope

This procedure is mandatory for acceptance test for PAC (reference to EPC, 8.3.6).

3 Referenced Documents

Turnkey Engineering, Procurement and Construction Contract (EPC Contract) xxxxx&AB_TER1_ENR00046

ISO 2314	Gas turbines – acceptance tests, 2nd edition 1989-05-01
ISO 2314	Amd. 1 Gas turbines – acceptance tests – Amendment 1: acceptance tests for combined-cycle power plants, 1997-12-01
ISO 6976	Natural gas – calculation of calorific values, density, relative density and Wobbe index from composition, 2nd edition, 1995-12-01
AGA 8	Compressibility Factors of Natural Gas and other related hydrocarbon gases.
AGA Report	No 8. 1985.
ISO 9951	Measurement of gas flow in closed conduits, 1993-12-01
DIN 1942	Acceptance testing of steam generators, February 1994
DIN 1943	Thermal acceptance tests of steam turbines, February 1975
	ASME PTC 6S Procedures for Routine Performance Tests of Steam Turbines, 1995
IAPWS-IF97	Properties of water and steam – The industrial standard IAPWS-IF97 for the thermodynamic properties and supplementary equations for other properties, Springer, 1998.
ASME PTC22	Performance Test Code on Gas Turbines, 1997.
ASME PTC 4.4	Gas Turbine Heat Recovery Steam Generators, 1981.
CTI ATC-105	Acceptance Test Code (Cooling Tower), 2000
PTC 19	DIN Instrumentation
DIN 1947	Thermal acceptance tests on wet cooling towers, May 1989

4 Definitions and Abbreviations

EPC	Turnkey Engineering, Procurement and Construction Contract
VT	Consortium (VA Tech and Technip)
VAT	VA Tech
TPI (TPIT)	Technip

5 Procedure

5.1 General

5.1.1 Introduction

Purpose of the plant performance test is to determine the performance of the combined cycle (CC) in relation to the guaranteed performances as

- Net Power output,
- Net Heat rate,

under specific operating conditions of the whole plant. The plant will be operated as designed and within normal operational parameters.

Plant performance test is realized by measuring the electrical and thermal performance, correct the measured performances to specified contract conditions and compare the corrected performances to the guaranteed net output and net heat rate, respectively.

The plant performance test shall be in accordance with ISO 2314 – Amendment 1.

The tests to determine compliance with these guarantees shall use station and, where necessary additional instrumentation, measurements of additional parameters shall be taken for checking contractual operation conditions, or to enable correction to contractual reference conditions.

Performance guarantees refer to equipment in new and clean conditon. For this reasons the performance tests shall be conducted as soon as possible after initial start-up of the plant, equipment shall be cleaned and/or inspected.

During the tests, the following environmental parameters shall be within the ranges prescribed NOx emissions, CO emissions, dust emission, acoustic emissions, total water consumption and liquid effluents characterists.

The test procedure must be mutually approved prior to testing. In the event that VATECH does not receive disapproval prior to the test, this test procedure will be considered approved and final by all parties.

5.1.2 Responsibilities of the Employer

The owner shall provide at no expense

- natural gas
- load for base load operation
- electric energy
- operators
- test assistants to support data collection

as may be necessary for the execution of the performance test. The natural gas shall meet the requirements as per contractor specification.

According to the contract the test shall be carried out by contractor's personnel with the assistance of the owner's staff appointed to operate the plant. The owner shall also be present during the tests.

5.2 Performance Guarantees and Reference Conditions

5.2.1 Performance Guarantees

The guaranteed power output of the combined cycle plant, is measured at the CTs and VTs located in the HV substation. The fuel consumption is measured with the fuel gas meter located in the fuel gas receiving station. The resulting contract performance guarantee data are shown in Table 2.1 and are based on the reference conditions of Table 2.2.

During performance guarantee test the facility will operate at Maximum Plant Load under the specified ambient conditions and the requirements of capacity margins of primary and secondary regulation of grid frequency, as specified by the Dispatching Rules, shall not apply.

Maximum Plant Load (100% Base Load) is defined as the operating load at which the plant is capable to produce continuously the maximum electrical power capacity with no allowance for the capacity margin for primary and secondary regulation of grid frequency. The base load of the gas turbine is that achieved when its exhaust temperature is at its continuously allowable limit in the present ambient inlet air conditions. This output varies substantially with variation of ambient air temperature.

No tolerances, even due to measurement uncertainties, are applicable.

Table 2.1: Base Load Net Power Net Output and Net Heat Rate performance guarantee data for combined cycle plant according to the contract.

GT Unit Operation		**Base Load Performance Guarantee Data for Combined Cycle Plant at the HV substation**	
Fuel	**Load Point**		
Natural Gas	Base Load, 100 %	Net Power Output	769,000 kW
		Net Heat Rate	6,365 kJ/kWh

5.2.2 Reference Conditions

Table 2.2: Reference Cycle Conditions:

Ambient air temperature	°C	17.5
Ambient air pressure	mbar	1013
Relative humidity	%	78
Cooling tower make up water	°C	15
Gas Turbine electrical load	[%]	100 (Base load)
Power Factor at generator terminals	-	0.85
Frequency	Hz	50.0
Voltage at HV substation GT	kV	380
HRSG blow down	[%]	0

5.2.2.1 Fuel Gas

Guarantees are based on Ow ner natural gas as per contractor specification (see Table 2.3).

Table 2.3: Natural gas characteristics

		Specification as per Contract
Methane	[Mol %]	90.607
Ethane	[Mol %]	3.751
Propane	[Mol %]	1.028
ISO-Butane	[Mol %]	0.148
N-Butane	[Mol %]	0.212
ISO-Pentane	[Mol %]	0.045
N-Pentane	[Mol %]	0.049
Heptanes plus	[Mol %]	0.037
N2	[Mol %]	3.641
CO2	[Mol %]	0.436
Helium	[Mol %]	0.047
Sulphur content [mg/m³]		0
Natural gas temperature [°C]		10
Gas at contractor terminal point [bara]		42.0

Specific Volume [kg/Sm³]	0.748
Lower Heating Value [kJ/Sm³]	34586
Wobbe Index [kJ/Sm³]	49082

5.2.2.2 Degradation

Guarantees are based on GT in "new and clean conditions" (0FFH).

Performance degradation will be recognised due to plant aging before the date fixed for the test using CCGT plant degradation curves (see Appendix B).

The actual factored fired hours to use to calculate degradation will be the average figure of fired hours for the two gas turbines.

The application of correction curves for degradation shall be capped, with reference to activities under the responsibility of the contractor, to 1000 FFH or 200 FS for the entire CCGT.

5.2.2.3 Auxiliary Consumers

According ISO 2314 - Amendment 1 only the auxiliary power consumption of the equipment which is absolutely necessary for power generation will be taken into account.

During the tests, both plants and auxiliary plants shall be operated at the same operating conditions as the plant standard operating conditions.

Auxiliary consumers are divided into four groups:

1. Consumers which will be shut off during the performance test.
2. Consumers which will operate intermittent during the performance test.
3. Consumers which can have higher or lower electrical load due to external factors.
4. Consumers which are independent of external factors.

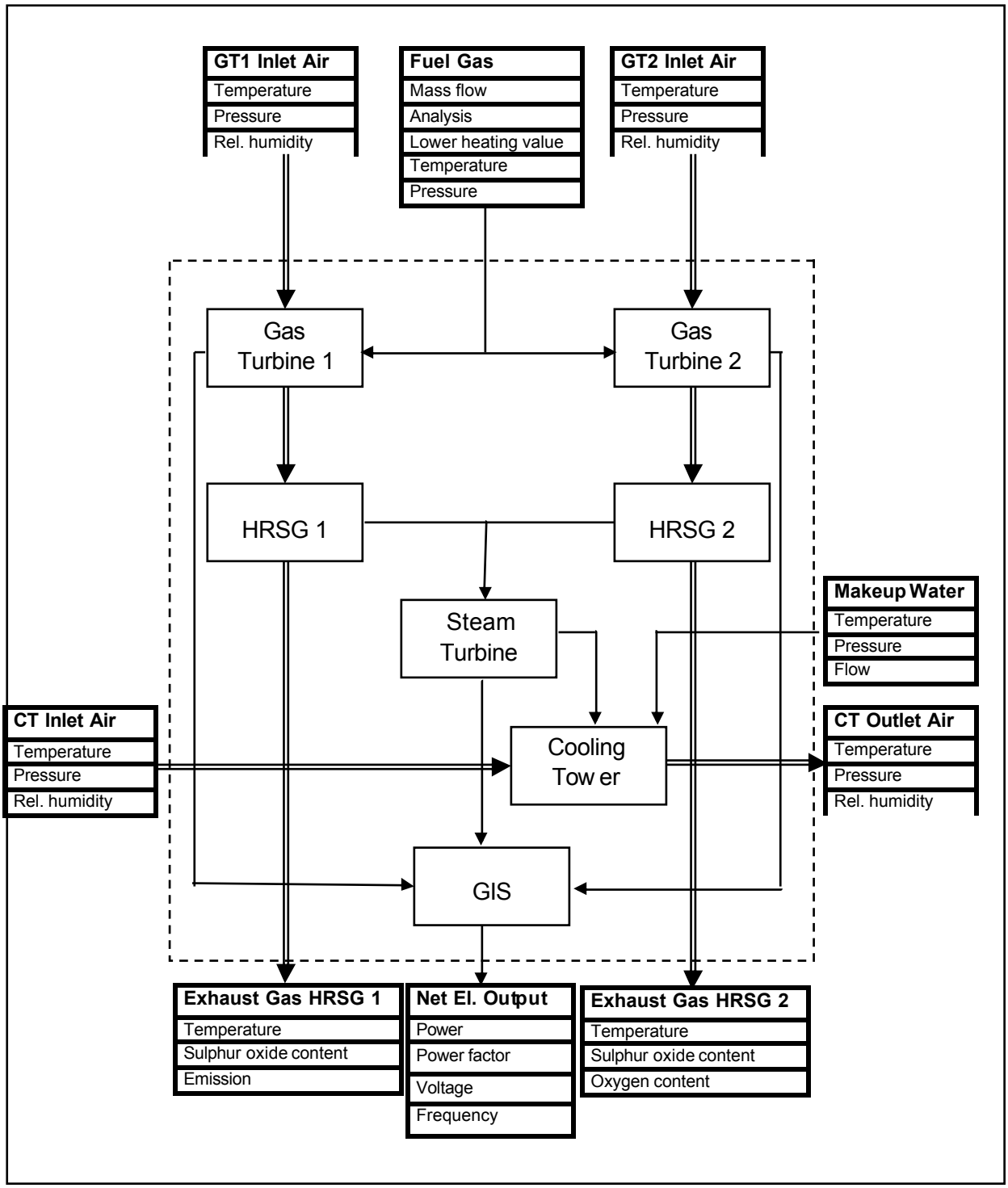
A detailed list of consumers of group 1 is enclosed in Appendix A.

Consumers of group 2, 3 and 4 are operated in automatic mode during the plant performance test.

Dependence of electrical consumers (feed water pumps, condensate pump and cooling tower fans) on external factors is already considered in correction curves for correction of net power output and net heat rate.

5.3 Measurements

5.3.1 Control Volume



Dashed line surrounding CC power plant scheme displays the limit of control volume. Shown in- and outputs at this system border represent performance data or reference data for performance of the whole CC power plant being described in following section.

Data shown in following tables are subdivided into "Measurements of performance guarantee data" meaning data directly used for performance data calculation, "Measurements of performance reference data" used for correction of performance data and "Additional reference parameters" recorded mainly for conditions and operation checks (for example for checking steady state conditions of the plant).

Calibrated instruments will be used for measurements which are sensitive to the evaluation of guaranteed data. Calibration reports and specifications of these instruments are enclosed in Appendix D. The readings of each calibrated instrument will be adjusted to its individual calibration curve.

5.3.2 Measurements of Performance Guarantee Data

Measurements of performance guarantee data are listed in Appendix C, Class G.

The fuel gas analysis and the LHV of the fuel gas results of gas sample analyses carried out by an independent laboratory. The results from the gas chromatograph can be used for the preliminary evaluation.

5.3.3 Measurements of Performance Reference Data

Measurements of performance reference data are listed in Appendix C, Class R.

5.3.4 Measurements of Additional Performance Reference Data

Measurements of additional performance reference data are listed in Appendix C, Class A.

Owner acknowledges that all additional measurements which are not for measurement of guarantee data or reference data are for information only.

5.4 Test Procedure

5.4.1 Preparation of the Test

For meeting new and clean conditions of equipment (as operating conditions requirement listed underneath, 5.4.2.1) and to check measurement installations and calibrations following pre-test activities shall take place:

- Off-line GT compressor water/detergent washing.
- Measuring the GT inlet guide vane (IGV) angular position on some vanes equally spaced around the inlet circumference. The average value of these measurements is used for calibration of the IGV positions.
- Inspection of the gas fuel turbine meter.

- Verifying the calibration and proper operation of the control system, permanent and temporary station instrumentation and measurement devices, as well as recording systems.
- Isolation of the cycle.
- Inspection of heat recovery steam generator.
- Inspection of the air inlet filters, operate a cleaning cycle.
- Documentation of gas turbine exhaust temperature control constants.

5.4.2 Test Implementation

5.4.2.1 Operating Conditions for Performance Test

operation mode	combined cycle mode
control mode	automatic
elapsed operating hours before the test	as per Mark VI or DCS
gas turbine compressor	clean condition
air inlet filter	clean condition
gas turbine load	base load
fuel	natural gas
control of operation	DCS
continues blow down rate of HP, IP and LP steam	0 %
steam turbine condenser	clean condition
HRSG	clean condition
exclusions from auxiliary power consumption	see Appendix A
condenser cleaning system	in operation
average wind velocity	< 4.5 m/s

5.4.2.2 Steady State Conditions

Prior to any readings, the plant operation shall be established at steady state conditions, as defined in ISO 2314, table 2 for the gas turbine and ISO 2314 Amd.1 table A.1 for the plant.

At least 2 hours before the test the plant shall be set to base load operation.

Prior to and during each test run, the gas turbine wheel space temperatures will be monitored individually to verify thermal equilibrium. The gas turbine will be considered in a

thermal equilibrium condition when each turbine wheel space temperature changes by no more than five (5) °F (two point eight (2.8) °C) over a fifteen (15) minute period.

The plant load shall remain within ± 2 % while readings are taken. The test has to be done as close as possible to the reference conditions.

5.4.3 Performance Tests

5.4.3.1 Time for Performance Tests

The performance test should be performed as soon as possible after initial start up of the gas turbine. If the performance test is executed at a later time the plant degradation has to be taken into consideration.

5.4.3.2 Preliminary Test

Directly prior to the performance test a preliminary test shall be carried out for the duration of one performance test period (see 5.4.3.3). Purposes of this test are to determine if the plant is in conditions suitable for conducting a performance test, for checking instrumentation and for familiarization with the test procedure. The preliminary test shall be repeated any time within the available pre test time until the results are satisfactory for both parties before passing into the contractual test period.

After having attained satisfactory results this preliminary test may, by agreement between owner and contractor, be deemed to be one of the three performance test periods as described next.

5.4.3.3 Test Period

The complete performance test of 1.5 hours is subdivided into three equal sections of 30 min duration. In case of successful preliminary test and after mutual agreement this test shall be considered as first performance test section (in accordance with ISO 2314 - Amendment 1). Each period shall be evaluated independently. Test periods shall immediately follow on each another. The intervals between manual readings shall not exceed 5 minutes. Data from DCS or data logger of test instruments will be collected as minute average values. The corrected performance is the average of the results of three 30 minutes periods of valid data.

5.4.3.4 Deviations During Testing

Instrument errors and/or anomalies must be agreed by contractor's test engineer and owner's test engineer. This time period will not be taken into account for evaluation. The test will be extended for the duration of the failure. Instrument errors must be mutually agreed by all parties before they may be removed from the testing period and the testing period extended by the appropriate time.

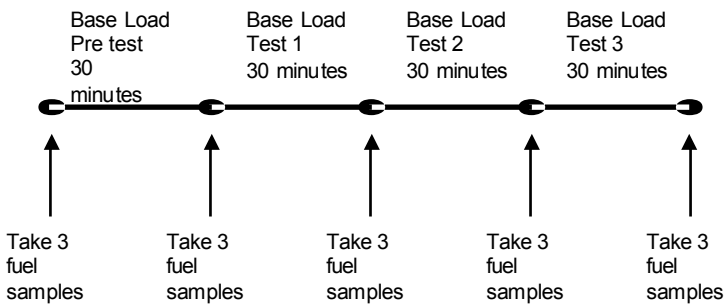
5.4.3.5 Signature and Distribution of Data Sheets

On completion of each test, test data sheets have to be signed by representatives of owner and contractor and copies can be distributed to parties agreed between owner and contractor.

5.4.3.6 Fuel Samples and Fuel Analysis

Three samples of gaseous fuel used during the tests shall be taken at start and end of each test period of the guarantee performance tests. These 15 samples offer three sets of samples with one sample of each period. The necessary apparatus for taking and containing the fuel samples shall be supplied by the contractor. Analysis of the samples will be carried out according ISO 6976.

One set of gas samples to be retained by the owner, the second set of samples to be retained by the contractor and the third set of samples to be set to the independent laboratory for analysis.



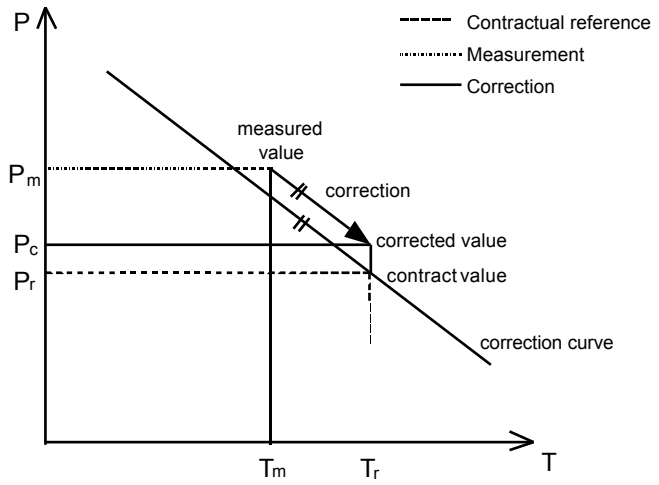
5.5 Bases for Evaluation

5.5.1 Correction of Measured Values to Reference Conditions

The measured results of the power plant performance tests are corrected according to the plant correction curves based on ISO 2314 - Amendment 1. Correction curves are enclosed in appendix B.

5.5.2 Correction method - Sample

The corrected performance value is determined by correction of the concerning measured value to the relevant contractual reference value.



5.5.3 Uncertainty

No tolerances, even due to measurement uncertainties, shall be applied on the measured performances during performance tests.

5.5.4 Acceptance criteria

The average results of the mutually accepted performance test periods have to be compared to the guaranteed performance values. If subsequently a problem has been identified with some of the data this test period may be eliminated by mutual agreement. Following acceptance criteria decides of acceptable performance.

If the determined value for net power output, when corrected to contract reference conditions, equals or exceeds the guaranteed value, then net power output shall be considered in compliance with the guarantee.

If the determined value for net heat rate, when corrected to contract reference conditions, is below or equals the guaranteed value, then net heat rate shall be considered in compliance with the guarantee.

5.5.5 Test report

Owner and contractor shall adhere to the following periods of evaluation the performance test.

Preliminary test report	immediately after the performance test
Final test report including fuel gas analysis from laboratory, performance test evaluation and results	latest 30 days after the performance test
Test results acceptance	within 14 days after submission of final test report by contractor

5.6 Evaluation

5.6.1 Combined Cycle Net Power Output

The corrected combined cycle net pow er output is the sum of each generating unit i pow er output measured at the HV substation being corrected to contractual reference conditions.

$P_{net_c} = \left[(P_{G_m}) \prod_{i}^{p} F_{G,i} + (P_{S_m}) \prod_{i}^{p} F_{S,i} \right] \prod_{j}^{n} F_{P,j}$		**Unit**
P_{net_c}	Corrected combined cycle net power output	kW
P_{G_m}	Measured generated power output of gas turbine at HV substation (under new and clean conditions)	kW
$F_{G,i}$	Factor for correcting gas turbine unit power output to each reference data i at contract conditions	-
P_{S_m}	Measured generated power output of steam turbine at HV substation (under new and clean conditions)	kW
$F_{S,i}$	Factor for correcting steam turbine unit power output to each reference data i at contract conditions	-
$F_{P,j}$	Factor for correcting net power output to each reference data j at contract conditions	-

$F_{G,1} = F_{G,1,r} / F_{G,1,m}$ Factor to correct gas turbine pow er from the measured (m) gas turbine generator pow er factor to the reference (r) gas turbine generator pow er factor

$F_{S,1} = F_{S,1,r} / F_{S,1,m}$ Factor to correct steam turbine pow er from the measured (m) steam turbine generator pow er factor to the reference (r) steam turbine generator pow er factor

$F_{P,1} = F_{P,1,r} / F_{P,1,m}$ Factor to correct CC net pow er output from the measured (m) ambient temperature to the reference (r) ambient temperature

$F_{P,2} = F_{P,2,r} / F_{P,2,m}$ Factor to correct CC net pow er output from the measured (m) w et bulb temperature to the reference (r) wet bulb temperature

$F_{P,3} = F_{P,3,r} / F_{P,3,m}$	Factor to correct CC net pow er output from the measured (m) ambient pressure to the reference (r) ambient pressure
$F_{P,4} = F_{P,4,r} / F_{P,4,m}$	Factor to correct CC net pow er output from the measured (m) ambient humidity to the reference (r) ambient humidity
$F_{P,5} = F_{P,5,r} / F_{P,5,m}$	Factor to correct CC net pow er output from the measured (m) grid frequency to the reference (r) grid frequency
$F_{P,6} = F_{P,6,r} / F_{P,6,m}$	Factor to correct CC net pow er output from the measured (m) gas pressure to the reference (r) gas pressure
$F_{P,7} = F_{P,7,r} / F_{P,7,m}$	Factor to correct CC net pow er output from the measured (m) gas temperature to the reference (r) gas temperature
$F_{P,8} = F_{P,8,r} / F_{P,8,m}$	Factor to correct CC net pow er output from the measured (m) gas LHV to the reference (r) gas LHV
$F_{P,9} = F_{P,9,r} / F_{P,9,m}$	Factor to correct CC net pow er output from the measured (m) make up water temperatur e l to the reference (r) make up w ater temperature
$F_{P,10} = F_{P,10,r} / F_{P,10,m}$	Factor to correct CC net pow er output from the measured (m) sulphur in natural gas to the reference (r) sulphur in natural gas
$F_{P,11} = F_{P,11,r} / F_{P,11,m}$	Factor to correct CC net pow er output from the measured (m) fired hours to the reference (r) fired hours
$F_{P,12} = F_{P,12,r} / F_{P,12,m}$	Factor to correct CC net pow er output from the measured (m) HV voltage to the reference (r) HV voltage

For correction factors FG,i,m, FG,i,r, FS,i,m, FS,i,r, FP,i,m, FP,i,r refer to correction curves in Appendix B.

5.6.2 Combined Cycle Net Heat Rate

The corrected combined cycle net heat rate is calculated w ith the fuel flow , LHV and measured combined cycle net power output being corrected to contractual reference conditions.

$HR_{net_c} = \dfrac{\dot{m}_{fuel_m}\ H_{l_m}}{\left[(P_{G_m})\prod_i^p F_{G,i} + (P_{S_m})\prod_i^p F_{S,i}\right]}\ 3600 \prod_j^n (F_{HR,j})$		**Unit**
HR_{net_c}	Corrected combined cycle net heat rate	kW
m_{fuel_m}	Measured fuel mass	kg/s
H_{l_m}	Measured fuel lower heating value	kJ/kg
P_{G_m}	Measured generated power output of gas turbine at HV substation (under new and clean conditions)	kW
$F_{G,i}$	Factor for correcting gas turbine unit power output to each reference data i at contract conditions	-
P_{S_m}	Measured generated power output of steam turbine at HV substation (under new and clean conditions)	kW
$F_{S,i}$	Factor for correcting steam turbine unit power output to each	-

	reference data i at contract conditions	
$F_{HR,j}$	Factor for correcting measured combined cycle net heat rate to each reference data j at contract conditions	-

$F_{HR,1} = F_{E,1,m} / F_{E,1,r}$ Factor to correct CC net heat rate from the measured (m) ambient temperature to the reference (r) ambient temperature

$F_{HR,2} = F_{E,2,m} / F_{E,2,r}$ Factor to correct CC net heat rate from the measured (m) wet bulb temperature to the reference (r) wet bulb temperature

$F_{HR,3} = F_{E,3,m} / F_{E,3,r}$ Factor to correct CC net heat rate from the measured (m) ambient pressure to the reference (r) ambient pressure

$F_{HR,4} = F_{E,4,m} / F_{E,4,r}$ Factor to correct CC net heat rate from the measured (m) ambient humidity to the reference (r) ambient humidity

$F_{HR,5} = F_{E,5,m} / F_{E,5,r}$ Factor to correct CC net heat rate from the measured (m) grid frequency to the reference (r) grid frequency

$F_{HR,6} = F_{E,6,m} / F_{E,6,r}$ Factor to correct CC net heat rate from the measured (m) gas pressure to the reference (r) gas pressure

$F_{HR,7} = F_{E,7,m} / F_{E,7,r}$ Factor to correct CC net heat rate from the measured (m) gas temperature to the reference (r) gas temperature

$F_{HR,8} = F_{E,8,m} / F_{E,8,r}$ Factor to correct CC net heat rate from the measured (m) gas LHV to the reference (r) gas LHV

$F_{HR,9} = F_{E,9,m} / F_{E,9,r}$ Factor to correct CC net heat rate from the measured (m) make up water temperature to the reference (r) make up water temperature

$F_{HR,10} = F_{E,10,m} / F_{E,10,r}$ Factor to correct CC net heat rate from the measured (m) sulphur in natural gas to the reference (r) sulphur in natural gas

$F_{HR,11} = F_{E,11,m} / F_{E,11,r}$ Factor to correct CC net heat rate from the measured (m) fired hours to the reference (r) fired hours

$F_{HR,12} = F_{E,12,m} / F_{E,12,r}$ Factor to correct CC net heat rate from the measured (m) HV voltage to the reference (r) HV voltage

For correction factors FE,i refer to correction curves in Appendix B.

6 Appendix

6.1 APPENDIX A: Consumer List and Isolation List

6.2 APPENDIX B: Correction Curves

6.3 APPENDIX C: List of Measurement Points, Measurement Diagram

6.4 APPENDIX D: Calibration Reports

6.5 APPENDIX E: Performance Test Data (Typical)

6.6 APPENDIX F: Guideline for Gas Sampling

6.7 APPENDIX G: Single Component Performances

6.8 APPENDIX H: Guaranteed plant operation constraints

7 Document History

Date of Issue	Revision	Revised Chapters	Type of Revision
27.04.2005	A	-	First Issue
24.10.2005	B	Implementation of OE comments, addition of appendix G, H	
03.04.2006	C	Implementation of OE comments to chapter 5.2.2.3 and 5.4.2.1	

KKS	KKS3	Text1_long	Status
10EKC14AH001	-E01	Fuel Gas Electrical Heater	off
10EKT11AP001	-M01	Fuel Gas Preheater Boiler Feed Water Pump 1	off
10EKT11AV001	-E01	Fuel Gas Preheater Boiler 1 Panel	off
10EKT12AP001	-M01	Fuel Gas Preheater Boiler Feed Water Pump 2	off
10EKT12AV001	-E01	Fuel Gas Preheater Boiler 2 Panel	off
10GAF32AP001	-M01	Demin Water System Feed Pump 2	off
10GAF72AP001	-M01	Service Water Pump 2	off
10GCB12AT001	-M01	Demin Plant Fine Strainer 2	off
10GCH12AP001	-M01	Demin Plant Intermediate Pump 2	off
10GCN42AP001	-M01	Demin Plant HCL Dosing Pump 2	off
10GCN82AP001	-M01	Demin Plant NAOH Dosing Pump 2	off
10GCP12AP001	-M01	Demin Plant Regeneration Pump 2	off
10GCP62AN001	-M01	Demin Plant Mixing Air Blower 2	off
10GCR22AP001	-M01	Demin Plant Neutralization Pump 2	off
10GHC12AP001	-M01	Demin Water Pump 2	off
10GHC13AP001	-M01	Demin Water Pump 3	off
10GHC90AP001	-M01	Auxiliary Deaerator Feed Pump	off
10GMA11AP001	-M01	Transformer Oil Retention Basin Pump 1	off
10GMA12AP001	-M01	Transformer Oil Retention Basin Pump 2	off
10GMA21AP001	-E01	Drains Recovery Pump 1 Motor Heater	off
10GMA21AP001	-M01	Drains Recovery Pump 1	off
10GMA22AP001	-E01	Drains Recovery Pump 2 Motor Heater	off
10GMA22AP001	-M01	Drains Recovery Pump 2	off
10GQA12AP001	-M01	Sanitary Water Sump Pump 2	off
10GUC31AP001	-M01	Diversion Basin Sump Pump 1	off
10GUC32AP001	-M01	Diversion Basin Sump Pump 2	off
10GUC51AP001	-M01	First Rain Water Pump 1	off
10GUC52AP001	-M01	First Rain Water Pump 2	off
10GUD21AP001	-M01	Treated Water Pump 1	off
10GUD22AP001	-M01	Treated Water Pump 2	off
10GUD23AP001	-M01	Treated Water Pump 3	off
10LCB12AH001	-E01	Condensate Pump 2 Motor Heater	off
10LCB12AP001	-M01	Condensate Pump 2	off
10LCB12GF001	-E21	Condensate Pump 2 Local Box	off
10PAR12AP001	-E01	Cooling Tower Make-Up Water Pump 2 Motor Heater	off
10PAR12AP001	-M01	Cooling Tower Make-Up Water Pump 2	off
10PAR13AP001	-E01	Cooling Tower Make-Up Water Pump 3 Motor Heater	off
10PAR13AP001	-M01	Cooling Tower Make-Up Water Pump 3	off
10PBN10AP001	-E01	Cooling Tower Sodium Hypochlorite Unloading Pump Motor Heat	off
10PBN10AP001	-M01	Cooling Tower Sodium Hypochlorite Unloading Pump	off
10PBN22AP001	-M01	CW Antiscale Disperdant Dosing Pump 2	off
10PBN22AP001	-M02	CW Antiscale Disperdant Dosing Pump 2 Actuator	off
10PBN32AP001	-M01	CW Corrosion Iinhibitor Dosing Pump 2	off
10PBN32AP001	-M02	CW Corrosion Iinhibitor Dosing Pump 2 Actuator	off
10PBN42AP001	-M01	CW Dosing Sulphuric Acid Dosing Pump 2	off
10PBN42AP001	-M02	CW Dosing Sulphuric Acid Dosing Pump 2 Actuator	off
10PCC12AH001	-E01	Auxiliary Cooling Water Pump 2 Heater	off
10PCC12AP001	-M01	Auxiliary Cooling Water Pump 2	off
10PGC12AH001	-E01	Closed Circuit Cooling Water Pump 2 Motor Heater	off
10PGC12AP001	-M01	Closed Circuit Cooling Water Pump 2	off
10QFA12GS001	-E01	Air Compressor 2	off
10QFA12GS001	-E02	Air Compressor 2	off
10QHG10AP001	-M01	Auxiliary Steam Generator Feed Water Pump 1	off
10QHG11AP001	-M01	Auxiliary Steam Generator Feed Water Pump 2	off
10QHG15AP001	-M01	Auxiliary Steam Generator Dosing Pump	off
10QHN10AN001	-M01	Auxiliary Steam Generator FD Fan	off
10QHY10GH001	-E51	Auxiliary Steam Generator Control Panel	off
10SGA11GS001	-E01	Fire Fighting Electrical Pump Control Panel	off
10SGA12GS001	-E01	Fire Fighting Diesel Pump Control Panel	off
10SMD10	-E01	380kV GIS Sub-Station Bridge Crane	off
10SMS10	-E01	Workshop Bridge Crane	off
10UBA16GQ051	-X01	DCS Printer Sockets (Central Control Room)	off

off = shut off consumers

KKS	KKS3	Text1_long	Status
10UBA16GQ051	-X02	DCS Printer Sockets (Central Control Room)	off
10UGN01GQ001	-E01	Welding Power Outlet Zone A Junction Box	off
10UGN01GQ001	-E02	Welding Power Outlet Zone A Junction Box	off
10UGN01GQ001	-E03	Welding Power Outlet Zone A Junction Box	off
10UMA01GQ001	-E01	Welding Power Outlet Zone F Junction Box	off
10UMA01GQ001	-E02	Welding Power Outlet Zone F Junction Box	off
10UMA01GQ001	-E03	Welding Power Outlet Zone F Junction Box	off
10UMA01GQ001	-E04	Welding Power Outlet Zone F Junction Box	off
10UMB01GQ001	-E01	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ001	-E02	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ001	-E03	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ002	-E01	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ002	-E02	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ002	-E03	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ003	-E01	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ003	-E02	Welding Power Outlet Zone D Junction Box	off
10UMB01GQ003	-E03	Welding Power Outlet Zone D Junction Box	off
10URB01GQ001	-E01	Welding Power Outlet Zone E Junction Box	off
10URB01GQ001	-E02	Welding Power Outlet Zone E Junction Box	off
10URB01GQ001	-E03	Welding Power Outlet Zone E Junction Box	off
10URB01GQ001	-E04	Welding Power Outlet Zone E Junction Box	off
10URB01GQ001	-E05	Welding Power Outlet Zone E Junction Box	off
10UYP01GQ001	-E01	Welding Power Outlet Zone C Junction Box	off
10UYP01GQ001	-E02	Welding Power Outlet Zone C Junction Box	off
11_23HG-2	-E01	GT1 Generator Space Heater	off
11_23QT-2	-E01	GT1 Lube Oil Tank Immersion Heater 2	off
11_23QT-3	-E01	GT1 Lube Oil Tank Immersion Heater 3	off
11_23WK-1	-E01	GT1 Wash Water Immersion Heater 1	off
11_23WK-2	-E01	GT1 Wash Water Immersion Heater 2	off
11_23WS-1	-E01	GT1 Wash Water Space Heater	off
11_88BD-2	-M01	GT1 Diffuser Area Cooling Air Fan 2 Motor	off
11_88BL-2	-M01	GT1 Lube Oil Skid Cooling Air Fan 2 Motor	off
11_88BN-2	-M01	GT1 #2 Bearing Area Cooling Air Fan 2 Motor	off
11_88BT-2	-M01	GT1 Turbine Compartment Cooling Air Fan2 Motor	off
11_88DEFHOIST	-M01	GT1 Air Intake System Hoist	off
11_88ES-1	-M01	GT1 Emergency Seal Oil Pump Motor	off
11_88FP-2A	-M01	GT1 Fire Protection System Condenser Fan	off
11_88HQ-2	-M01	GT1 Hydraulic Oil Supply Pump 2 Motor	off
11_88QA-2	-M01	GT1 Auxiliary Lube Oil Pump 2 Motor	off
11_88QV-1B	-M01	GT1 Lube Mist Separator 2 Motor	off
11_88TG-1	-M01	GT1 Turning Gear Motor	off
11_88TK-2	-M01	GT1 Turbine Shell & Exhaust Frame Blower 2 Motor	off
11_88VG-2	-M01	GT1 Load Compartment Cooling Air Fan 2 Motor	off
11_88VW-1	-M01	GT1 Water Wash Unit Vent Fan Motor	off
11_88WS-1	-M01	GT1 Water Wash Skid Space Heater Blower Motor	off
11GMA11AP001	-E01	HRSG1 Drain Recovery Pump 1 Motor Heater	off
11GMA11AP001	-M01	HRSG1 Drain Recovery Pump 1	off
11GMA12AP001	-E01	HRSG1 Drain Recovery Pump 2 Motor Heater	off
11GMA12AP001	-M01	HRSG1 Drain Recovery Pump 2	off
11LAC12AP001	-M01	HRSG1 Feedwater Pump 2	off
11LAC12GH001	-E01	HRSG1 HP FWP2 Housing Cooling Fan Local Box	off
11LAC12GX001	-E01	HRSG1 HP Feedwater Pump 2 Frequency Converter	off
11LAC12GX001	-U01	HRSG1 HP Feedwater Pump 2 Frequency Converter	off
11LCA88AP001	-E01	HRSG1 Recirculating Pump 2 Motor Heater	off
11LCA88AP001	-M01	HRSG1 Recirculating Pump 2	off
11SMB10	-E01	GT1 Bridge Crane	off
11UHA01AE001	-M01	HRSG1 Motorised Hoist	off
11UMB11GQ001	-E01	Welding Power Outlet GT1 Machine Hall Junction Box	off
11UMB11GQ002	-E01	Welding Power Outlet GT1 Machine Hall Junction Box	off
12_23HG-2	-E01	GT2 Generator Space Heater	off
12_23QT-2	-E01	GT2 Lube Oil Tank Immersion Heater 2	off
12_23QT-3	-E01	GT2 Lube Oil Tank Immersion Heater 3	off

off = shut off consumers

KKS	KKS3	Text1_long	Status
12_23WK-1	-E01	GT2 Wash Water Immersion Heater 1	off
12_23WK-2	-E01	GT2 Wash Water Immersion Heater 2	off
12_23WS-1	-E01	GT2 Wash Water Space Heater	off
12_88BD-2	-M01	GT2 Diffuser Area Cooling Air Fan 2 Motor	off
12_88BL-2	-M01	GT2 Lube Oil Skid Cooling Air Fan 2 Motor	off
12_88BN-2	-M01	GT2 #2 Bearing Area Cooling Air Fan 2 Motor	off
12_88BT-2	-M01	GT2 Turbine Compartment Cooling Air Fan2 Motor	off
12_88DEFHOIST	-M01	GT2 Air Intake System Hoist	off
12_88ES-1	-M01	GT2 Emergency Seal Oil Pump Motor	off
12_88FP-2A	-M01	GT2 Fire Protection System Condenser Fan	off
12_88HQ-2	-M01	GT2 Hydraulic Oil Supply Pump 2 Motor	off
12_88QA-2	-M01	GT2 Auxiliary Lube Oil Pump 2 Motor	off
12_88QV-1B	-M01	GT2 Lube Mist Separator 2 Motor	off
12_88TG-1	-M01	GT2 Turning Gear Motor	off
12_88TK-2	-M01	GT2 Turbine Shell & Exhaust Frame Blower 2 Motor	off
12_88VG-2	-M01	GT2 Load Compartment Cooling Air Fan 2 Motor	off
12_88VW-1	-M01	GT2 Water Wash Unit Vent Fan Motor	off
12_88WS-1	-M01	GT2 Water Wash Skid Space Heater Blower Motor	off
12GMA11AP001	-E01	HRSG2 Drain Recovery Pump 1 Motor Heater	off
12GMA11AP001	-M01	HRSG2 Drain Recovery Pump 1	off
12GMA12AP001	-E01	HRSG2 Drain Recovery Pump 2 Motor Heater	off
12GMA12AP001	-M01	HRSG2 Drain Recovery Pump 2	off
12LAC12AP001	-M01	HRSG2 Feedwater Pump 2	off
12LAC12GH001	-E01	HRSG2 HP FWP2 Housing Cooling Fan Local Box	off
12LAC12GX001	-E01	HRSG2 HP Feedwater Pump 2 Frequency Converter	off
12LAC12GX001	-U01	HRSG2 HP Feedwater Pump 2 Frequency Converter	off
12LCA88AP001	-E01	HRSG2 Recirculating Pump 2 Motor Heater	off
12LCA88AP001	-M01	HRSG2 Recirculating Pump 2	off
12SMB10	-E01	GT2 Bridge Crane	off
12UHA01AE001	-M01	HRSG2 Motorised Hoist	off
12UMB11GQ001	-E01	Welding Power Outlet GT2 Machine Hall Junction Box	off
12UMB11GQ002	-E01	Welding Power Outlet GT2 Machine Hall Junction Box	off
13MAJ70AN001	-M01	CONDENSER VACUUM PUMP 2	off
13MAJ73AN001	-M01	CONDENSER BOOSTER PUMP WATER SUPPLY VACUUM PUMP 2	off
13MAV21AP022	-M01	LUBE OIL PUMP 2	off
13MAV24AP001	-M01	EMERGENCY OIL PUMP	off
13MAV31AP001	-M01	LIFTING OIL PUMP 1	off
13MAV32AP001	-M01	LIFTING OIL PUMP 2	off
13MAV82AN002	-M01	OIL VAPOR EXHAUSTER 2	off
13MAW80AN002	-M01	VAPOR EXHAUSTER 2	off
13MAX01AN012	-M01	FAN CONTROL FLUID COOLER 2	off
13MAX01AP002	-M01	CONTROL FLUID PUMP 2	off
13MAX01AP012	-M01	CONTROL FLUID TREATMENT CIRCULATION PUMP 2	off
13MAX05AN012	-M01	FAN CONTROL FLUID COOLER 2	off
13MAX05AP002	-M01	CONTROL FLUID PUMP 2	off
13MAX05AP012	-M01	CONTROL FLUID TREATMENT CIRCULATION PUMP 2	off
13MKQ22AN001	-M01	ST Generator Exhaust Fan 2	off
13MKW12AP001	-M01	ST Generator Seal Oil Pump 2	off
13SAM10AN002	-M01	Aspiration/H2 Seal Oil Plant Ventilator 2	off
13SMA10	-E01	ST Bridge Crane	off
13UMA11GQ001	-E01	Welding Power Outlet ST Machine Hall Junction Box	off
13UMA11GQ002	-E01	Welding Power Outlet ST Machine Hall Junction Box	off

off = shut off consumers

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P301	XXHAH24	AA151	HP SH2/SH3 DRAIN MOT.	GLOBE	4"		X	
N1008-00-P301	XXHAH24	AA651	HP SH2/SH3 DRAIN	GATE	4"		X	
N1008-00-P301	XXLBA10	AA913	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA914	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA910	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA909	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA912	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA908	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA911	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA907	HP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA901	HP MAIN STEAM PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA902	HP MAIN STEAM PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA904	HP MAIN STEAM PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA906	HP MAIN STEAM PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA601	HP START UP VENT S/O VALVE	GATE	6"		X	
N1008-00-P301	XXLBA10	AA151	HP START UP VENT VALVE - MOT. INCHING	GLOBE	6"		X	
N1008-00-P301	XXLBA10	AA903	HP MAIN STEAM PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA905	HP MAIN STEAM PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLBA43	AA501	HP MAIN STEAM - SAMPLING	GLOBE	3/4"	X		
N1008-00-P301	XXLBA43	AA502	HP MAIN STEAM - SAMPLING	GLOBE	3/4"	X		
N1008-00-P301	XXLBA10	AA501	HP MAIN STEAM STOP VALVE	GATE	12"	X		
N1008-00-P301	XXHAH14	AA602	HP SH1 VENT	GLOBE	1"		X	
N1008-00-P301	XXHAH14	AA601	HP SH1 VENT	GLOBE	1"		X	
N1008-00-P301	XXHAH10	AA152	HP SATURATED STEAM - DRAIN	GLOBE	2"		X	
N1008-00-P301	XXHAH10	AA153	HP SH1 - DRAIN MOT.	GLOBE	3"		X	
N1008-00-P301	XXHAH10	AA653	HP SH1 HOT HEADER - DRAIN	GATE	3"		X	
N1008-00-P301	XXHAH10	AA652	HP SH1 COLD HEADER - DRAIN	GATE	3"		X	
N1008-00-P301	XXHAH42	AA501	HP SATURATED STEAM - SAMPLING	GLOBE	3/4"	X		
N1008-00-P301	XXHAH10	AA651	HP SATURATED STEAM - DRAIN	GLOBE	2"		X	
N1008-00-P301	XXHAH42	AA502	HP SATURATED STEAM - SAMPLING	GLOBE	3/4"	X		
N1008-00-P301	XXLAE10	AA601	HP SH SPRAY WATER LINE VENT	GLOBE	3/4"		X	
N1008-00-P301	XXLAE10	AA602	HP SH SPRAY WATER LINE VENT	GLOBE	3/4"		X	
N1008-00-P301	XXLAE10	AA101	HP SH SPRAY WATER - Mot. Valve	GLOBE	4"	X		
N1008-00-P301	XXLAE10	AA906	HP SH SPRAYWATER PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLAE10	AA905	HP SH SPRAYWATER PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLAE10	AA901	HP SH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number	Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P301	XXLAE10 AA902	HP SH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLAE10 AA903	HP SH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P301	XXLAE10 AA904	HP SH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD12 AA101	HP CONTINUOUS BLOWDOWN LINE - MOT. VALVE	GLOBE	1 1/2"		X	
N1008-00-P302	XXHAD11 AA653	HP EVAPORATOR DRAIN VALVE	GATE	4"		X	
N1008-00-P302	XXHAD14 AA101	AUXILIARY STEAM LINE - MOT. VALVE	GLOBE	3"		X	
N1008-00-P302	XXHAD41 AA502	HP EVAPORATOR SAMPLING LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD41 AA501	HP EVAPORATOR SAMPLING LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD11 AA651	HP EVAPORATOR DRAIN VALVE	GATE	3"		X	
N1008-00-P302	XXHAD11 AA652	HP EVAPORATOR DRAIN VALVE	GATE	3"		X	
N1008-00-P302	XXHAC20 AA655	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA658	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA656	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA660	HP ECO2 DRAIN VALVE	GATE	4"		X	
N1008-00-P302	XXHAC20 AA659	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA657	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA654	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA652	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA653	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC20 AA651	HP ECO2 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAD10 AA926	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA928	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA930	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA932	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD12 AA904	HP CBD LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD12 AA902	HP CBD LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD12 AA903	HP CBD LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD12 AA901	HP CBD LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD13 AA501	HP CONTINUOUS BLOWDOWN LINE - S/O VALVE	GLOBE	2"	X		
N1008-00-P302	XXHAD13 AA101	HP CONTINUOUS BLOWDOWN LINE - MOT. VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAD10 AA925	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA929	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA931	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA927	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA924	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA922	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10 AA923	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P302	XXHAD10	AA921	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA910	HP DRUM HYDRAULIC COL. PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD12	AA501	HP CONTINUOUS BLOW DOWN LINE - S/O VALVE	GLOBE	1 1/2"		X	
N1008-00-P302	XXHAD10	AA903	HP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA904	HP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA901	HP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA902	HP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXQCA10	AA501	HP DRUM CHEMICAL INJECTION	GLOBE	1/2"	X		
N1008-00-P302	XXQCA10	AA502	HP DRUM CHEMICAL INJECTION	GLOBE	1/2"	X		
N1008-00-P302	XXQCA10	AA701	HP DRUM CHEMICAL INJECTION	PISTON CHECK	1/2"	X		
N1008-00-P302	XXHAD10	AA908	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA907	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA905	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA906	HP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA909	HP DRUM HYDRAULIC COL. PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAH10	AA101	HP DRUM VENT LINE- MOV	GLOBE	2"		X	
N1008-00-P302	XXHAH10	AA501	HP DRUM OUTLET LINE NITROGEN INJECTION	GLOBE	1"		X	
N1008-00-P302	XXHAH10	AA701	HP DRUM OUTLET LINE NITROGEN INJECTION	PISTON CHECK	1"		X	
N1008-00-P302	XXHAH10	AA502	HP DRUM OUTLET LINE NITROGEN INJECTION	GLOBE	1"		X	
N1008-00-P302	XXHAH10	AA601	HP DRUM VENT LINE - S/O VALVE	GLOBE	2"	X		
N1008-00-P302	XXHAC10	AA601	HP ECO1/ECO2 VENT VALVE	GLOBE	1"		X	
N1008-00-P302	XXLAB20	AA601	HP FW TO ECO1 - VENT VALVE	GLOBE	1"		X	
N1008-00-P302	XXLAB20	AA903	HP FW TO ECO1 PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA904	HP FW TO ECO1 PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAC10	AA659	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA657	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA658	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA656	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA654	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA655	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA660	HP ECO1 DRAIN VALVE	GATE	4"		X	
N1008-00-P302	XXHAC10	AA652	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA653	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXHAC10	AA651	HP ECO1 DRAIN VALVE	GLOBE	2"		X	
N1008-00-P302	XXLAB20	AA902	HP FW TO ECO1 PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA901	HPFW TO ECO1 PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA501	HPFW TO ECO1 - GATE VALVE	GATE	8"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P302	XXLAB20	AA505	HP FEEDWATER BYPASS C.V. ISOLATION VALVE	GATE	4"	X		
N1008-00-P302	XXLAB20	AA503	HP FEEDWATER C.V. ISOLATION VALVE	GATE	8"	X		
N1008-00-P302	XXLAB20	AA906	HP FW TO ECO1 PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA905	HP FW TO ECO1 PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA910	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA909	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA908	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA907	HPFW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA914	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA913	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA912	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA911	HP FW TO ECO1 FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXLAB20	AA504	HP FEEDWATER BYPASS C.V. ISOLATION VALVE	GATE	4"	X		
N1008-00-P302	XXLAB20	AA502	HP FEEDWATER C.V. ISOLATION VALVE	GATE	8"	X		
N1008-00-P302	XXHAD10	AA651	HP DRUM HYDRAULIC COL. DRAIN	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA652	HP DRUM HYDRAULIC COL. DRAIN	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA653	HP DRUM HYDRASTEP DRAIN	GLOBE	1/2"		X	
N1008-00-P302	XXHAD10	AA654	HP DRUM LEVEL INDICATOR DRAIN	GLOBE	1/2"		X	
N1008-00-P302	XXHAD10	AA655	HP DRUM HYDRAULIC COL. DRAIN	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA656	HP DRUM HYDRAULIC COL. DRAIN	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA912	HP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD10	AA916	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA914	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAC10	AA602	HP ECO1/ECO2 VENT VALVE	GLOBE	1"		X	
N1008-00-P302	XXLAB20	AA602	HP FW TO ECO1 - VENT VALVE	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA918	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA911	HP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P302	XXHAD10	AA917	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA920	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA915	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA913	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA919	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P303	XXLBC50	AA151	RH1 HEADER DRAIN MOT. VALVE	GLOBE	2"		X	
N1008-00-P303	XXLBC50	AA654	RH1 HEADER DRAIN VALVE	GLOBE	2"		X	
N1008-00-P303	XXLBC50	AA903	COLD RH PRESSURE TRANSMITTER ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLBC50	AA904	COLD RH PRESSURE TRANSMITTER ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXHAJ60	AA151	RH2 HEADER DRAIN - MOT. VALVE	GLOBE	4"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P303	XXHAJ60	AA651	RH2 HEADER DRAIN - VALVE	GATE	4"		X	
N1008-00-P303	XXLBB50	AA902	HOT RH PRESSURE TRANSMITTER ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLBB50	AA901	HOT RH PRESSURE TRANSMITTER ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLBB50	AA903	HOT RH PRESSURE INDICATOR ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLBB50	AA904	HOT RH PRESSURE INDICATOR ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLBB50	AA601	HOT RH VENT LINE	GATE	8"		X	
N1008-00-P303	XXLBB50	AA151	HOT RH VENT LINE - MOT. VALVE INCHING TYPE	GLOBE	8"		X	
N1008-00-P303	XXHAJ54	AA601	RH1 TO RH2 LINE VENT	GLOBE	1"		X	
N1008-00-P303	XXHAJ54	AA602	RH1 TO RH2 LINE VENT	GLOBE	1"		X	
N1008-00-P303	XXLAF50	AA601	RH SPRAYWATER LINE VENT	GLOBE	3/4"		X	
N1008-00-P303	XXLAF50	AA602	RH SPRAYWATER LINE VENT	GLOBE	3/4"		X	
N1008-00-P303	XXLAF50	AA903	RH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLAF50	AA101	RH SPRAYWATER LINE MOT.VALVE	GLOBE	3"	X		
N1008-00-P303	XXLAF50	AA901	RH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLAF50	AA904	RH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P303	XXLAF50	AA902	RH SPRAYWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXLBA50	AA501	IP MAIN STEAM STOP VALVE	GATE	10"	X		
N1008-00-P304	XXLBA51	AA151	IP SH2 OUTLET DRAIN	GLOBE	2"		X	
N1008-00-P304	XXLBA50	AA911	IP MAIN STEAM PRESSURE IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA909	IP MAIN STEAM PRESSURE TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA912	IP MAIN STEAM PRESSURE IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA910	IP MAIN STEAM PRESSURE TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAH72	AA501	IP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXHAH72	AA502	IP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXHAH72	AA503	IP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXHAH72	AA504	IP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXLBA73	AA501	IP MAIN STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXLBA73	AA502	IP MAIN STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA907	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA905	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA901	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA904	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA906	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD71	AA501	IP DRUM SAMPLING LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA908	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA902	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXLBA50	AA903	IP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P304	XXHAH50	AA152	IP SH1 DRAIN LINE - MOV	GLOBE	2"		X	
N1008-00-P304	XXHAH50	AA651	IP SH1 DRAIN LINE - S/O VALVE	GLOBE	2"		X	
N1008-00-P304	XXHAD50	AA652	IP EVAPORATOR DRAIN	GATE	3"		X	
N1008-00-P304	XXHAD50	AA651	IP EVAPORATOR DRAIN	GATE	3"		X	
N1008-00-P304	XXHAD50	AA653	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1"		X	
N1008-00-P304	XXHAD50	AA654	IP DRUM HYDRASTEP DRAIN LINE	GLOBE	1"		X	
N1008-00-P304	XXHAD50	AA655	IP DRUM LEVEL INDICATOR DRAIN LINE	GLOBE	1/2"		X	
N1008-00-P304	XXHAD50	AA656	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1/2"		X	
N1008-00-P304	XXHAD50	AA657	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1"		X	
N1008-00-P304	XXHAD50	AA658	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1"		X	
N1008-00-P304	XXHAD50	AA928	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA927	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD52	AA101	IP CONTINUOUOS BLOWDOWN MOV VALVE	GLOBE	1"		X	
N1008-00-P304	XXHAD50	AA932	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA930	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA931	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA929	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA904	IP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA903	IP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA926	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD52	AA901	IP CONTINUOUS BLOW DOWN FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD52	AA903	IP CONTINUOUS BLOW DOWN FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD52	AA902	IP CONTINUOUS BLOW DOWN FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD52	AA904	IP CONTINUOUS BLOW DOWN FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAH54	AA601	IP SH1 TO SH2 VENT LINE - S/O VALVE	GLOBE	1"		X	
N1008-00-P304	XXHAH54	AA602	IP SH1 TO SH2 VENT LINE - S/O VALVE	GLOBE	1"		X	
N1008-00-P304	XXHAD53	AA501	IP INTERMITTENT BLOWDOWN S/O VALVE	GLOBE	2"	X		
N1008-00-P304	XXHAD53	AA101	IP INTERMITTENT BLOWDOWN MOV VALVE	GLOBE	2"		X	
N1008-00-P304	XXHAD50	AA924	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA922	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA923	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA925	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA921	IP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD52	AA501	IP CONTINUOUS BLOWDOWN S/O VALVE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA901	IP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA902	IP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAH50	AA501	IP DRUM OUTLET LINE NITROGEN INJECTION	GLOBE	1"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P304	XXHAH50	AA701	IP DRUM OUTLET LINE NITROGEN INJECTION	PISTON CHECK	1"		X	
N1008-00-P304	XXHAH50	AA601	IP DRUM OUTLET LINE VENT LINE - S/O VALVE	GLOBE	2"	X		
N1008-00-P304	XXHAH50	AA101	IP DRUM OUTLET LINE VENT LINE - MOV	GLOBE	2"		X	
N1008-00-P304	XXHAH50	AA502	IP DRUM OUTLET LINE NITROGEN INJECTION	GLOBE	1"		X	
N1008-00-P304	XXHAC50	AA658	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAD51	AA101	IP SYSTEM - AUXILIARY STEAM STOP VALVE	GLOBE	3"		X	
N1008-00-P304	XXHAC50	AA659	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA655	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA656	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA657	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA654	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA652	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA653	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA660	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC50	AA651	IP ECO DRAIN	GLOBE	2"		X	
N1008-00-P304	XXHAC60	AA903	IP FEEDWATER LINE PRESSURE TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA901	IP FEEDWATER LINE PRESSURE TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA902	IP FEEDWATER LINE PRESSURE TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA904	IP FEEDWATER LINE PRESSURE TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXLAB60	AA501	IP FW TO IPECO - STOP VALVE	GATE	4"	X		
N1008-00-P304	XXHAD50	AA911	IP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD50	AA909	IP DRUM HYDRAULIC COL. PRES. IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAC60	AA504	IP FEEDWATER BYPASS C.V. ISOLATION VALVE	GATE	3"	X		
N1008-00-P304	XXHAC60	AA502	IP FEEDWATER C.V. ISOLATION VALVE	GATE	6"	X		
N1008-00-P304	XXHAC60	AA503	IP FEEDWATER BYPASS C.V. ISOLATION VALVE	GATE	3"	X		
N1008-00-P304	XXHAC60	AA501	IP FEEDWATER C.V. ISOLATION VALVE	GATE	6"	X		
N1008-00-P304	XXQCA50	AA502	IP DRUM CHEMICAL INJECTION	GLOBE	1/2"		X	
N1008-00-P304	XXQCA50	AA501	IP DRUM CHEMICAL INJECTION	GLOBE	1/2"		X	
N1008-00-P304	XXQCA50	AA701	IP DRUM CHEMICAL INJECTION	PISTON CHECK	1/2"		X	
N1008-00-P304	XXHAC60	AA907	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA905	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA909	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA911	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAD50	AA905	IP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA907	IP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA908	IP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA906	IP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P304	XXHAD50	AA914	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA916	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAC60	AA908	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA906	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA910	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA912	IP FEEDWATER LINE FLOW TRANSM. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA913	IP FEEDWATER LINE PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXHAC60	AA914	IP FEEDWATER LINE PRES. IND. ROOT LINE	GLOBE	3/4"	X		
N1008-00-P304	XXEKT10	AA501	IP FEEDWATER TO NG FUEL HEATER STOP VALVE	GATE	3"	X		
N1008-00-P304	XXHAD50	AA920	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA918	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA919	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA913	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA917	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA915	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA910	IP DRUM HYDRAULIC COL. PRES. IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P304	XXHAD50	AA912	IP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXHAH80	AA701	LP DRUM OUTLET LINE NITROGEN INJECTION	PISTON CHECK	1"		X	
N1008-00-P306	XXLBA80	AA905	LP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXLBA80	AA906	LP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXLBA80	AA904	LP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXHAD80	AA911	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA916	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA914	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA915	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA913	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA912	LP DRUM HYDRAULIC COLUMN LEVEL IND. ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA908	LP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA907	LP DRUM LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA910	LP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA905	LP DRUM HYDRAULIC COL. PRES. IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXHAD80	AA906	LP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXHAD80	AA904	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA902	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA903	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXLBA80	AA902	LP MAIN STEAM PRESSURE IND. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXHAH95	AA503	LP SAT. STEAM SAMPLING	GLOBE	1/2"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P306	XXHAH95	AA502	LP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P306	XXHAH95	AA501	LP SAT. STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P306	XXHAH80	AA101	LP DRUM OUTLET LINE VENT LINE - MOV	GLOBE	2"		X	
N1008-00-P306	XXHAH80	AA601	LP DRUM OUTLET LINE VENT LINE - S/O VALVE	GLOBE	2"		X	
N1008-00-P306	XXHAH80	AA501	LP DRUM OUTLET LINE NITROGEN INJECTION	GLOBE	1"		X	
N1008-00-P306	XXLBA80	AA151	LP START UP VENT VALVE - MOT. INCHING	GLOBE	6"		X	
N1008-00-P306	XXLBA80	AA601	LP START UP VENT S/O VALVE	GATE	6"		X	
N1008-00-P306	XXHAD80	AA651	LP EVAPORATOR DRAIN	GATE	4"		X	
N1008-00-P306	XXHAD80	AA101	DEAERATOR VENT	GLOBE	2"		X	
N1008-00-P306	XXHAD80	AA601	DEAERATOR VENT	GLOBE	2"			X
N1008-00-P306	XXHAD80	AA102	DEAERATOR VENT	GLOBE	2"		X	
N1008-00-P306	XXHAD80	AA652	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1"		X	
N1008-00-P306	XXHAD80	AA653	IP DRUM HYDRASTEP DRAIN LINE	GLOBE	1/2"		X	
N1008-00-P306	XXHAD80	AA654	IP DRUM LEVEL INDICATOR DRAIN LINE	GLOBE	1/2"		X	
N1008-00-P306	XXHAD80	AA655	IP DRUM HYDRAULIC COLUMN DRAIN LINE	GLOBE	1"		X	
N1008-00-P306	XXHAD81	AA101	LP SYSTEM - AUXILIARY STEAM STOP VALVE	GLOBE	3"		X	
N1008-00-P306	XXLBA93	AA501	LP MAIN STEAM SAMPLING	GLOBE	1/2"	X		
N1008-00-P306	XXHAH84	AA501	LP SH1 TO SH2 - DRAIN	GLOBE	2"		X	
N1008-00-P306	XXHAH84	AA151	LP SH1 TO SH2 - DRAIN	GLOBE	2"		X	
N1008-00-P306	XXLBA80	AA903	LP MAIN STEAM FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXLBA80	AA901	LP MAIN STEAM PRESSURE TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P306	XXLBA80	AA501	LP MAIN STEAM STOP VALVE	GATE	16"	X		
N1008-00-P306	XXHAD83	AA101	LP INTERMITTENT BLOWDOWN MOV	GLOBE	2"		X	
N1008-00-P306	XXHAD83	AA501	LP INTERMITTENT BLOWDOWN S/O VALVE	GLOBE	2"	X		
N1008-00-P306	XXHAD80	AA909	LP DRUM HYDRASTEP ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA901	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P307	XXLCA90	AA502	PREHEATER BY-PASS C.V. ISOLATION VALVE	GATE	8"	X		
N1008-00-P307	XXLCA90	AA501	PREHEATER BY-PASS C.V. ISOLATION VALVE	GATE	8"	X		
N1008-00-P307	XXLCA88	AA501	RECIRCULATING PUMP SUCTION - STOP VALVE	GATE	6"	X		
N1008-00-P307	XXLCA87	AA501	RECIRCULATING PUMP SUCTION - STOP VALVE	GATE	6"	X		
N1008-00-P307	XXLCA88	AA502	RECIRCULATING PUMP DISCHARGE - STOP VALVE	GATE	6"	X		
N1008-00-P307	XXHAA80	AA667	PREHEATER DRAIN	GATE	4"		X	
N1008-00-P307	XXHAA80	AA655	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA662	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXLCA87	AA502	RECIRCULATING PUMP DISCHARGE - STOP VALVE	GATE	6"	X		
N1008-00-P307	XXHAA80	AA666	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA665	PREHEATER DRAIN	GLOBE	2"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P307	XXHAA80	AA663	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA664	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA661	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA659	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA660	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA657	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA658	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA656	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA653	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA654	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA652	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXHAA80	AA651	PREHEATER DRAIN	GLOBE	2"		X	
N1008-00-P307	XXLCA80	AA906	PREHEATER INLET FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA905	PREHEATER INLET FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA904	PREHEATER INLET FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA903	PREHEATER INLET FLOW TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA902	PREHEATER INLET PRESSURE TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA901	PREHEATER INLET PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA80	AA101	FROM CONDENSATE TO PREHEATER STOP VALVE	GATE	10"	X		
N1008-00-P307	XXLCA85	AA901	PREHEATER OUTLET PRESSURE TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA85	AA503	PREHEATER OUTLET BYPASS C.V. ISOLATION VALVE	GATE	4"	X		
N1008-00-P307	XXLCA85	AA501	PREHEATER OUTLET C.V. ISOLATION VALVE	GATE	10"	X		
N1008-00-P307	XXLCA85	AA504	PREHEATER OUTLET BYPASS C.V. ISOLATION VALVE	GATE	4"	X		
N1008-00-P307	XXLCA85	AA502	PREHEATER OUTLET C.V. ISOLATION VALVE	GATE	10"	X		
N1008-00-P305	XXLAB12	AA102	FEEDWATER PUMP HP DISCHARGE - BY-PASS STOP VALVE	GLOBE	1"		X	
N1008-00-P305	XXLAB12	AA101	FEEDWATER PUMP HP DISCHARGE - STOP VALVE	GATE	8"	X		
N1008-00-P305	XXLAB12	AA651	FEEDWATER PUMP HP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB12	AA652	FEEDWATER PUMP HP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB14	AA501	FEEDWATER PUMP RECIRCULATING LINE	GATE	4"	X		
N1008-00-P305	XXLAB11	AA102	FEEDWATER PUMP HP DISCHARGE - BY-PASS STOP VALVE	GLOBE	1"		X	
N1008-00-P305	XXLAB11	AA101	FEEDWATER PUMP HP DISCHARGE - STOP VALVE	GATE	8"	X		
N1008-00-P305	XXLAB52	AA652	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB52	AA651	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB11	AA652	FEEDWATER PUMP HP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB11	AA651	FEEDWATER PUMP HP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB14	AA502	FEEDWATER PUMP MINIMUM FLOW LINE	GATE	4"	X		
N1008-00-P305	XXLAB51	AA101	FEEDWATER PUMP IP DISCHARGE - STOP VALVE	GATE	4"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P305	XXLAB52	AA101	FEEDWATER PUMP IP DISCHARGE - STOP VALVE	GATE	4"	X		
N1008-00-P305	XXLAB51	AA652	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB51	AA651	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB52	AA653	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB12	AA501	FEEDWATER PUMP SUCTION - STOP VALVE	GATE	12"	X		
N1008-00-P305	XXLAB13	AA501	FEEDWATER PUMP RECIRCULATING LINE	GATE	4"	X		
N1008-00-P305	XXLAB52	AA654	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB13	AA502	FEEDWATER PUMP MINIMUM FLOW LINE	GATE	4"	X		
N1008-00-P305	XXLAB11	AA501	FEEDWATER PUMP SUCTION - STOP VALVE	GATE	12"	X		
N1008-00-P305	XXLAB51	AA653	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB51	AA654	FEEDWATER PUMP IP DISCHARGE DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXHAD91	AA501	LP DRUM FEEDWATER SAMPLING LINE	GLOBE	1/2"	X		
N1008-00-P308	XXHAN10	AA652	CONTINUOUS BLOW DOWN TANK - DRAIN	GLOBE	2"		X	
N1008-00-P308	XXHAN10	AA651	CBD TANK - HHYDRAULIC COLUMN DRAIN	GLOBE	1"		X	
N1008-00-P308	XXHAN10	AA905	CBD TANK LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN10	AA903	CBD TANK LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN15	AA101	CBD TANK TO IBD TANK - STOP VALVE	GATE	3"	X		
N1008-00-P308	XXHAN10	AA902	CBD TANK LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN10	AA904	CBD TANK LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN10	AA901	CBD TANK PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P308	XXHAN20	AA651	INTERMITTENT BLOW DOWN TANK - DRAIN	GLOBE	1"		X	
N1008-00-P308	XXHAN20	AA904	IBD TANK LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN20	AA905	IBD TANK LEVEL INDICATOR ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN20	AA652	IBD TANK -COOLING WATER LINE - DRAIN	GLOBE	1"		X	
N1008-00-P309	XXHBK10	AA651	CASING - INLET DUCT - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK10	AA901	CASING - INLET DUCT - PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P309	XXHBK10	AA902	CASING - INLET DUCT - PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P309	XXHBK10	AA903	CASING - INLET DUCT - PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P309	XXHBK10	AA652	CASING - MODULE 1 - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK20	AA651	CASING - MODULE 2 - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK25	AA651	CASING - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK30	AA651	CASING - MODULE 3 - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK40	AA651	CASING - MODULE 4 - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK50	AA651	CASING - MODULE 5 - DRAIN LINE	GLOBE	2"		X	
N1008-00-P309	XXHBK50	AA902	CASING - OUTLET DUCT - PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P309	XXHBK50	AA901	CASING - OUTLET DUCT - PRESSURE INDICATOR ROOT LINE	GLOBE	1/2"	X		
N1008-00-P309	XXHNE10	AA651	STACK DRAIN LINE	GATE	4"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P308	XXHAN20	AA653	IBD TANK - IDRAULIC COLUMN - DRAIN	GLOBE	1"		X	
N1008-00-P308	XXHAN20	AA902	IBD TANK LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P308	XXHAN20	AA903	IBD TANK LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P312	XXPGB60	AA501	FEEDWATER PUMPS COOLING WATER INLET	GATE	4"	X		
N1008-00-P312	XXPGB67	AA501	FEEDWATER PUMPS COOLING WATER OUTLET	GATE	4"	X		
N1008-00-P312	XXPGB61	AA501	MOTOR INVERTER COOLING WATER INLET	GLOBE	2"	X		
N1008-00-P312	XXPGB61	AA502	MOTOR INVERTER COOLING WATER OUTLET	GLOBE	2"	X		
N1008-00-P312	XXPGB62	AA501	FEEDWATER PUMP/MOTOR COOLING WATER INLET	GATE	3"	X		
N1008-00-P312	XXPGB62	AA502	FEEDWATER PUMP/MOTOR COOLING WATER OUTLET	GATE	3"	X		
N1008-00-P312	XXPGB64	AA501	FEEDWATER PUMP/MOTOR COOLING WATER INLET	GATE	3"	X		
N1008-00-P312	XXPGB64	AA502	FEEDWATER PUMP/MOTOR COOLING WATER OUTLET	GATE	3"	X		
N1008-00-P312	XXPGB55	AA501	BLOW DOWN COOLING WATER INLET	GATE	4"	X		
N1008-00-P312	XXPGB56	AA501	BLOW DOWN COOLING WATER OUTLET	GLOBE	4"	X		
N1008-00-P312	XXHAH01	AA501	NITROGEN INJECTION LINE	GLOBE	2"		X	
N1008-00-P312	XXHAH01	AA502	HP DRUM NITROGEN INJECTION LINE	GLOBE	1"		X	
N1008-00-P312	XXHAH01	AA503	IP DRUM NITROGEN INJECTION LINE	GLOBE	1"		X	
N1008-00-P312	XXHAH01	AA504	LP DRUM NITROGEN INJECTION LINE	GLOBE	1"		X	
N1008-00-P313	XXQLB80	AA501	AUXILIARY STEAM C.V. ISOLATION VALVE	GATE	8"	X		
N1008-00-P313	XXQLB80	AA101	AUXILIARY STEAM C.V. BYPASS MOT.VALVE	GLOBE	8"		X	
N1008-00-P313	XXQLB80	AA502	AUXILIARY STEAM C.V. ISOLATION VALVE	GATE	10"	X		
N1008-00-P301	XXLAE10	AA651	HP SH SPRAY WATER LINE - DRAIN	GLOBE	1"		X	
N1008-00-P301	XXLAE10	AA652	HP SH SPRAY WATER LINE - DRAIN	GLOBE	1"		X	
N1008-00-P301	XXHAH24	AA652	HP MAIN STEAM LINE - MANUAL DRAIN LINE	GLOBE	1"		X	
N1008-00-P301	XXHAH24	AA653	HP MAIN STEAM LINE - MANUAL DRAIN LINE	GLOBE	1"		X	
N1008-00-P301	XXHAH10	AA657	HP SH1 HOT HEADER - DRAIN	GLOBE	1"		X	
N1008-00-P301	XXHAH10	AA658	HP SH1 HOT HEADER - DRAIN	GLOBE	1"		X	
N1008-00-P301	XXHAH10	AA654	HP SH1 INLET - DRAIN MOT.	GLOBE	1"		X	
N1008-00-P301	XXHAH10	AA655	HP SH1 INLET - DRAIN MOT.	GLOBE	1"		X	
N1008-00-P302	XXLAB20	AA651	HP FEEDWATER LINE - DRAIN	GLOBE	1"		X	
N1008-00-P302	XXLAB20	AA652	HP FEEDWATER LINE - DRAIN	GLOBE	1"		X	
N1008-00-P303	XXLBC50	AA655	RH1 HEADER DRAIN VALVE	GLOBE	1"		X	
N1008-00-P303	XXLBC50	AA656	RH1 HEADER DRAIN VALVE	GLOBE	1"		X	
N1008-00-P303	XXHAJ60	AA652	RH2 HEADER DRAIN - VALVE	GLOBE	1"		X	
N1008-00-P303	XXHAJ60	AA653	RH2 HEADER DRAIN - VALVE	GLOBE	1"		X	
N1008-00-P304	XXLBA51	AA651	IP MAIN STEAM LINE DRAIN	GLOBE	2"		X	
N1008-00-P306	XXHAD80	AA917	LP DRUM HYDRAULIC COL. PRES. TRANSM. ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA90	AA002	BY-PASS PREHEATER LINE MANUAL CONTROL VALVES	GLOBE	4"	X		

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P312	XXPGB61	AA503	MOTOR INVERTER COOLING WATER INLET	GLOBE	2"	X		
N1008-00-P312	XXPGB61	AA504	MOTOR INVERTER COOLING WATER OUTLET	GLOBE	2"	X		
N1008-00-P312	XXPGB66	AA501	RECIRCULATING PUMPS COOLING WATER INLET	GLOBE	1/2"	X		
N1008-00-P312	XXPGB66	AA502	RECIRCULATING PUMPS COOLING WATER OUTLET	GLOBE	1/2"	X		
N1008-00-P312	XXPGB66	AA503	RECIRCULATING PUMPS COOLING WATER INLET	GLOBE	1/2"	X		
N1008-00-P312	XXPGB66	AA504	RECIRCULATING PUMPS COOLING WATER OUTLET	GLOBE	1/2"	X		
N1008-00-P308	XXHAN30	AA651	EXTERNAL COOLER OUTLET - DRAIN	GLOBE	1"		X	
N1008-00-P305	XXLAC11	AA901	FWPMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P305	XXLAC11	AA902	FWPMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P305	XXLAC12	AA901	FWPMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P305	XXLAC12	AA902	FWPMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA87	AA901	REC. PMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA87	AA902	REC. PMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA88	AA901	REC. PMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P307	XXLCA88	AA902	REC. PMP- SUCTION FILTER DIFF. PRESSURE ROOT LINE	GLOBE	1/2"	X		
N1008-00-P303	XXLAF50	AA651	IP RH SPRAYWATER DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P303	XXLAF50	AA652	IP RH SPRAYWATER DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P303	XXLAF50	AA653	IP RH SPRAYWATER DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P303	XXLAF50	AA654	IP RH SPRAYWATER DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P304	XXHAC60	AA651	IP ECO to IP DRUM DOWNSTREAM C.V. - DRAIN VALVE	GLOBE	1"		X	
N1008-00-P306	XXHAD80	AA656	FROM PEGGING STEAM TO DEAERATOR -DRAIN VALVE	GLOBE	1"		X	
N1008-00-P307	XXLCA87	AA651	RECIRCULATION PUMP OUTLET-DRAIN VALVE	GLOBE	1"		X	
N1008-00-P307	XXLCA88	AA651	RECIRCULATION PUMP OUTLET-DRAIN VALVE	GLOBE	1"		X	
N1008-00-P307	XXLCA89	AA651	RECIRCULATION PUMP DOWNSTREAM C.V.-DRAIN VALVE	GLOBE	1"		X	
N1008-00-P307	XXLCA80	AA651	PRHTR INLET FROM TP - DRAIN VALVE	GLOBE	1"		X	
N1008-00-P307	XXLCA85	AA601	PRHTR OUTLET LAST VALVE to LPDA - VENT VALVE	GLOBE	1"		X	
N1008-00-P308	XXHAN15	AA651	CBD TANK TO IBD TANK - UPSTREAM C.V.-DRAIN LINE	GLOBE	1"		X	
N1008-00-P305	XXLAB13	AA651	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA652	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA653	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA654	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA655	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA656	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA651	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA652	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA653	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA654	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P305	XXLAB14	AA655	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA656	HP BOILER FEEDPUMP-RECIRC. LINE - DRAIN VALVE	GLOBE	1/2"		X	
N1008-00-P312	XXPGB55	AA651	BLOW DOWN COOLING WATER INLET - DRAIN	GLOBE	1"		X	
N1008-00-P312	XXPGB56	AA651	BLOW DOWN COOLING WATER OUTLET - DRAIN	GLOBE	1"		X	
N1008-00-P302	XXHAD10	AA933	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA934	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA935	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P302	XXHAD10	AA936	HP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA933	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA934	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA935	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXHAD50	AA936	IP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA917	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P306	XXHAD80	AA918	LP DRUM LEVEL TRANSMITTER ROOT LINE	GLOBE	1"	X		
N1008-00-P304	XXLAF50	AA501	BY-PASS DSH SPRAYWATER - STOP VALVE	GATE	3"			
N1008-00-P302	XXLAB20	AA601	HP FEEDWATER LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P302	XXLAB20	AA602	HP FEEDWATER LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P304	XXHAC60	AA601	IP ECO to IP DRUM - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P304	XXHAC60	AA602	IP ECO to IP DRUM - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P304	XXLAB60	AA601	IP FEEDWATER LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P304	XXLAB60	AA602	IP FEEDWATER LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P305	XXLAB13	AA601	HP FWPMP-RECIRC. LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P305	XXLAB14	AA601	HP FWPMP-RECIRC. LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P307	XXLCA80	AA601	PREHEATER INLET LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P312	XXHAN30	AA652	BLOW DOWN EXTERNAL COOLER - DRAIN	GLOBE	1"		X	
N1008-00-P312	XXHAN30	AA653	BLOW DOWN EXTERNAL COOLER - DRAIN	GLOBE	1"		X	
N1008-00-P313	XXQLB80	AA601	AUXILIARY STEAM LINE - Vent Valve for Hydraulic Test	GLOBE	1/2"		X	
N1008-00-P301	XXLAE11	AA001	HP DESUPERHEATER	REG	2 1/2"x 4"			X
N1008-00-P301	XXLAE12	AA001	HP DESUPERHEATER	REG	2 1/2"x 4"			X
N1008-00-P301	XXLAE13	AA001	HP DESUPERHEATER	REG	2 1/2"x 4"			X
N1008-00-P302	XXHAD12	AA001	HPDRUM CONTINUOUS BLOW DOWN	REG	1 1/2"		X	
N1008-00-P302	XXLAB20	AA001	HP FEEDWATER TO ECO 1 CONTROL VALVE 100%	REG	8"			X
N1008-00-P302	XXLAB20	AA002	HP FEEDWATER TO ECO 1 CONTROL VALVE 30%	REG	4"		X	
N1008-00-P303	XXLAF51	AA001	RH DESUPERHEATER	REG	2" x 4"			X
N1008-00-P303	XXLAF52	AA001	RH DESUPERHEATER	REG	2" x 4"			X
N1008-00-P303	XXLAF53	AA001	RP DESUPERHEATER	REG	2" x 4"			X
N1008-00-P304	XXHAD52	AA001	IP DRUM CONTINUOUS BLOW DOWN	REG	1"		X	

ISOLATION VALVES LIST FOR PERFORMANCE TEST

P&ID	TAG Number		Descrizione	Valve Type	DN	OPEN	CLOSE	CONTROL
N1008-00-P304	XXHAC60	AA001	IP FEEDWATER TO ECO 1 CONTROL VALVE 100%	REG	4"			X
N1008-00-P304	XXHAC0	AA002	IP FEEDWATER TO ECO 1 CONTROL VALVE 30%	REG	3"		X	
N1008-00-P307	XXLCA90	AA001	BY PASS PREHEATER LINE - CONTROL VALVE	REG	8"			
N1008-00-P307	XXLCA85	AA001	PRHTR OUTLET TO DEAERATOR - CONTROL VALVE 100%	REG	10"			X
N1008-00-P307	XXLCA85	AA002	PRHTR OUTLET TO DEAERATOR - CONTROL VALVE 30%	REG	4"		X	
N1008-00-P307	XXLCA89	AA001	RECIRCULATION PUMPS DISCHARGE CONTROL VALVE	REG	8"			X
N1008-00-P308	XXHAN15	AA001	CBD TANK TO IBDTANK LINE CONTROL VALVE	REG	3"			X
N1008-00-P313	XXQLB80	AA001	AUXILARY STEAM - CONTROL VALVE	REG	8"			X
N1008-00-P304	XXLBA50	AA001	IP MAIN STEAM CONTROL VALVE	REG	10"			

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		W a t e r - S t e a m C i r c u l a t i o														
		Condensate extraction pumps	**"O"**													**Nr: TER_TIR 00 103_C**
1	Manual	10LCA11 AA651	- " -	⊗												Drain filter Cond Extr.Pump 1
2	Manual	10LCA12 AA651	- " -	⊗												Drain filter Cond Extr.Pump 2
3	Manual	10LCB11 AA501	- " -	⊗												Vent Line to condenser Cond Pump 1
4	Manual	10LCB12 AA501	- " -	⊗												Vent Line to condenser Cond Pump 2
5	Manual	10LAW20 AA503	- " -	⊗												to Sealing system
6	Manual	10LAW20 AA504	- " -	⊗												to Sealing system
7	Manual	10GHC52 AA501	- " -	⊗												from Tank to in Cond Line bh Cond. Pumps
		Condensate system distrbution	**"O"**													**Nr: TER_TIR 00 104_O**
8	Motor	10LCE20 BR001	- " -	⊗												to IP / LP Turb.Bypass
9	Manual	10LCE10 BR001	- " -	⊗												to IP / LP Turb.Bypass
10	Manual	10LFN AA501	- " -	⊗												Ammonia solution
11	Manual	10LFN AA**501 (?)**	- " -	⊗												Oxygen scavenger
12	Manual	10LCA20 AA051	- " -	⊗												Bypass Gland steam
13	Control valve	10LCA41 AA001	- " -	⊗												Condenser recycle
14	Manual	10LCM30 AA501	- " -	⊗												Excess CND to CT Basin
15	Manual	12LCE10 AA501	- " -	⊗												from spray water circ.line
16	Manual	11LCE10 AA501	- " -	⊗												from spray water circ.line
		HRSG ITEM - LP PRHTR System	**05**													**Nr: TER1_NEI 00123 _04**
17	Manual	XXLCA80 AA651	- " -	⊗												to Blow Down Tank
18	Manual	XXHAA80 AA667	- " -	⊗												to Blow Down Tank
19	Manual	XXLCA89 AA651	- " -	⊗												to Blow Down Tank
20	Manual	XXLCA87 AA651	- " -	⊗												to Blow Down Tank
21	Manual	XXLCA88 AA651	- " -	⊗												to Blow Down Tank
		HRSG ITEM - LP EVA/SH System	**05**													**Nr: TER1_NEI 00122 _04**
22	Manual	XXHAH80 AA701	- " -	⊗												from Service syst
23	Manual	XXHAH80 AA501	- " -	⊗												from Service syst
24	Manual	XXHAH95 AA501	- " -	⊗												to Sample
25	Manual	XXHAH95 AA502	- " -	⊗												to Sample
26	Manual	XXHAH95 AA503	- " -	⊗												to Sample
27	Manual	XXHAD80 AA655	- " -	⊗												to Blow Down Tank
28	Manual	XXHAD80 AA653	- " -	⊗												to Blow Down Tank
29	Manual	XXHAD80 AA654	- " -	⊗												to Blow Down Tank
30	Manual	XXHAD80 AA652														to Blow Down Tank
31	Motor	XXHAD83 AA101	- " -	⊗												Blow Down
32	Manual	XXHAD83 AA501	- " -	⊗												Blow Down
33	Manual	XXLBA93 AA501	- " -	⊗												Sample
34	Motor	XXHAH84 AA151	- " -	⊗												to Blow Down Tank
35	Manual	XXHAH84 AA501	- " -	⊗												to Blow Down Tank
36	Manual	XXHAD80 AA651	- " -	⊗												to Blow Down Tank

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37	Manual	XXHAD81 AA652	- " -	⊗												to Blow Down Tank
38	Manual	XXHAD81 AA651	- " -	⊗												to Blow Down Tank
39	Motor	XXHAD81 AA101	- " -	⊗												from Auxiliary steam
		LP Header	**C**													**Nr: TER1_TIP 00 102_C**
40	Manual	11LBA90 AA651	- " -	⊗												Drain to flash Tank
41	Motor	11LBH90 AA101	- " -	⊗												Drain to flash Tank
42	Manual	11LBA90 AA652	- " -	○												**Control !** Drain to flash Tank
43	Manual	11LBH90 AA651	- " -	○												**Control !** Drain to flash Tank
44	Manual	11LBA80 AA651	- " -	⊗												Drain to flash Tank
45	Motor	11LBH80 AA101	- " -	⊗												Drain to flash Tank
46	Manual	11LBA80 AA652	- " -	○												**Control !** Drain to flash Tank
47	Manual	11LBH80 AA651	- " -	○												**Control !** Drain to flash Tank
48	Manual	13LBA80 AA651	- " -	⊗												Drain to flash Tank
49	Motor	13LBA80 AA101	- " -	⊗												Drain to flash Tank
50	Manual	13LBA80 AA652	- " -	○												**Control !** Drain to flash Tank
51	Manual	13LBA80 AA653	- " -	○												**Control !** Drain to flash Tank
52	Manual	12LBA80 AA651	- " -	⊗												Drain to flash Tank
53	Motor	12LBH80 AA101	- " -	⊗												Drain to flash Tank
54	Manual	12LBA80 AA652	- " -	○												**Control !** Drain to flash Tank
55	Manual	12LBH80 AA651	- " -	○												**Control !** Drain to flash Tank
56	Manual	12LBA90 AA651	- " -	⊗												Drain to flash Tank
57	Motor	12LBH90 AA101	- " -	⊗												Drain to flash Tank
58	Manual	12LBA90 AA652	- " -	○												**Control !** Drain to flash Tank
59	Manual	12LBH90 AA651	- " -	○												**Control !** Drain to flash Tank
60	Manual	13LBA90 AA651	- " -	⊗												Drain to flash Tank LPS Line to Steam Turbine
61	Motor	13LBH90 AA101	- " -	⊗												Drain to flash Tank LPS Line to Steam Turbine
62	Manual	13LBA90 AA652	- " -	○												**Control !** Drain to flash Tank LPS Line to Steam Turbine
63	Manual	13LBA90 AA653	- " -	○												**Control !** Drain to flash Tank LPS Line to Steam Turbine
		Feedwater Pumps system	**05**													**Nr: TER1_NEI 00121 _04**
64	Manual	XXHAD91 AA501	- " -	⊗												Sample
65	Manual	XXLAB13 AA651	- " -	⊗												Drain to funnel bh FW Pumps 1
66	Manual	XXLAB13 AA652	- " -	⊗												Drain to funnel bh FW Pumps 1
67	Manual	XXLAB13 AA653	- " -	⊗												Drain to funnel bh FW Pumps 1
68	Manual	XXLAB13 AA654	- " -	⊗												Drain to funnel bh FW Pumps 1
69	Manual	XXLAB14 AA651	- " -	⊗												Drain to funnel bh FW Pumps 2

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70	Manual	XXLAB14 AA652	- " -	⊗												Drain to funnel bh FW Pumps 2
71	Manual	XXLAB14 AA653	- " -	⊗												Drain to funnel bh FW Pumps 2
72	Manual	XXLAB14 AA654	- " -	⊗												Drain to funnel bh FW Pumps 2
73	Manual	XXLAB13 AA655	- " -	⊗												Drain to funnel Recircul. to LP Drum FW Pump 1
74	Manual	XXLAB13 AA656	- " -	⊗												Drain to funnel Recircul. to LP Drum FW Pump 1
			- " -	⊗												
75	Manual	XXLAB14 AA655	- " -	⊗												Drain to funnel Recircul. to LP Drum FW Pump 2
76	Manual	XXLAB14 AA656	- " -	⊗												Drain to funnel Recircul. to LP Drum FW Pump 2
77	Manual	XXLAB11 AA651	- " -	⊗												to Blow Down System from HP Line bf XXLAB11 AA101 Pump 1
78	Manual	XXLAB11 AA652	- " -	⊗												to Blow Down System from HP Line bf XXLAB11 AA101 Pump 1
79	Manual	XXLAB11 AA653	- " -	⊗												to Blow Down System from HP Line bh XXLAB11 AA101 Pump 1
80	Manual	XXLAB11 AA654	- " -	⊗												to Blow Down System from HP Line bh XXLAB11 AA101 Pump 1
81	Manual	XXLAB12 AA651	- " -	⊗												to Blow Down System from HP Line bf XXLAB12 AA101 FW Pump 2
82	Manual	XXLAB12 AA652	- " -	⊗												to Blow Down System from HP Line bf XXLAB12 AA101 Pump 2
83	Manual	XXLAB12 AA653	- " -	⊗												to Blow Down System from HP Line bh XXLAB12 AA101 Pump 2
84	Manual	XXLAB12 AA654	- " -	⊗												to Blow Down System from HP Line bh XXLAB12 AA101 Pump 2
85	Manual	XXLAB51 AA651	- " -	⊗												to Blow Down System from IP Line Pump 1 bf XXLAB51 AA701
86	Manual	XXLAB51 AA652	- " -	⊗												to Blow Down System from IP Line Pump 1 bf XXLAB51 AA701
87	Manual	XXLAB51 AA653	- " -	⊗												to Blow Down System from IP Line Pump 1 bf XXLAB51 AA101
88	Manual	XXLAB51 AA654	- " -	⊗												to Blow Down System from IP Line Pump 1 bf XXLAB51 AA101
89	Manual	XXLAB51 AA655	- " -	⊗												to Blow Down System from IP Line Pump 1 bh XXLAB51 AA101
90	Manual	XXLAB51 AA656	- " -	⊗												to Blow Down System from IP Line Pump 1 bh XXLAB51 AA101
91	Manual	XXLAB52 AA651	- " -	⊗												to Blow Down System from IP Line Pump2 bf XXLAB52 AA701
92	Manual	XXLAB52 AA652	- " -	⊗												to Blow Down System from IP Line Pump2 bf XXLAB52 AA701
93	Manual	XXLAB52 AA653	- " -	⊗												to Blow Down System from IP Line Pump2 bf XXLAB52 AA101
94	Manual	XXLAB52 AA654	- " -	⊗												to Blow Down System from IP Line Pump2 bf XXLAB52 AA101
95	Manual	XXLAB52 AA655	- " -	⊗												to Blow Down System from IP Line Pump2 bh XXLAB52 AA101
96	Manual	XXLAB52 AA656	- " -	⊗												to Blow Down System from IP Line Pump2 bh XXLAB52 AA101
		HRSG ITEM - IP ECO/EVA/SH System	**06**													**Nr: TER1_NEI 00120 _05**
97	Manual	XXLAB60 AA601	- " -	⊗												Atm. IP FWP-Line
98	Manual	XXLAB60 AA602	- " -	⊗												Atm. IP FWP-Line
99	Manual	XXHAC60 AA601	- " -	⊗												Atm. Bh. XXHAC60 AA001
100	Manual	XXHAC60 AA602	- " -	⊗												to Blow Down Tank bh. XXHAC60 AA001
101	Manual	XXQCA50 AA501	- " -	⊗												from Chemical Feed
102	Manual	XXQCA50 AA502	- " -	⊗												from Chemical Feed
103	Check Valve	XXQCA50 AA701	- " -	⊗												from Chemical Feed

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104	Manual	XXHAD50 AA653	- " -	⊗												Level IP Drum to Blow Down Tank
105	Manual	XXHAD50 AA654	- " -	⊗												Level IP Drum to Blow Down Tank
106	Manual	XXHAD50 AA656	- " -	⊗												to Blow Down Tank
107	Manual	XXHAD71 AA501	- " -	⊗												Sample
108	Manual	XXHAD52 AA501	- " -	⊗												Continuous Blow Down
109	Motor	XXHAD52 AA101	- " -	⊗												Continuous Blow Down
110	Manual	XXHAD50 AA655	- " -	⊗												Level IP Drum to Blow Down Tank
111	Manual	XXHAD50 AA657	- " -	⊗												Level IP Drum to Blow Down Tank
112	Manual	XXHAD50 AA658	- " -	⊗												Level IP Drum to Blow Down Tank
113	Manual	XXHAH50 AA601	- " -	⊗												ATM
114	Motor	XXHAH50 AA101	- " -	⊗												ATM
115	Manual	XXHAH72 AA504	- " -	⊗												Sample
116	Manual	XXHAC50 AA660	- " -	⊗												to Blow Down Tank
117	Motor	XXHAD51AA101	- " -	⊗												from Aux.Steam
118	Manual	XXHAD51AA651	- " -	⊗												to Blow Down Tank bf XXHAD51 AA701
119	Manual	XXHAD51AA652	- " -	⊗												to Blow Down Tank bh XXHAD51 AA702
120	Manual	XXHAD51AA653	- " -	⊗												to Blow Down Tank bh XXHAD51 AA703
121	Manual	XXHAD50 AA651	- " -	⊗												to Blow Down Tank
122	Manual	XXHAD50 AA652	- " -	⊗												to Blow Down Tank
123	Manual	XXHAH50 AA651	- " -	⊗												to Blow Down Tank
124	Motor	XXHAH50 AA152	- " -	⊗												to Blow Down Tank
125	Manual	XXLBA51 AA651	- " -	⊗												to Blow Down Tank
126	Motor	XXLBA51 AA151	- " -	⊗												to Blow Down Tank
127	Manual	XXLBA73 AA501	- " -	⊗												Sample
128	Manual	XXLBA73 AA502	- " -	⊗												Sample
		HRSG ITEM - IP RH System	**05**													**Nr: TER1_NEI 00119 _05**
129	Manual	XXLBC50 AA654	- " -	⊗												to Blow Down Tank
130	Motor	XXLBC50 AA151	- " -	⊗												to Blow Down Tank
131	Manual	XXLBC50 AA655	- " -	○												**Control !** to Blow Down Tank
132	Manual	XXLBC50 AA656	- " -	○												**Control !** to Blow Down Tank
133	Manual	XXHAJ60 AA651	- " -	⊗												to Blow Down Tank
134	Motor	XXHAJ60 AA151	- " -	⊗												to Blow Down Tank
135	Manual	XXHAJ60 AA652	- " -	○												**Control !** to Blow Down Tank
136	Manual	XXHAJ60 AA653	- " -	○												**Control !** to Blow Down Tank
			- " -	⊗												
137	Manual	XXLAF50 AA651	- " -	⊗												to HAC60-BR080 Line
138	Manual	XXLAF50 AA652	- " -	⊗												to HAC60-BR080 Line
139	Manual	XXLAF50 AA653	- " -	⊗												to HAC60-BR080 Line
140	Manual	XXLAF50 AA654	- " -	⊗												to HAC60-BR080 Line
			- " -	⊗												

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141	Manual	XXLAF50 AA601	- " -	⊗												ATM
142	Manual	XXLAF50 AA602	- " -	⊗												ATM
		CRH Header	**A**													**Nr: TER1_TIP 00 105_C**
143	Manual	11LBC50 AA651	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 1
144	Motor	11LBC50 AA101	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 1
145	Manual	11LBC50 AA652	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 1
146	Manual	11LBC50 AA653	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 1
			- " -	⊗												
147	Manual	12LBC50 AA651	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 2
148	Motor	12LBC50 AA101	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 2
149	Manual	12LBC50 AA652	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 2
150	Manual	12LBC50 AA653	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 2
			- " -	⊗												
151	Manual	13LBC50 AA651	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 1/2
152	Motor	13LBC50 AA101	- " -	⊗												to Flash Tank CRH Steam Line to HRSG 1/2
153	Manual	13LBC50 AA652	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 1/2
154	Manual	13LBC50 AA653	- " -	○												**Control !** to Flash Tank CRH Steam Line to HRSG 1/2
		HRSG ITEM - HP ECO/EVA/ System	**06**													**Nr: TER1_NEI 00118 _05**
155	Manual	XXLAB20 AA651	- " -	⊗												to Blow Down Tank
156	Manual	XXLAB20 AA652	- " -	⊗												to Blow Down Tank
157	Manual	XXLAB20 AA601	- " -	⊗												ATM bf XXLAB20 AA001
158	Manual	XXLAB20 AA602	- " -	⊗												ATM bf XXLAB20 AA001
159	Manual	XXLAB20 AA603	- " -	⊗												ATM bh XXLAB20 AA001
160	Manual	XXLAB20 AA604	- " -	⊗												ATM bh XXLAB20 AA001
			- " -	⊗												
161	Manual	XXHAC10 AA601	- " -	⊗												ATM
162	Manual	XXHAC10 AA602	- " -	⊗												ATM
			- " -	⊗												
163	Manual	XXQCA10 AA501	- " -	⊗												from Chemical Feed
164	Manual	XXQCA10 AA502	- " -	⊗												from Chemical Feed
165	Manual	XXQCA10 AA701	- " -	⊗												from Chemical Feed
			- " -	⊗												
166	Manual	XXHAD10 AA651	- " -	⊗												Level HP Drum to Blow Down Tank
167	Manual	XXHAD10 AA652	- " -	⊗												Level HP Drum to Blow Down Tank
168	Manual	XXHAD10 AA653	- " -	⊗												to Blow Down Tank
169	Manual	XXHAD10 AA654	- " -	⊗												to Blow Down Tank
170	Manual	XXHAD10 AA655	- " -	⊗												Level HP Drum to Blow Down Tank
171	Manual	XXHAD10 AA656	- " -	⊗												Level HP Drum to Blow Down Tank
			- " -	⊗												

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No.	Armatur	Bezeichnung *Description*	Schaltbild P&D	Test Nr. 1 Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Bemerkung *note*
172	Manual	XXHAH10 AA601	- " -	⊗												ATM
173	Motor	XXHAH10 AA101	- " -	⊗												ATM
			- " -	⊗												
174	Manual	XXHAD13 AA501	- " -	⊗												Intermittent Blow Down
175	Motor	XXHAD13 AA101	- " -	⊗												Intermittent Blow Down
			- " -	⊗												
176	Manual	XXHAD41 AA501	- " -	⊗												Sample
177	Manual	XXHAD41 AA502	- " -	⊗												Sample
			- " -	⊗												
178	Manual	XXHAC10 AA660	- " -	⊗												to Blow Down Tank
179	Manual	XXHAC20 AA660	- " -	⊗												to Blow Down Tank
			- " -	⊗												
180	Manual	XXHAD11 AA651	- " -	⊗												to Blow Down Tank
181	Manual	XXHAD11 AA652	- " -	⊗												to Blow Down Tank
182	Manual	XXHAD11 AA653	- " -	⊗												to Blow Down Tank
			- " -	⊗												
183	Motor	XXHAD14 AA101	- " -	⊗												to Blow Down Tank
184	Manual	XXHAD14 AA651	- " -	⊗												to Blow Down Tank
185	Manual	XXHAD14 AA652	- " -	⊗												to Blow Down Tank
		HRSG ITEM - HP SH System	**06**													**Nr: TER1_NEI 00117 _05**
186	Manual	XXHAH42 AA501	- " -	⊗												Sample
187	Manual	XXHAH42 AA502	- " -	⊗												Sample
188	Manual	XXHAH10 AA651	- " -	⊗												to Blow Down Tank
189	Motor	XXHAH10 AA152	- " -	⊗												to Blow Down Tank
190	Manual	XXHAH10 AA654	- " -	○												**Control !** to Blow Down Tank
191	Manual	XXHAH10 AA655	- " -	○												**Control !** to Blow Down Tank
192	Manual	XXHAH10 AA652	- " -	⊗												to Blow Down Tank
193	Manual	XXHAH10 AA653	- " -	⊗												to Blow Down Tank
194	Motor	XXHAH10 AA153	- " -	⊗												to Blow Down Tank
195	Manual	XXHAH10 AA657	- " -	○												**Control !** to Blow Down Tank
196	Manual	XXHAH10 AA658	- " -	○												**Control !** to Blow Down Tank
197	Manual	XXHAH24 AA651	- " -	⊗												to Blow Down Tank
198	Motor	XXHAH24 AA151	- " -	⊗												to Blow Down Tank

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No.	Armatur	Bezeichnung *Description*	Schaltbild P&D	Test Nr. 1 Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Bemerkung *note*
199	Manual	XXHAH24 AA652	- " -	○												**Control !** to Blow Down Tank
200	Manual	XXHAH24 AA653	- " -	○												**Control !** to Blow Down Tank
201	Manual	XXLAE10 AA651	- " -	⊗												to Blow Down Tank
202	Manual	XXLAE10 AA652	- " -	⊗												to Blow Down Tank
203	Manual	XXLAE10 AA601	- " -	⊗												ATM
204	Manual	XXLAE10 AA602	- " -	⊗												ATM
			- " -	⊗												
205	Manual	XXHAH14 AA601	- " -	⊗												ATM
206	Manual	XXHAH14 AA602	- " -	⊗												ATM
207	Manual	XXLBA43 AA501	- " -	⊗												Sample
208	Manual	XXLBA43 AA502	- " -	⊗												Sample
		Steam system HP Header	**C**													**Nr: TER1_TIP 00 101_C**
209	Manual	11LBA10 AA651	- " -	⊗												to Flash Tank HP Steam Line from HRSG 1
210	Motor	11LBH10 AA101	- " -	⊗												to Flash Tank HP Steam Line from HRSG 1
211	Manual	11LBA10 AA652	- " -	○												**Control !** to Flash Tank HP Steam Line from HRSG 1
212	Manual	11LBH10 AA651	- " -	○												**Control !** to Flash Tank HP Steam Line from HRSG 1
213	Manual	13LBA10 AA651	- " -	⊗												to Flash Tank HP Steam Line
214	Motor	13LBH10 AA101	- " -	⊗												to Flash Tank HP Steam Line
215	Manual	13LBA10 AA652	- " -	○												**Control !** to Flash Tank HP Steam Line
216	Manual	11LBH10 AA653	- " -	○												**Control !** to Flash Tank HP Steam Line
217	Manual	12LBA10 AA651	- " -	⊗												to Flash Tank HP Steam Line from HRSG 2
218	Motor	12LBH10 AA101	- " -	⊗												to Flash Tank HP Steam Line from HRSG 2
219	Manual	12LBA10 AA652	- " -	○												**Control !** to Flash Tank HP Steam Line from HRSG 2
220	Manual	12LBH10 AA651	- " -	○												**Control !** to Flash Tank HP Steam Line from HRSG 2
			- " -	⊗												
221	Manual	13LBA21 AA651	- " -	⊗												to Flash Tank HP Steam Line to Steam Turbine
222	Motor	13LBA21 AA101	- " -	⊗												to Flash Tank HP Steam Line to Steam Turbine
223	Manual	13LBA21 AA652	- " -	○												**Control !** to Flash Tank HP Steam Line to Steam Turbine
224	Manual	13LBH21 AA653	- " -	○												**Control !** to Flash Tank HP Steam Line to Steam Turbine
			- " -	⊗												

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No.	Armatur	Bezeichnung *Description*	Schaltbild P&D	Test Nr. 1 Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Bemerkung *note*
225	Manual	13LBA22 AA651	- " -	⊗												to Flash Tank HP Steam Line to Steam Turbine
226	Motor	13LBA22 AA101	- " -	⊗												to Flash Tank HP Steam Line to Steam Turbine
227	Manual	13LBA22 AA652	- " -	○												**Control !** to Flash Tank HP Steam Line to Steam Turbine
228	Manual	13LBH22 AA653	- " -	○												**Control !** to Flash Tank HP Steam Line to Steam Turbine
229	Motor	11LAF20 AA101	- " -	⊗												BFW from HRSG 1
230	Piston Valve	11LBF10 AA001	- " -	⊗												HRSG 1 HPS Bypass-System
			- " -	⊗												
231	Manual	11LBA20 AA651	- " -	⊗												to Flash Tank HRSG 1 HPS Bypass-System
232	Motor	11LBH20 AA101	- " -	⊗												to Flash Tank HRSG 1 HPS Bypass-System
233	Manual	11LBA20 AA652	- " -	○												**Control !** to Flash Tank HRSG 1 HPS Bypass-System
234	Manual	11LBH20 AA651	- " -	○												**Control !** to Flash Tank HRSG 1 HPS Bypass-System
235	Motor	12LAF20 AA101	- " -	⊗												BFW from HRSG 2
236	Piston Valve	12LBF10 AA001	- " -	⊗												HRSG 2 HPS Bypass-System
237	Manual	12LBA20 AA651	- " -	⊗												to Flash Tank HRSG 2 HPS Bypass-System
238	Motor	12LBH20 AA101	- " -	⊗												to Flash Tank HRSG 2 HPS Bypass-System
239	Manual	12LBA20 AA652	- " -	○												**Control !** to Flash Tank HRSG 2 HPS Bypass-System
240	Manual	12LBH20 AA651	- " -	○												**Control !** to Flash Tank HRSG 2 HPS Bypass-System
		System Diagram Turbine Drain system	**G 02**													**Nr: 10773-985130**
241	Motor	13MAL11 AA111	- " -	⊗												Turbine Drain
242	Motor	13MAL23 AA111	- " -	⊗												Turbine Drain
243	Motor	13MAL26 AA111	- " -	⊗												Turbine Drain
244	Motor	13MAL12 AA111	- " -	⊗												Turbine Drain
245	Motor	13MAL24 AA111	- " -	⊗												Turbine Drain
246	Motor	13MAL27 AA111	- " -	⊗												Turbine Drain
247	Motor	13MAL15 AA111	- " -	⊗												Turbine Drain
248	Motor	13MAL65 AA111	- " -	⊗												Turbine Drain
249	Motor	13MAL31 AA111	- " -	⊗												Turbine Drain
250	Motor	13MAL71 AA111	- " -	⊗												Turbine Drain
251	Motor	13MAL47 AA111	- " -	⊗												Turbine Drain
252	Motor	13MAL81 AA111	- " -	⊗												Turbine Drain
253	Motor	13MAL81 AA112	- " -	⊗												Turbine Drain
254	Motor	13MAL35 AA111	- " -	⊗												Turbine Drain
255	Motor	13MAL28 AA111	- " -	⊗												Turbine Drain

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No.	Armatur	Bezeichnung *Description*	Schaltbild P&D	Test Nr. 1 Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Nr. Pos.	check	Bemerkung *note*
		Machine Hall Flash Tank	**C**													**Nr: TER1_TIP 00 105_C**
256	Control Valve	10GAC81 AA001	- " -	⊗												from Distribution
257	Manual	10GAC81 AA051	- " -	⊗												Bypass 10GAC81 AA001
258	Manual	10LBH65 AA502	- " -	⊗												from Flash Tank to HRSG Drain PIT

VA TECH COMBINED CYCLE

TECHNIP ITALY S.p.A.

Energia Molise Power Plant

Correction Curves Total Plant

Project: H410.110012

Document No.: xxxxx&BDC_TER1_PTH00005 **Rev.** E

REV.	ÄNDERUNG/MODIFICATION (letzte 4/last 4)	DATUM/ DATE	NAME	GEPR./ CHECK	GES./ APPR.
A	Original	------	------	------	------
B	Updated	03.04.2006	Sengschmied	Vomberg	Vomberg
C	Power Factor @ HV Substation	07.06.2006	Sengschmied	Vomberg	Vomberg
D	Extended Ambient Temperature Range	30.06.2006	Sengschmied	Vomberg	Vomberg
E	Revised Wet Bulb Temperature Correction	17.06.2006	Sengschmied	Raber	Raber

KUNDE/PURCH.

Energia Molise S.p.A.

LIEFERANT/SUPPLIER

LIEF.DOK.NR./SUPPLIER DOC.NO

BENENNUNG/TITLE

Correction Curves Total Plant

Correction Curves

Total Plant

VATECH DOC.NO.

xxxxx&BDC_TER1_PTH00005

SCHUTZVERMERK NACH DIN 34 BEACHTEN!
NOTE PROTECTION DIN 34!

	DATUM/ DATE	NAME
ERST./CREATED	24.10.2005	Sengschmied
GEPR./CHECK	24.10.2005	Vomberg
GES./APPR.	24.10.2005	Vomberg

xxxxx&BDC_TER1_PTH00005

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ELIN

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Plant Correction Curves

Following performance correction curves are proposed to use for correction of plant performance values as defined herein. The Plant Correction Curves to be used during performance testing are listed in Table 1. Correction curves may be added if preconditions of the contract alter during the performance test.

Title of Correction curve		No. of Correction curve
CC Net Power Output vs. Amb. Temp.		VA C010 Rev. E
y = a+bx+cx^2+dx^3+ex^4+fx^5+gx^6+hx^7+ix^8		VA C011 Rev. E
	a	100.2573799
	b	1.038698097
	c	Extended Ambient Temperature Range
	E	vised Wet Bulb Temperature Correction
	d	0.017072491
	e	-0.000312077
	f	-4.36053E-05
	g	2.9501E-06
	h	-7.10172E-08
	i	6.12245E-10
CC Net Efficiency vs. Amb. Temp.		VA C020 Rev. E
y = a+bx^(0.5)+cx+dx^(1.5)+ex^2+fx^(2.5)+gx^3+hx^(3.5)+ix^4		VA C021 Rev. E
	a	2656.297466
	b	-5700.749598
	c	5439.242421
	d	-2907.529457
	e	953.4972903
	f	-196.5914465
	g	24.90479878
	h	-1.773787909
	i	0.054423371
CC Net Power Output & CC Net Efficiency vs. Wet Bulb Temp. @ CT Boundary		VA C030 Rev. E
y = 7.372162E-10x6 - 1.197867E-07x5 + 4.866411E-06x4 - 8.564440E-05x3 - 2.158798E-03x2 + 4.277892E-02x + 9.997368E+01		
CC Net Power Output vs. Amb. Pressure		VA C040 Rev. E
y = (a+bx^2+cx^4+dx^6+ex^8)/(1+fx^2+gx^4+hx^6+ix^8)		
	a	369.1418223
	b	-0.002042371
	c	3.95736E-09
	d	-3.26241E-15
	e	9.78332E-22
	f	-9.5001E-06
	g	2.29662E-11
	h	-2.14141E-17
	i	6.94846E-24
CC Net Efficiency vs. Amb. Pressure		VA C045 Rev. E
y = (a+cx+ex^2+gx^3)/(1+bx+dx^2+fx^3+hx^4)		
	a	76.78916671
	b	-0.00298631
	c	-0.206063848
	d	3.20831E-06
	e	0.000182371
	f	-1.45145E-09
	g	-5.30853E-08
	h	2.29572E-13
CC Net Power Output vs. Rel. Humidity @ GT Boundary		VA C050 Rev. E
y = -2.582513E-09x3 - 2.727057E-07x2 + 4.140475E-03x + 9.968000E+01		
y = -1.382515E-07x3 + 1.423589E-05x2 + 2.303026E-03x + 9.979734E+01		
y = -5.671746E-10x3 - 4.671949E-06x2 - 3.908790E-04x + 1.000586E+02		
CC Net Efficiency vs. Rel. Humidity @ GT Boundary		VA C060 Rev. E
y = -1.488767E-08x3 + 1.793120E-06x2 + 6.714695E-04x + 9.994412E+01		
y = -1.373990E-07x3 + 1.521231E-05x2 - 8.942930E-04x + 1.000404E+02		

y = -1.057454E-08x3 + 1.791182E-06x2 - 3.645793E-03x + 1.002780E+02

CC Net Power Output vs. Grid Frequency	VA C070 Rev. E

y = 3.451086E-01x3 - 5.234152E+01x2 + 2.645192E+03x - 4.444437E+04
y =-52856569.24380820-478811.121867013*x^2*ln(x)+3605829.39410529*(ln(x))^2+136063085.720334/x^(0.5)
y = 1.714997E-02x3 - 3.423938E+00x2 + 2.166733E+02x - 4.317564E+03

CC Net Efficiency vs. Grid Frequency	VA C080 Rev. E

y = 1.841145E-01x3 - 2.769352E+01x2 + 1.387402E+03x - 2.305062E+04
y =-13662242.2328526+384961.517029985*x-2800.9769929742*x^2*ln(x)+1040.04943389204*x^(2.5)+171116613.721727/x
y = 7.013711E-02x3 - 1.077042E+01x2 + 5.514195E+02x - 9.312067E+03

CC Net Power Output & CC Net Efficiency vs. Gas Fuel pressure	VA C090 Rev. E

y = 100 (Correction of Power)
y = 100.006945365365 (Correction of Efficency if p <40 bara)
y = -3.488562E-03x + 1.001465E+02 (Correction of Efficency if p >40 bara)

CC Net Power Output vs. Gas Fuel temperature	VA C100 Rev. E

y = 100.0 (Correction of Power if t < 10 °C)
y = 5.807603E-04x + 9.999427E+01 (Correction of Power if t > 10°C)

CC Net Efficiency vs. Gas Fuel temperature	VA C105 Rev. E

y = = 6.760185E-03x + 9.993240E+01 (Correction of Efficency if t < 10 °C)
y = 5.807603E-04x + 9.999427E+01 (Correction of Power if t > 10°C)

CC Net Power Output vs. Fuel LHV	VA C110 Rev. E

y = 5.067391E-10x2 - 1.444055E-04x + 1.054681E+02 @ 10°C Ambient Temperature
y = 5.294442E-10x2 - 1.462893E-04x + 1.056321E+02 @ 17.5°C Ambient Temperature
y = 7.073020E-10x2 - 1.624107E-04x + 1.061328E+02 @ 25°C Ambient Temperature

CC Net Efficiency vs. Gas Fuel LHV	VA C120 Rev. E

y = -5.758312E-10x2 + 4.100029E-06x + 1.010027E+02 @ 10°C Ambient Temperature
y = -6.031392E-10x2 + 7.030395E-06x + 1.009649E+02 @ 17.5°C Ambient Temperature
y = -3.855904E-10x2 - 1.266511E-05x + 1.014493E+02 @ 25°C Ambient Temperature

CC Net Power Output & CC Net Efficiency vs. CT Make up water temperature	VA C130 Rev. E

y = -4.519055E-07x3 + 1.929740E-05x2 - 1.602692E-03x + 1.000208E+02

CC Net Power Output & & CC Net Efficiency vs. sulphur in natural gas (flue gas)	VA C140 Rev. E

y = -2.712008E-01x + 1.000271E+02

CC Power Output & CC Net Efficiency vs. Power Factor at HV substation	VA C165 Rev. E

y = 2.056112E+01x3 - 5.798888E+01x2 + 5.700685E+01x + 8.081447E+01

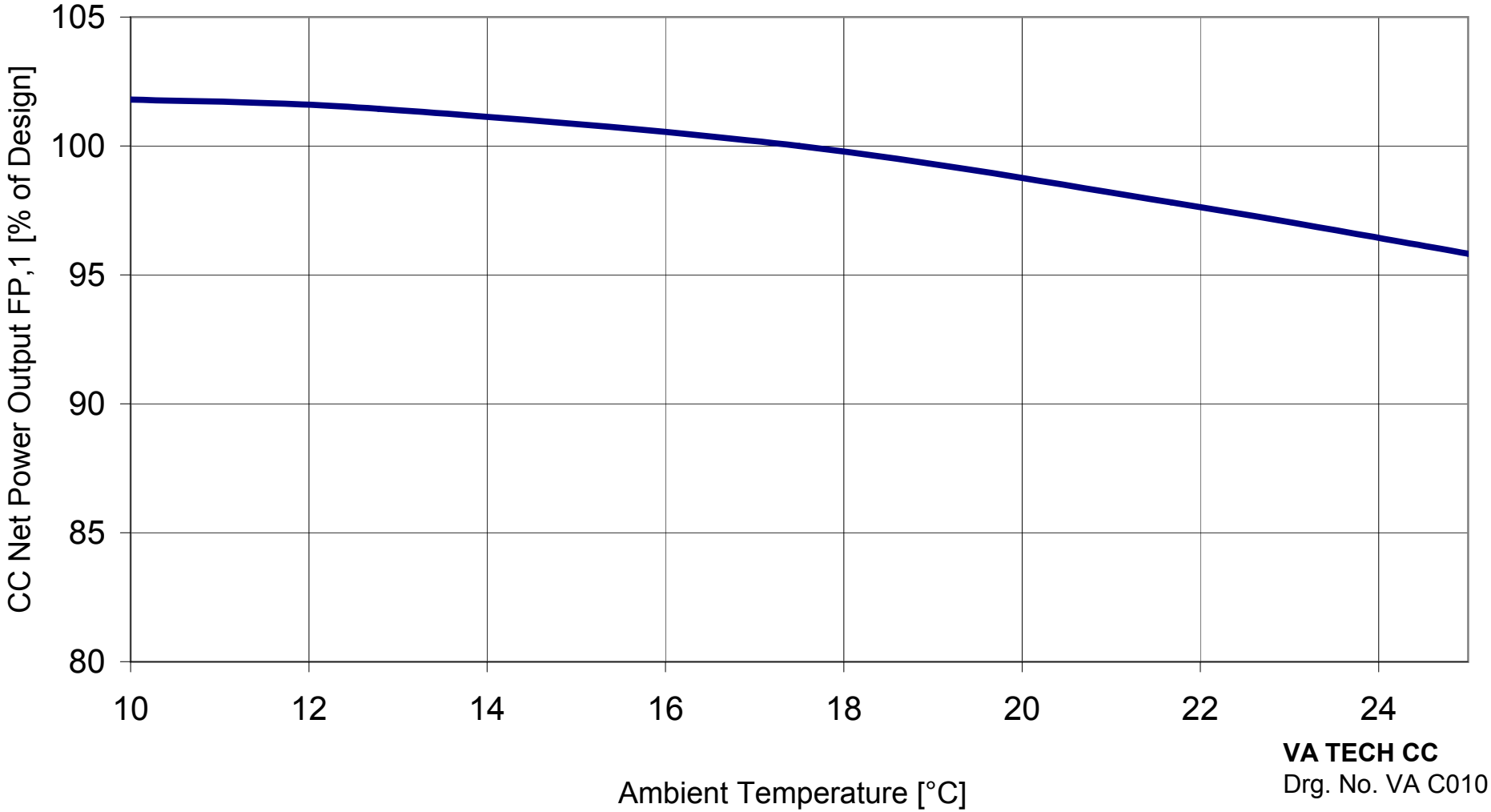
CC Power Output & CC Net Efficiency vs. Voltage at HV substation	VA C170 Rev. E

y = 5.343095E-07x3 - 3.997954E-05x2 + 2.620779E-03x + 1.000000E+02

CC Plant Performance Loss following normal maintenance and off-line compressor water wash	VA C180 Rev. E

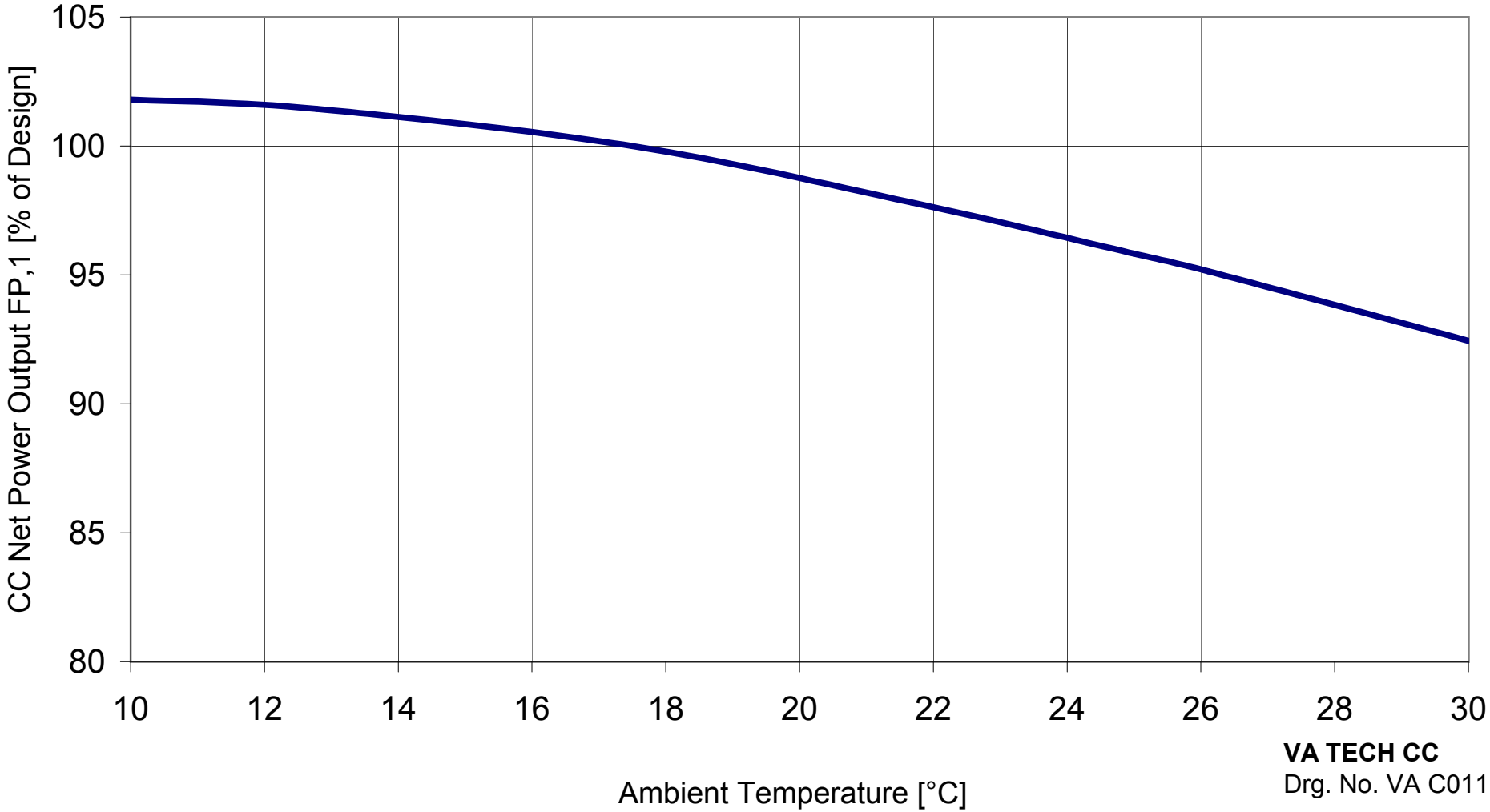
y = -3.499836E-12x3 + 1.982793E-07x2 - 9.944210E-04x + 1.000020E+02 (Correction of Power)
y = 1.234480E-11x3 - 2.200615E-08x2 - 1.750251E-04x + 1.000002E+02 (Correction of Efficiency)

CC Net Power Output vs. Ambient Temperature



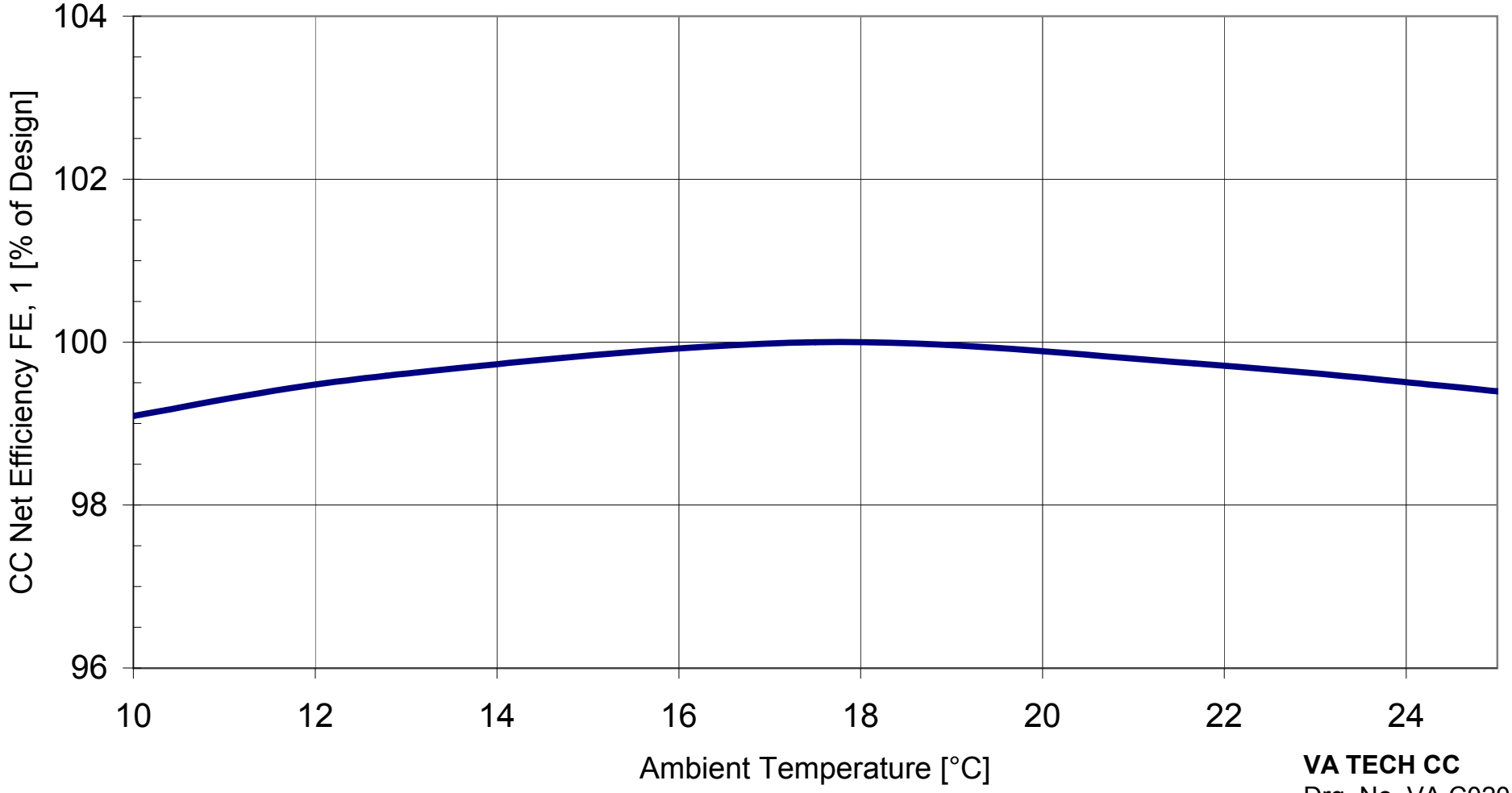
VA TECH CC
Drg. No. VA C010

CC Net Power Output vs. Ambient Temperature



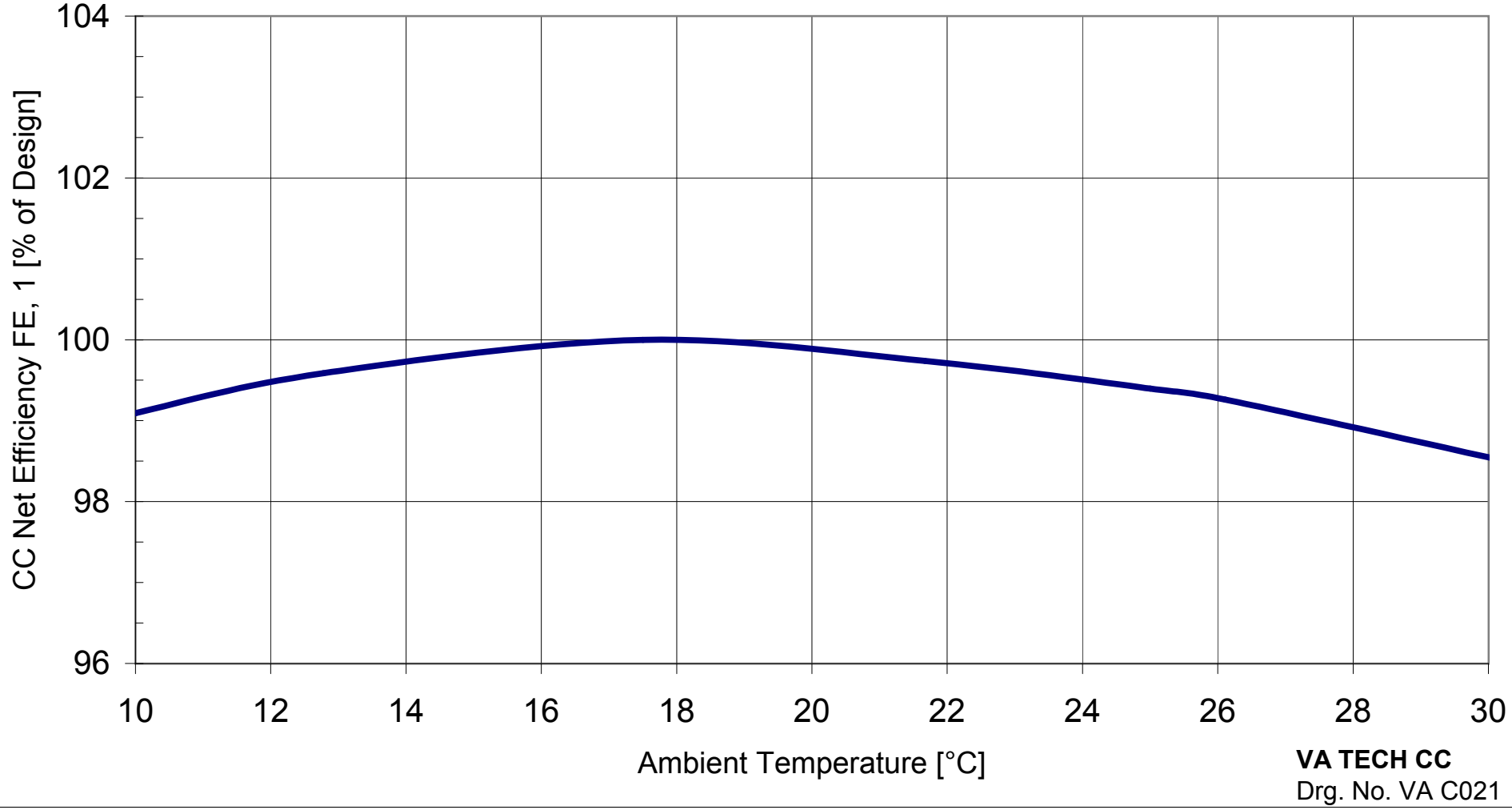
VA TECH CC
Drg. No. VA C011

CC Net Efficiency vs. Ambient Temperature

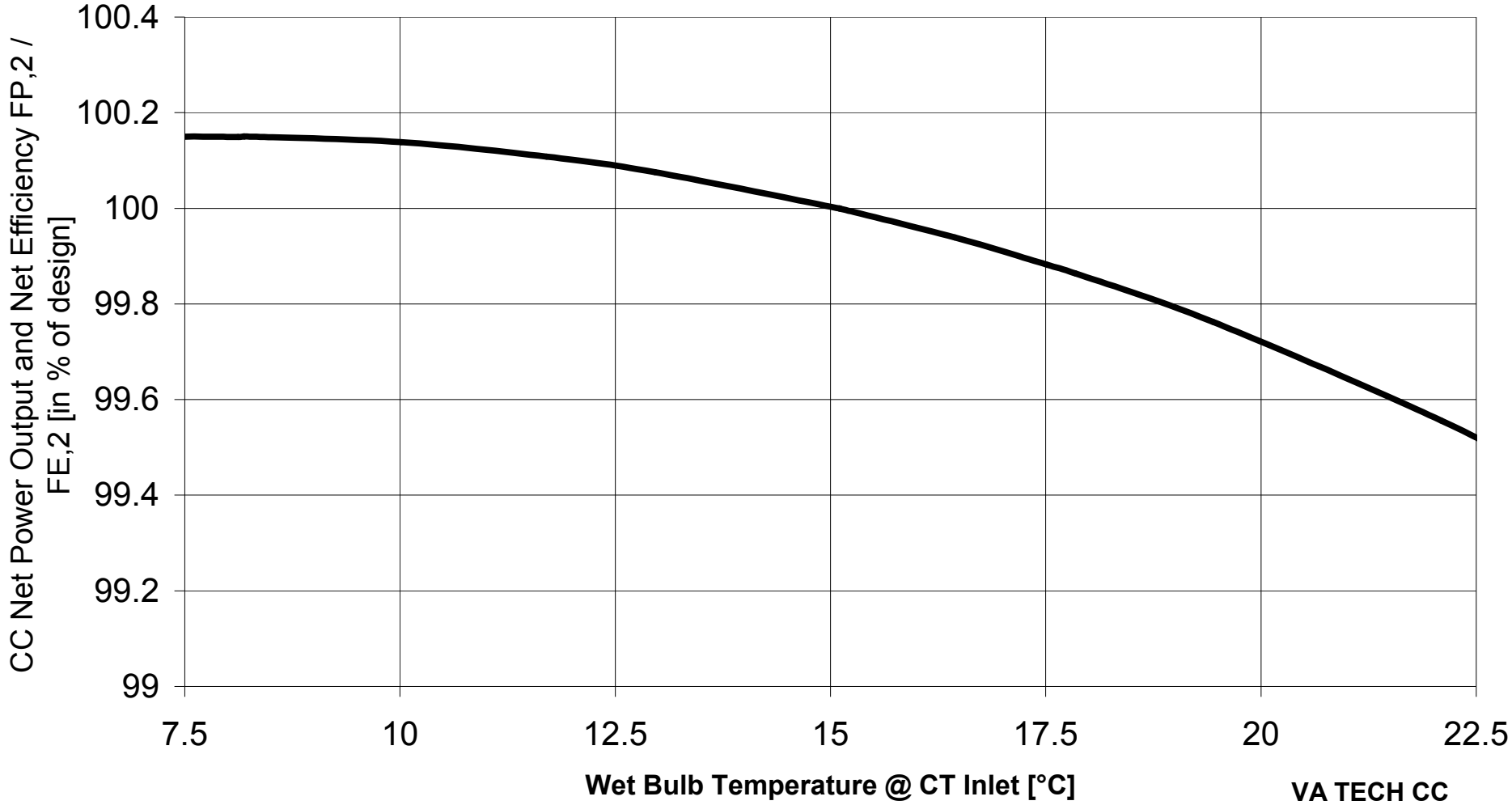


VA TECH CC
Drg. No. VA C020

CC Net Efficiency vs. Ambient Temperature

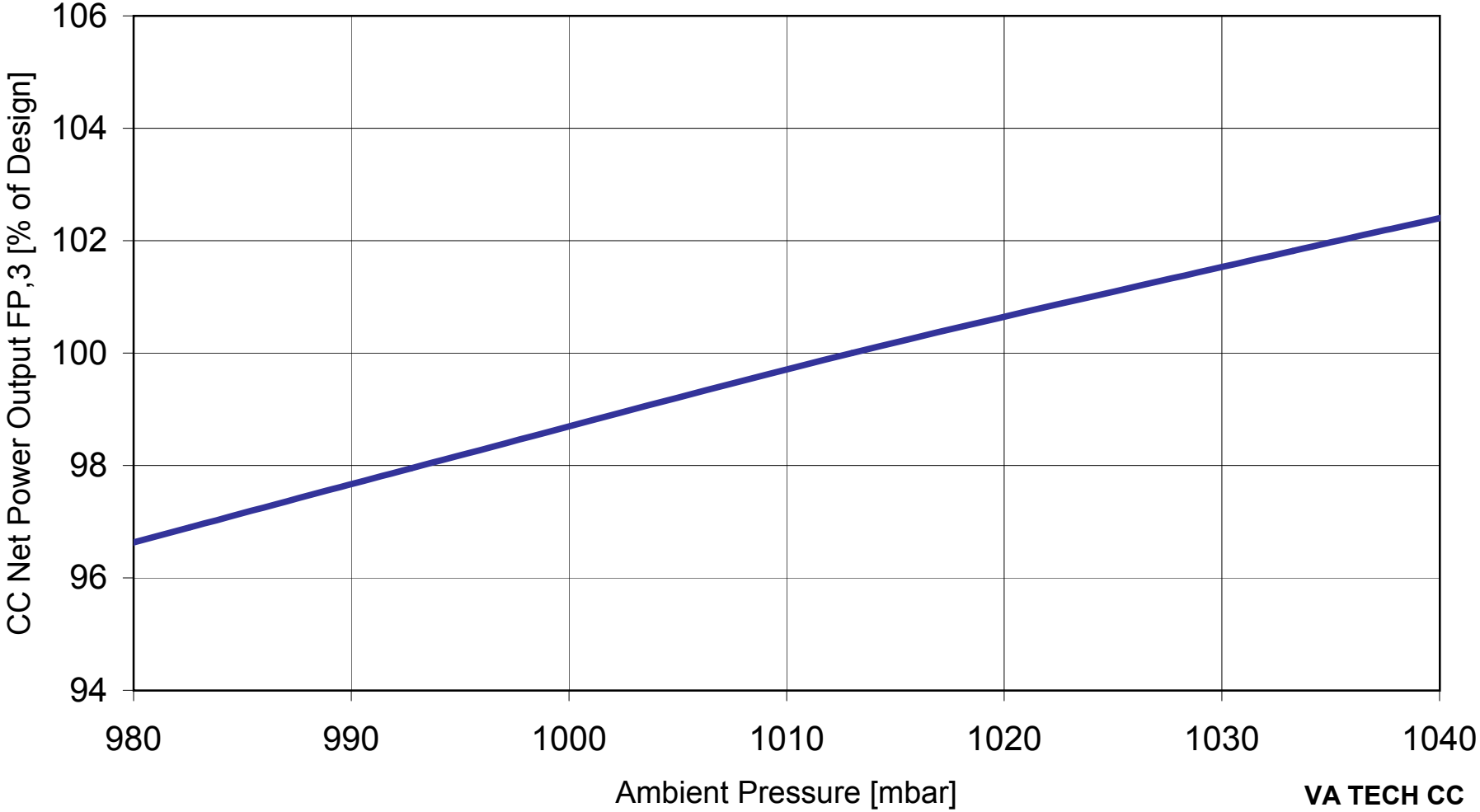


CC Net Power Output & Net Efficiency vs. Wet Bulb Temperature @ CT Inlet



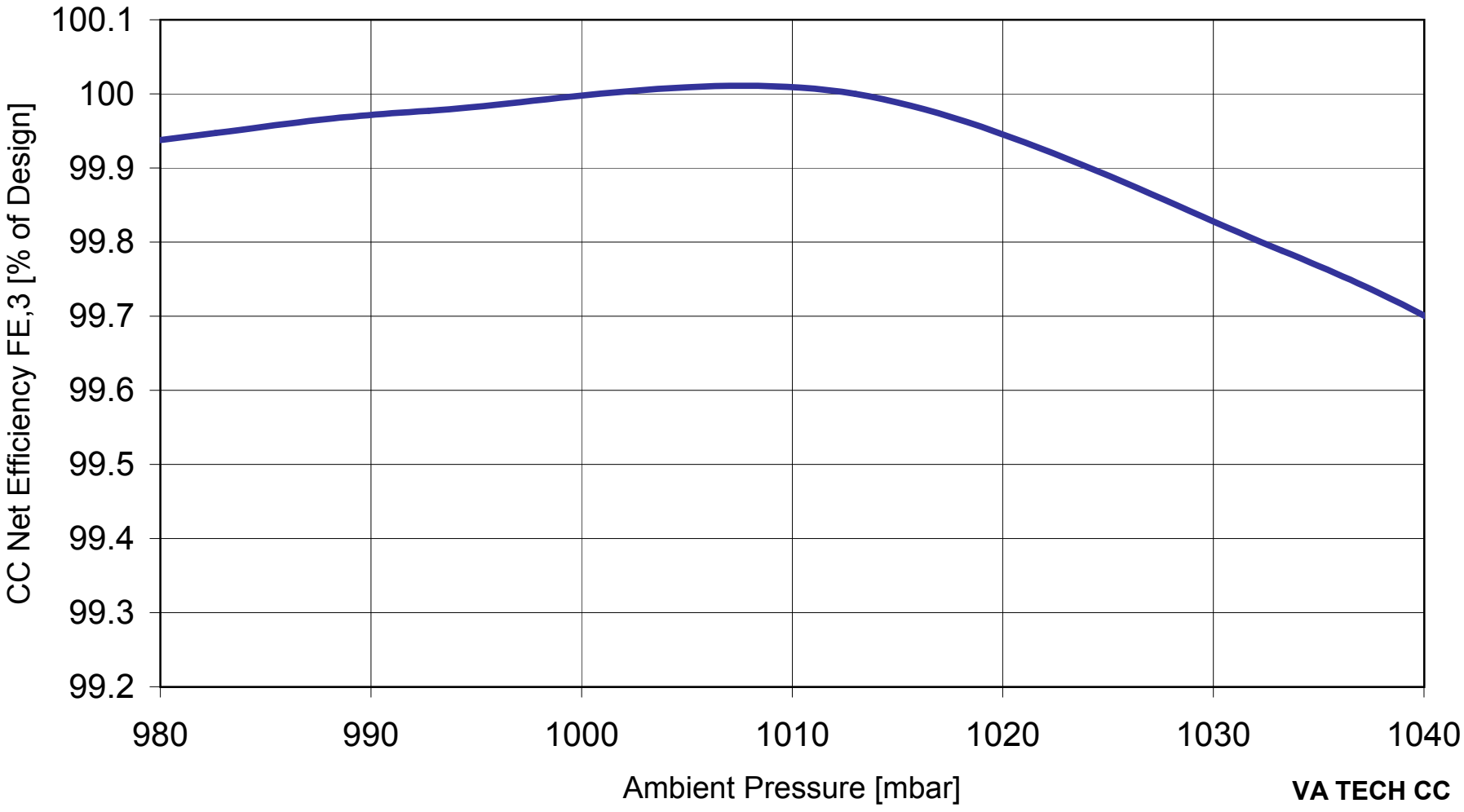
VA TECH CC
Drg. No. VA C030

CC Net Power Output vs. Ambient Pressure

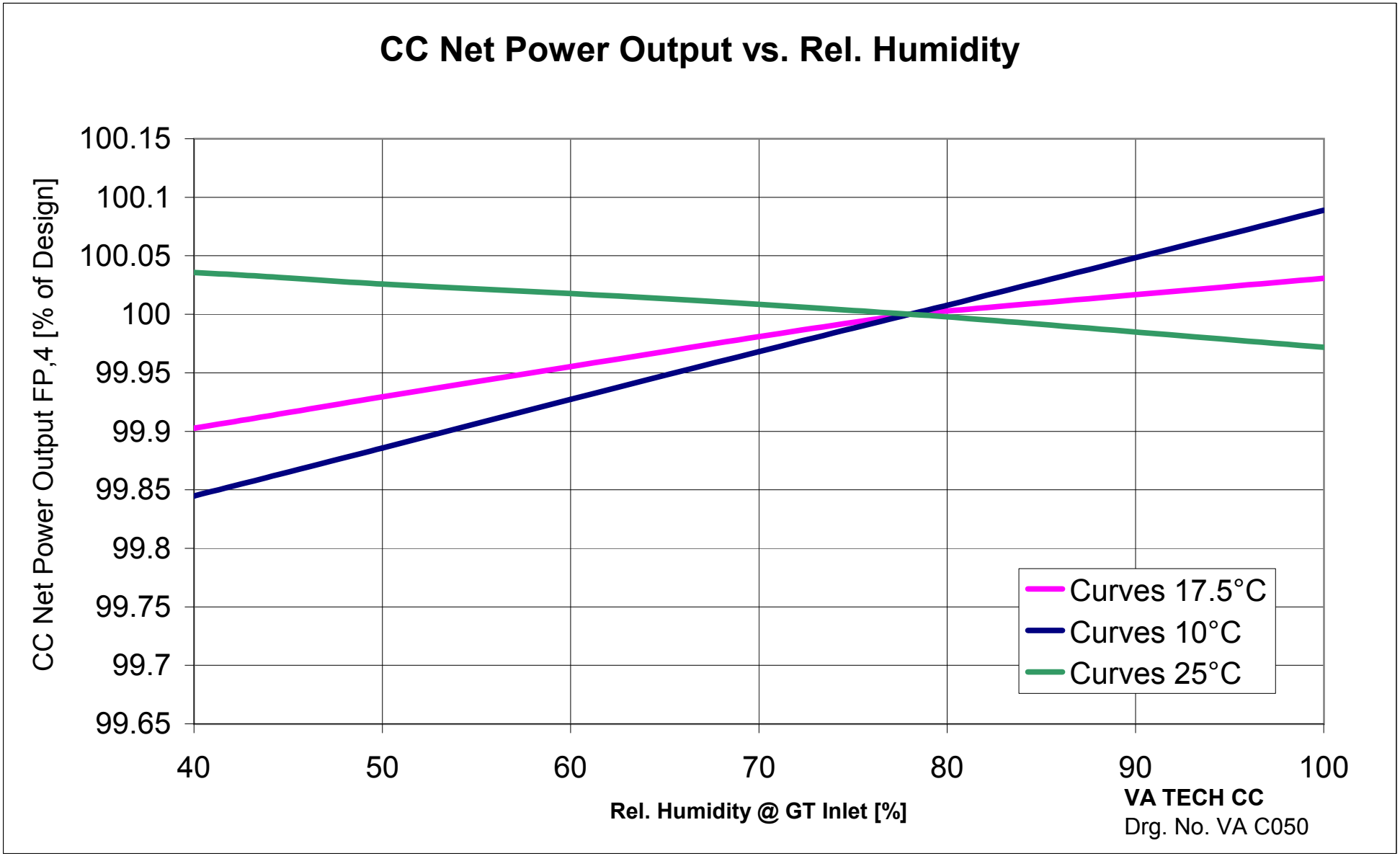


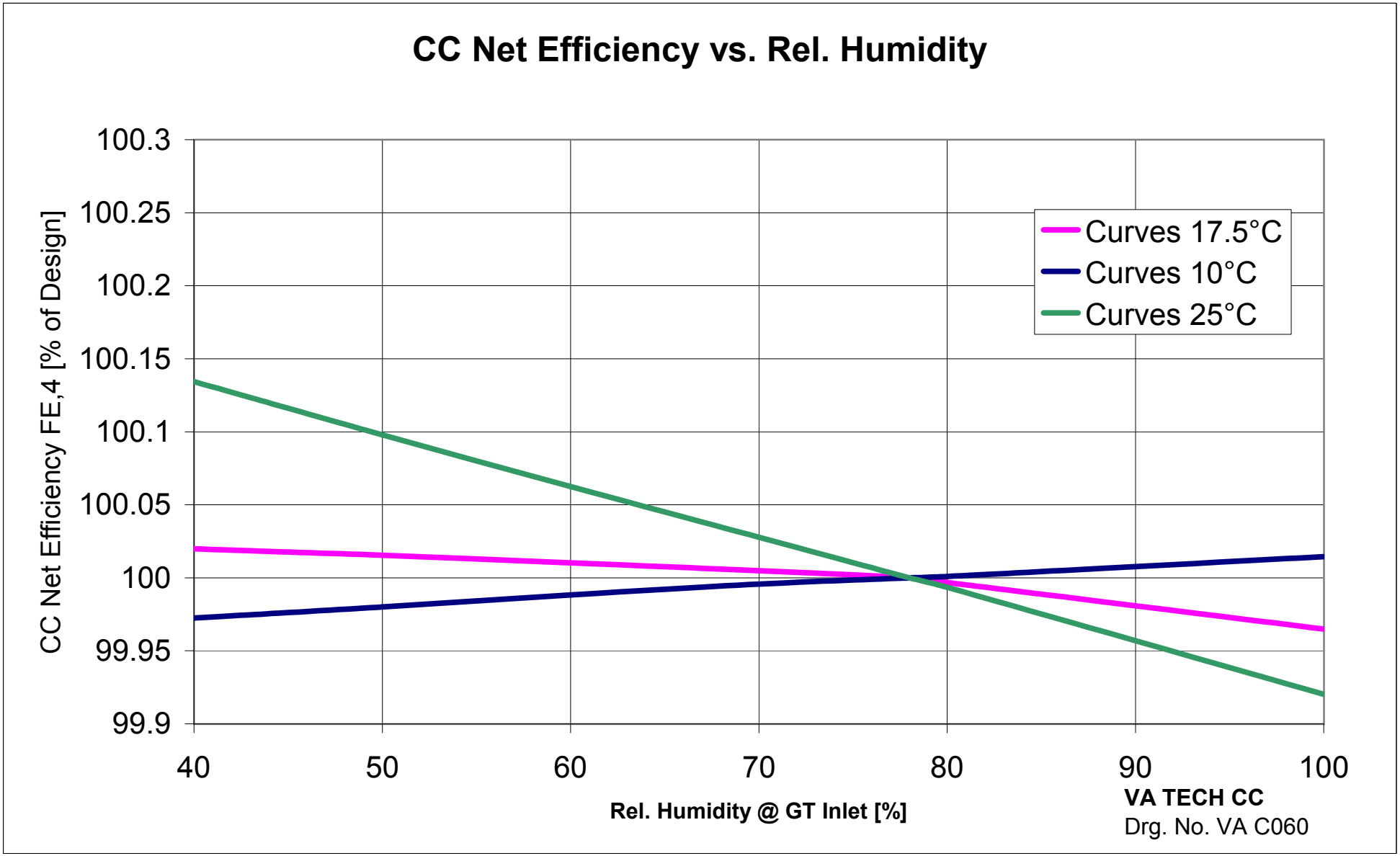
VA TECH CC
Drg. No. VA C040

CC Net Efficiency vs. Ambient Pressure



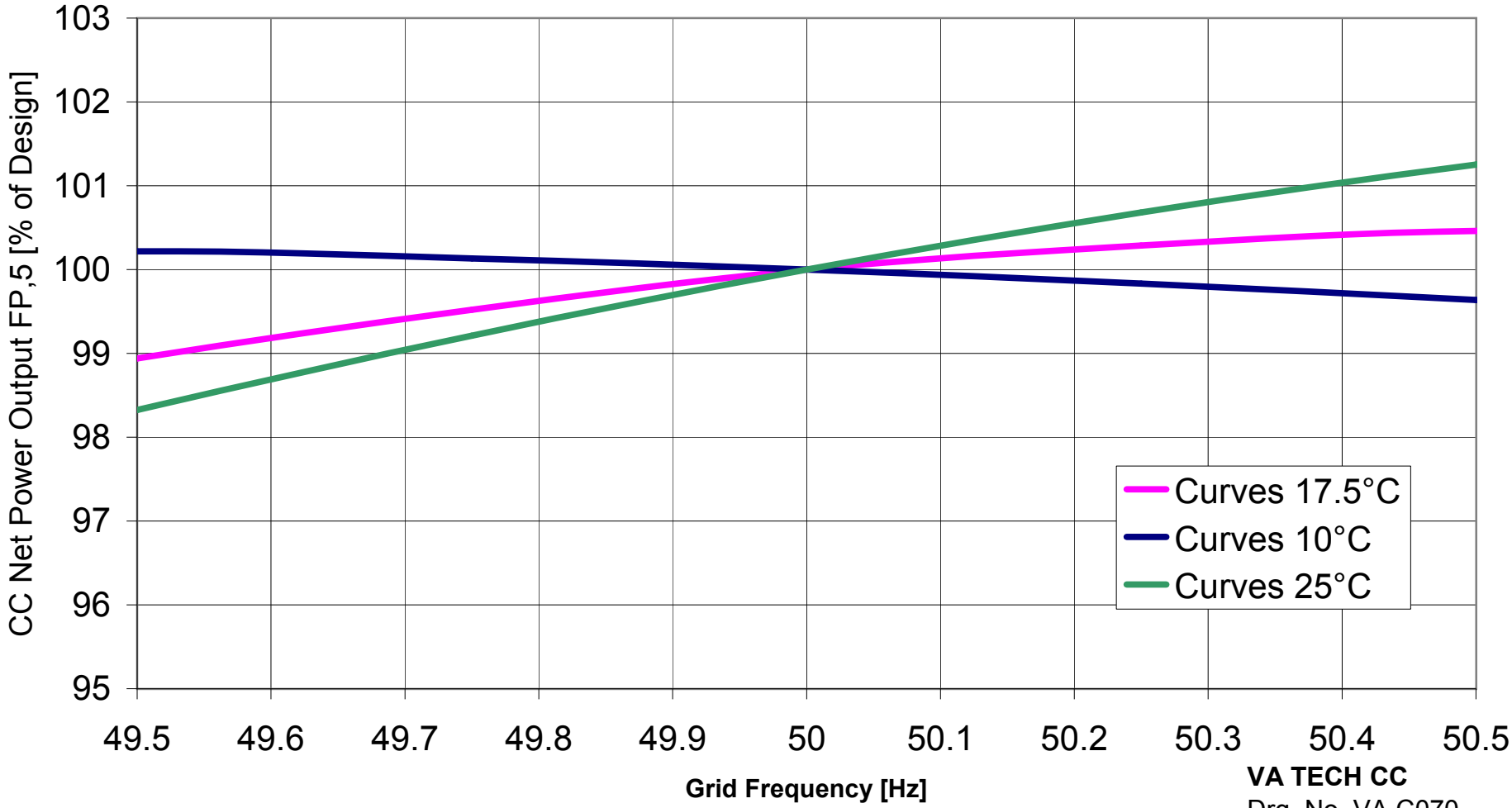
VA TECH CC
Drg. No. VA C045


CC Net Power Output vs. Rel. Humidity
CC Net Power Output FP,4 [% of Design]
100.15
100.1
100.05
100
99.95
99.9
99.85
99.8
99.75
99.7
99.65
40
50
60
70
80
90
100
Rel. Humidity @ GT Inlet [%]
Curves 17.5°C
Curves 10°C
Curves 25°C
VA TECH CC
Drg. No. VA C050


CC Net Efficiency vs. Rel. Humidity
CC Net Efficiency FE,4 [% of Design]
100.3
100.25
100.2
100.15
100.1
100.05
100
99.95
99.9
40
50
60
70
80
90
100
Rel. Humidity @ GT Inlet [%]
Curves 17.5°C
Curves 10°C
Curves 25°C
VA TECH CC
Drg. No. VA C060

CC Net Power Output vs. Grid Frequency

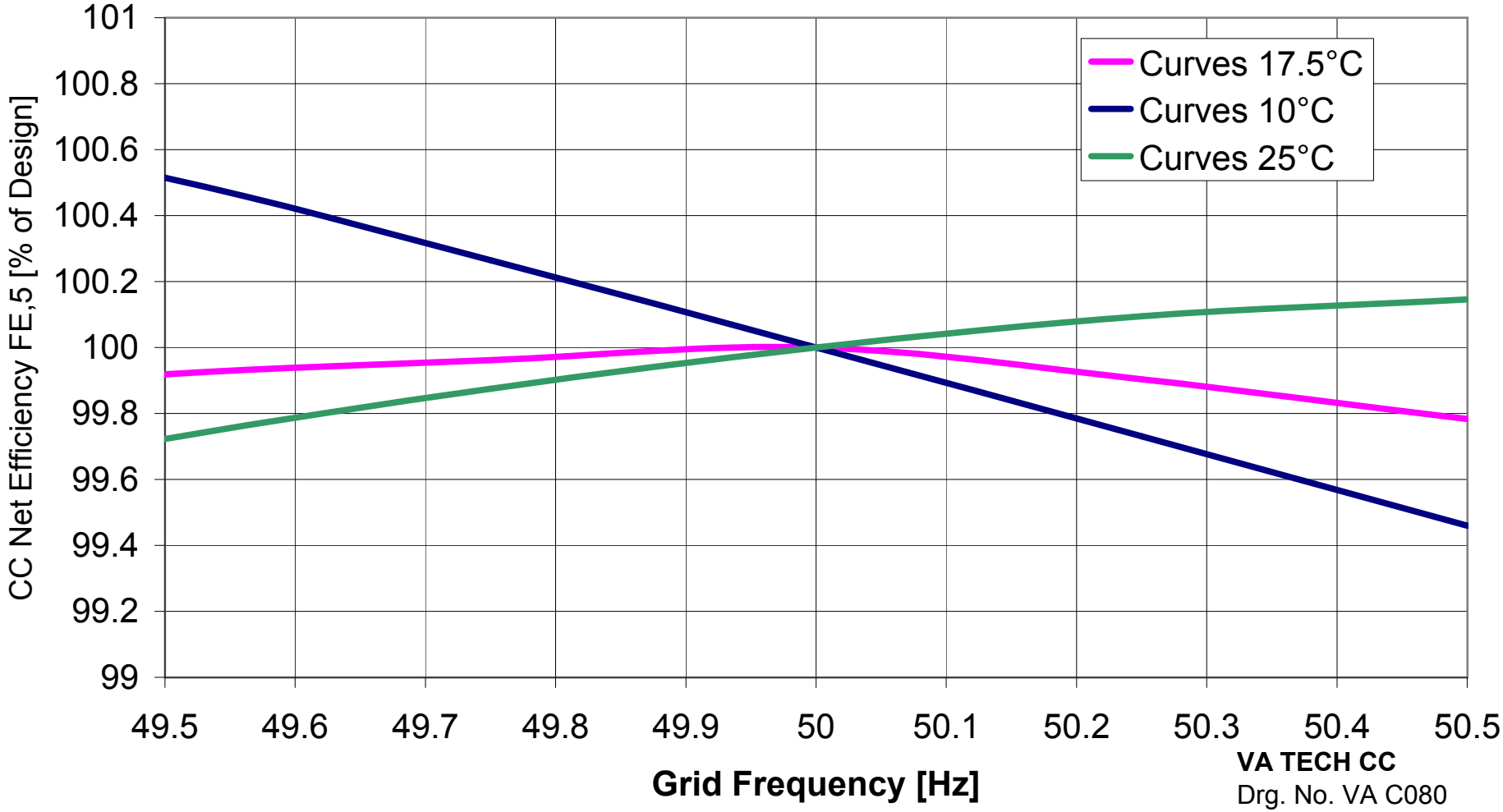
Operation without Grid Compliance Control



VA TECH CC
Drg. No. VA C070

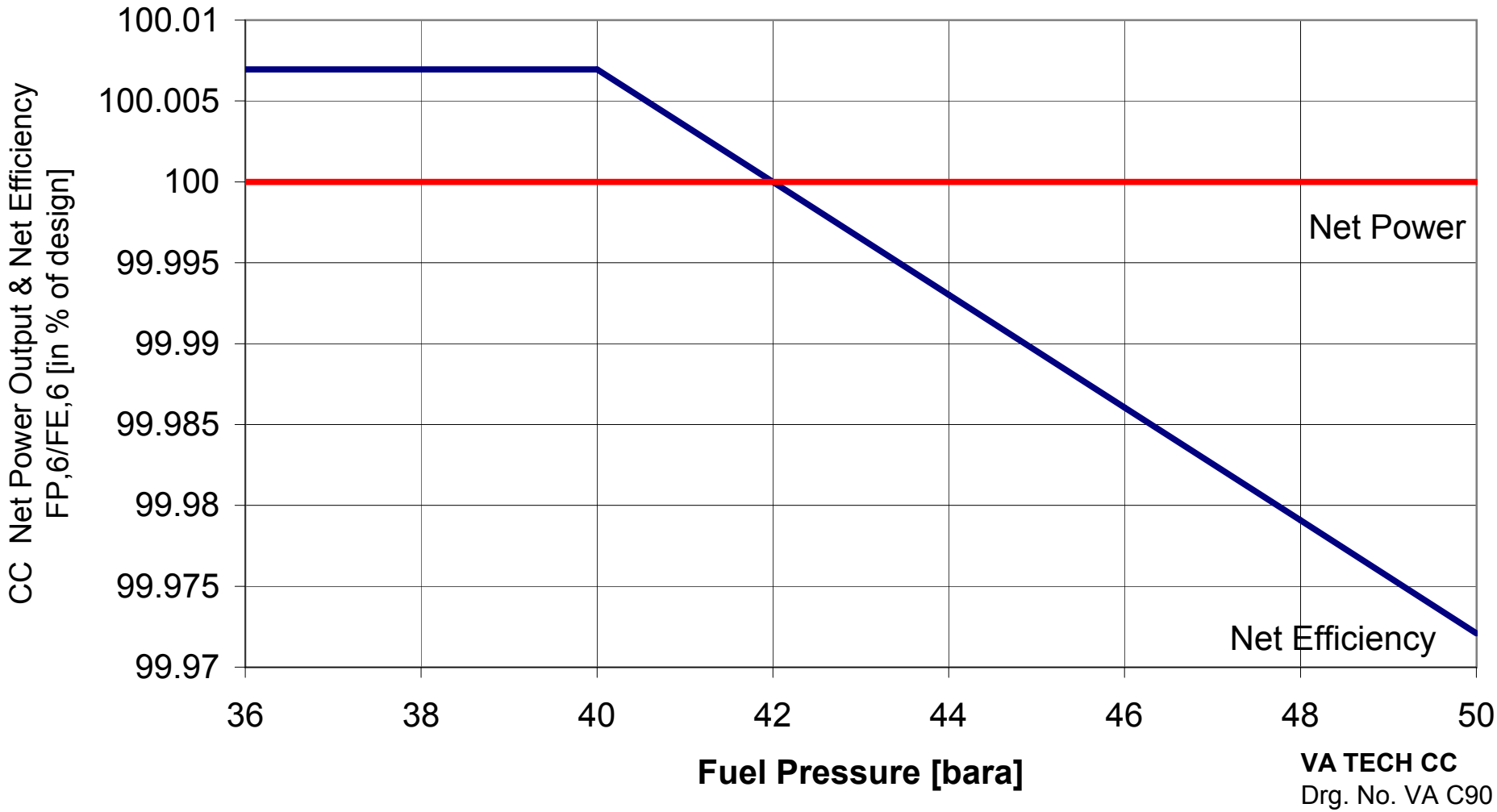
CC Net Efficiency vs. Grid Frequency

Operation without Grid Compliance Control



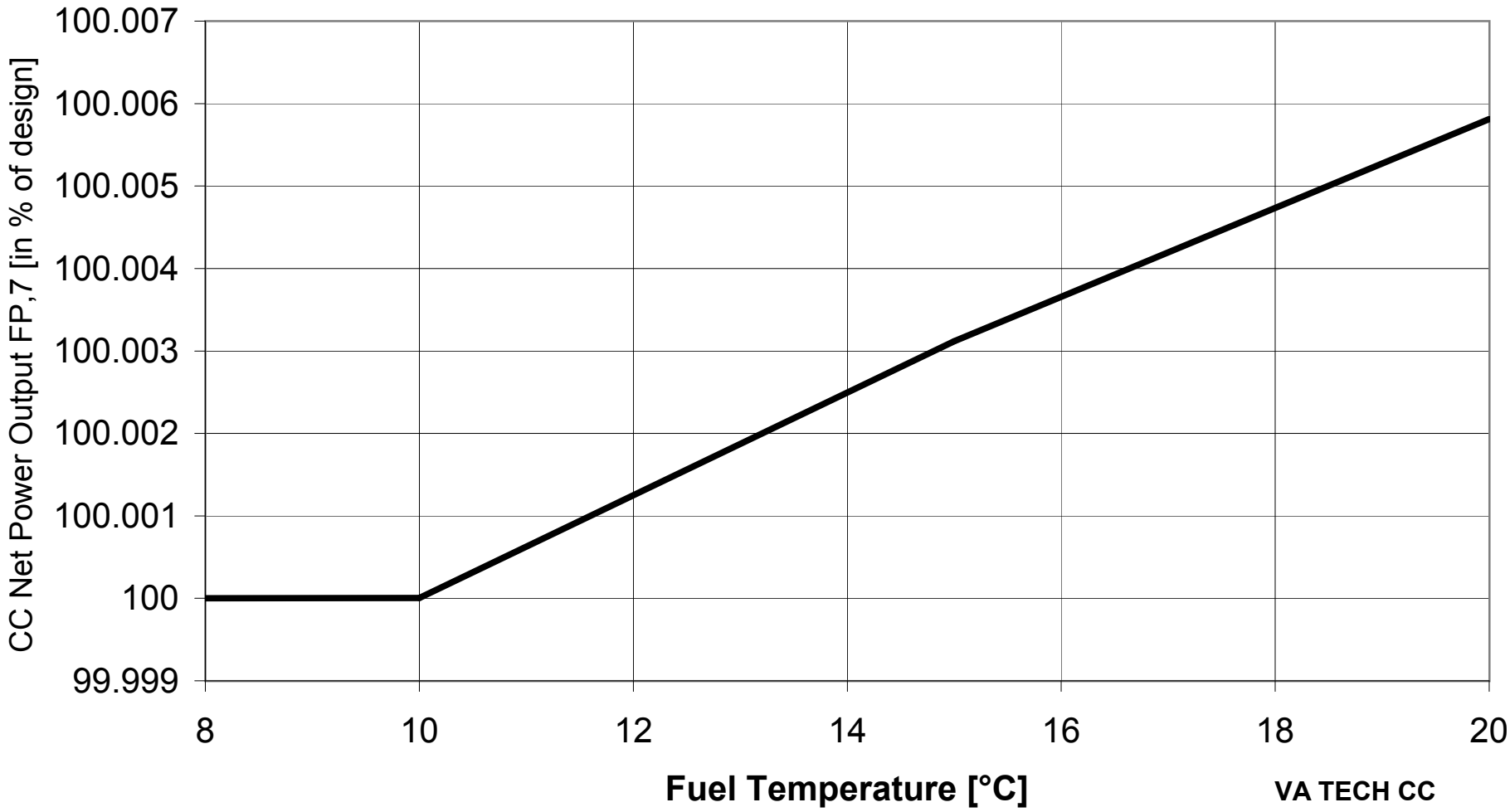
VA TECH CC
Drg. No. VA C080

CC Net Power Output & Net Efficiency vs. Fuel Pressure

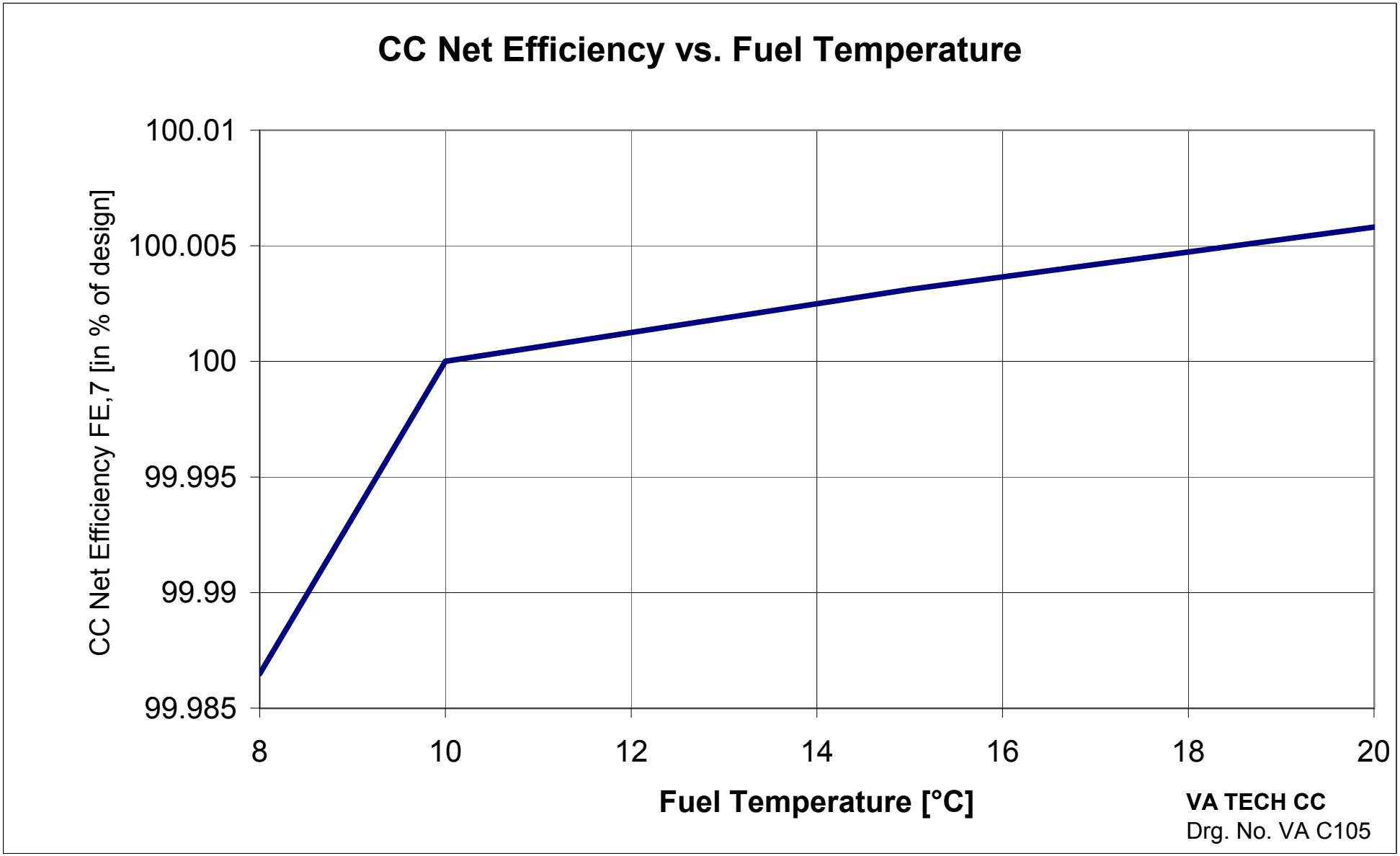


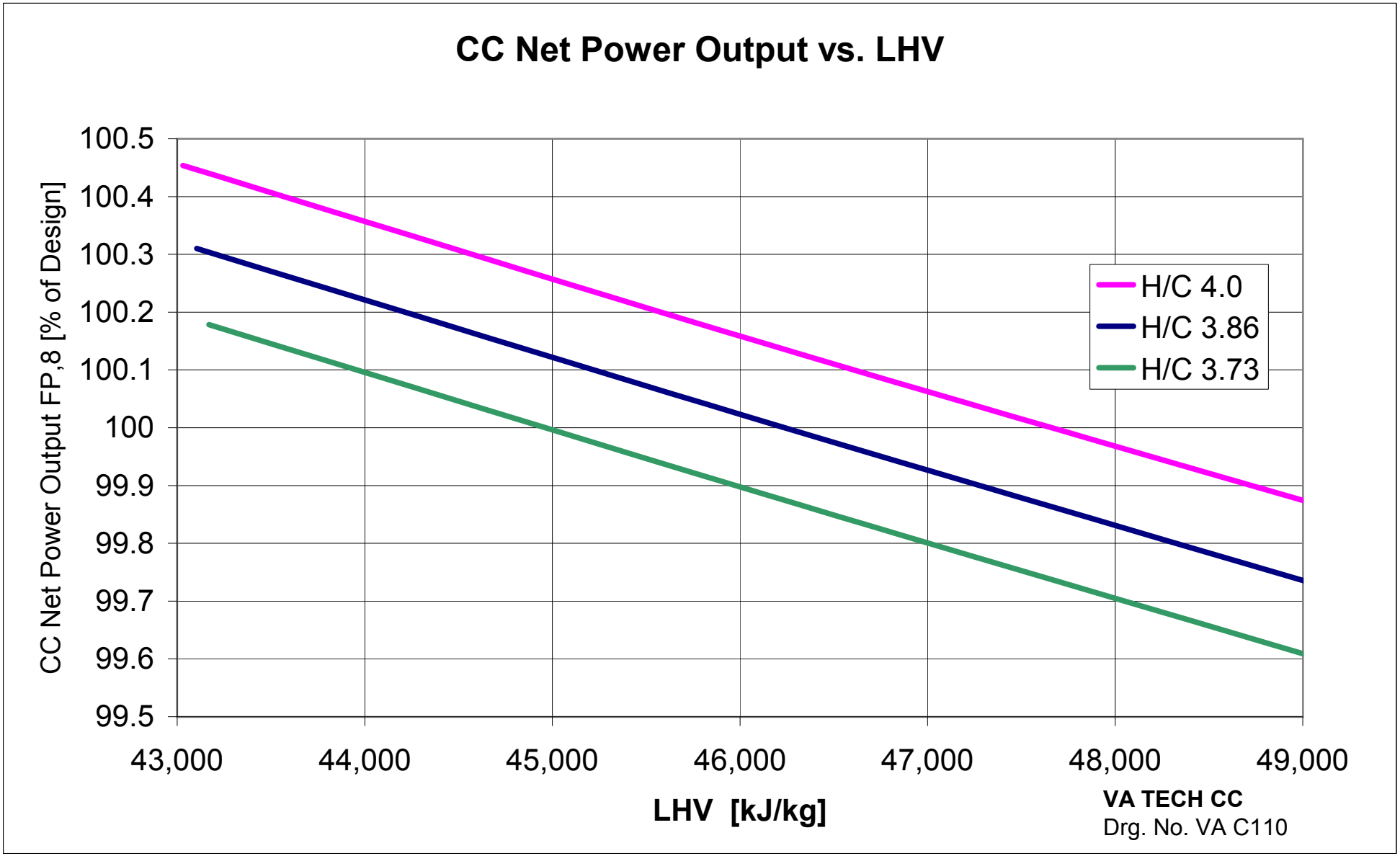
VA TECH CC
Drg. No. VA C90

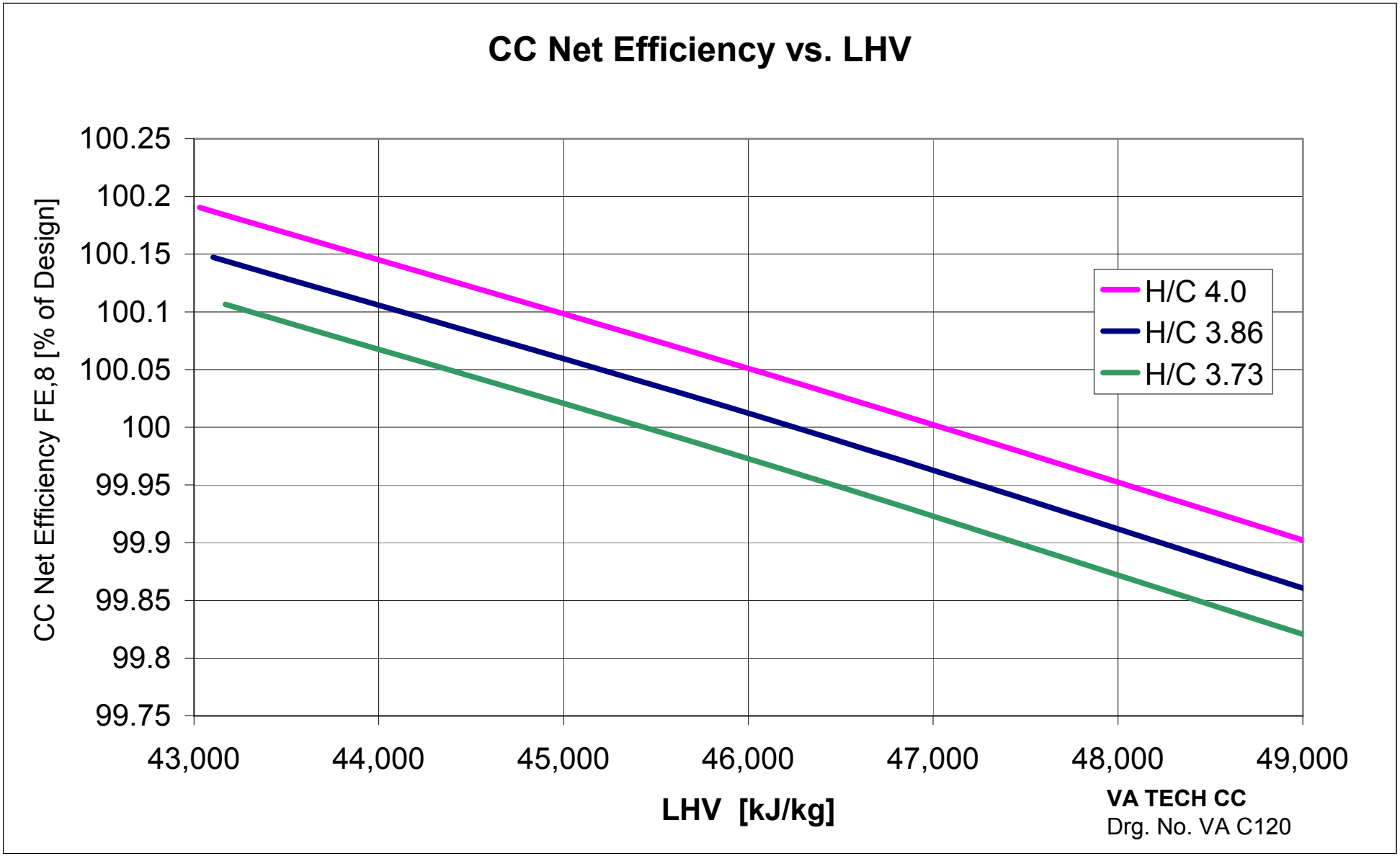
CC Net Power Output vs. Fuel Temperature



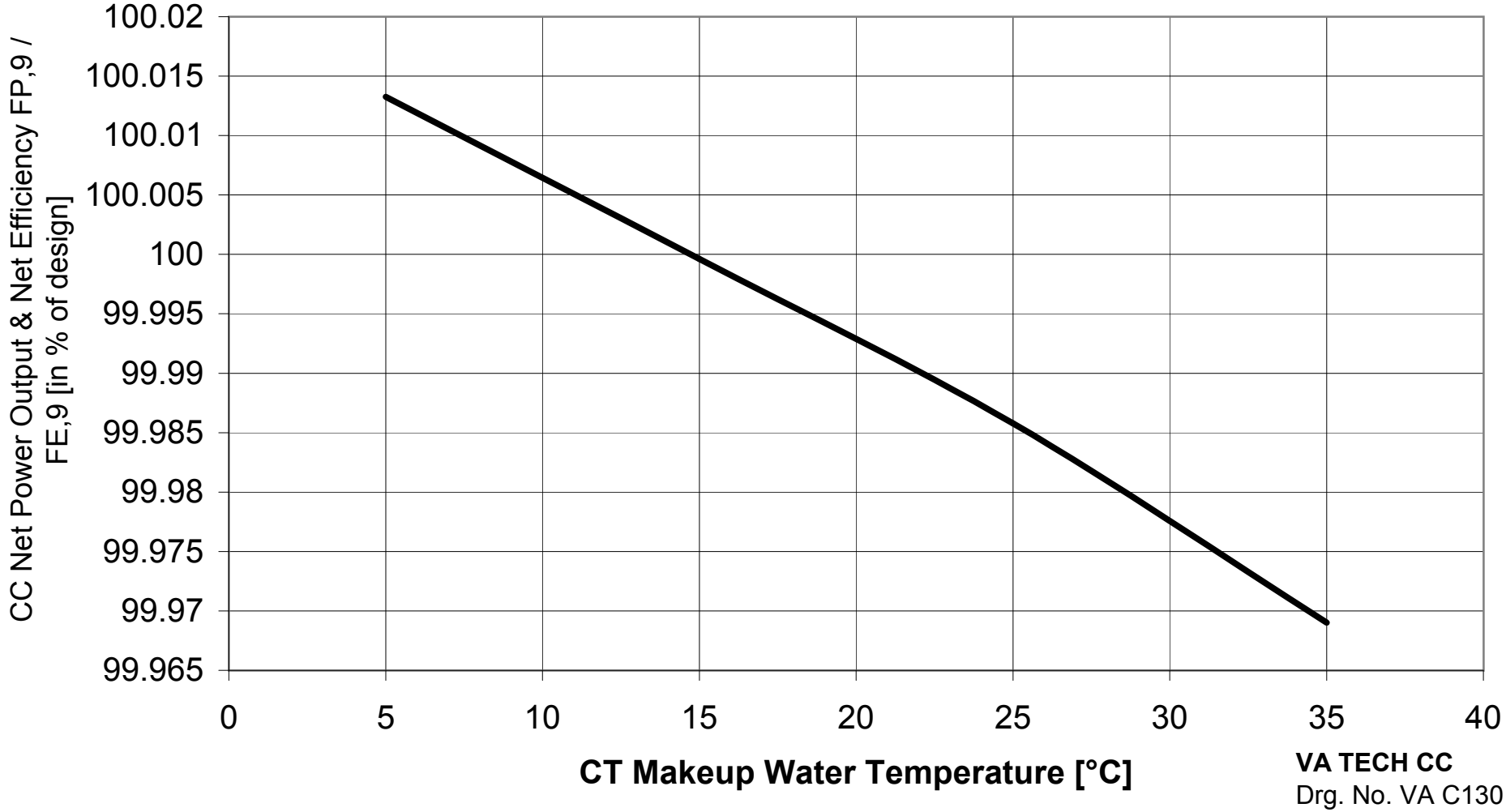
VA TECH CC
Drg. No. VA C100


CC Net Efficiency vs. Fuel Temperature
100.01
100.005
100
99.995
99.99
99.985
CC Net Efficiency FE,7 [in % of design]
8
10
12
14
16
18
20
Fuel Temperature [°C]
VA TECH CC
Drg. No. VA C105


CC Net Power Output vs. LHV
CC Net Power Output FP,8 [% of Design]
100.5
100.4
100.3
100.2
100.1
100
99.9
99.8
99.7
99.6
99.5
43,000
44,000
45,000
46,000
47,000
48,000
49,000
LHV [kJ/kg]
H/C 4.0
H/C 3.86
H/C 3.73
VA TECH CC
Drg. No. VA C110

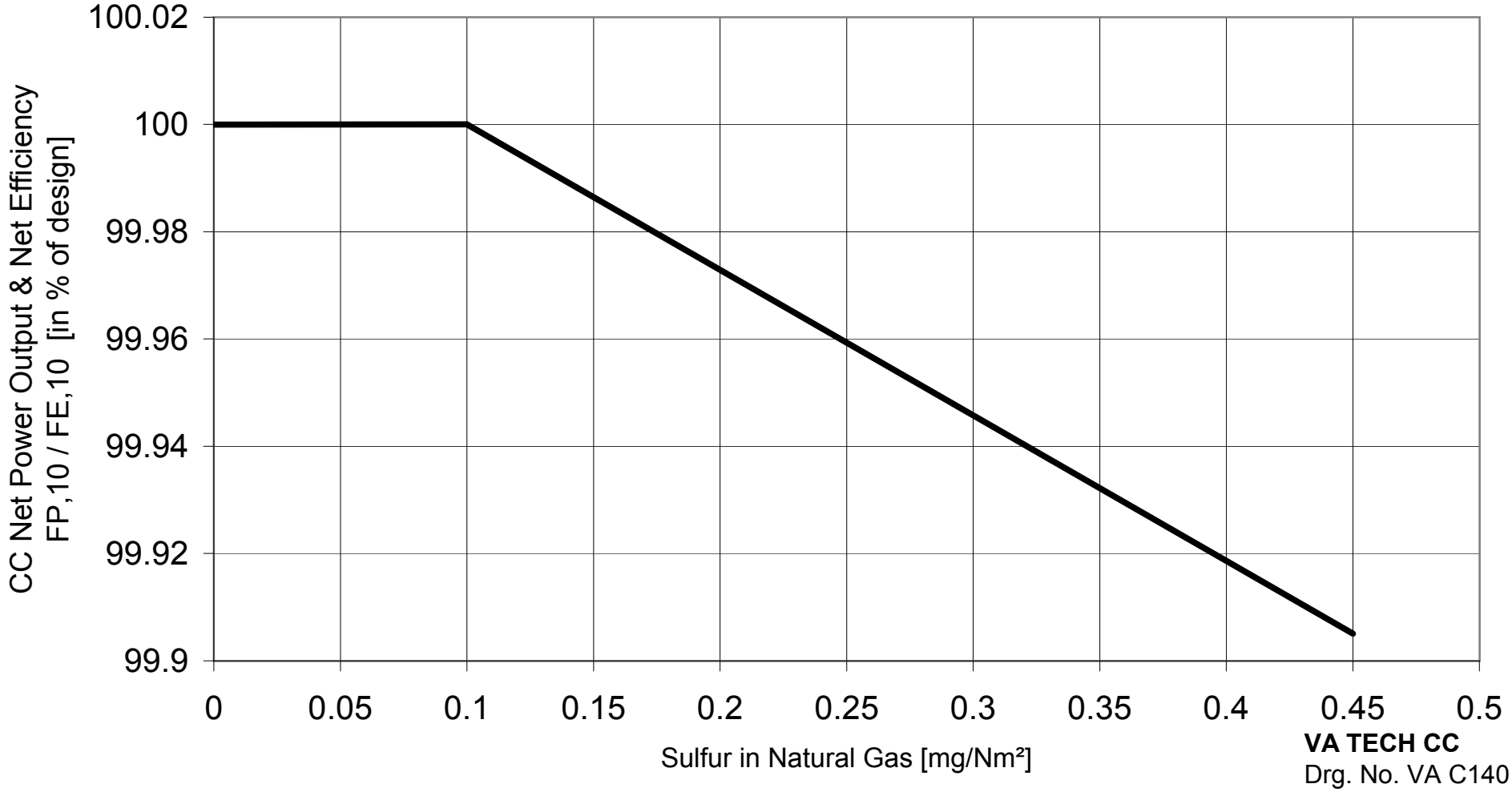

CC Net Efficiency vs. LHV
CC Net Efficiency FE,8 [% of Design]
100.25
100.2
100.15
100.1
100.05
100
99.95
99.9
99.85
99.8
99.75
43,000
44,000
45,000
46,000
47,000
48,000
49,000
LHV [kJ/kg]
H/C 4.0
H/C 3.86
H/C 3.73
VA TECH CC
Drg. No. VA C120

CC Net Power Output & CC Net Efficiency vs. CT Makeup Temperature

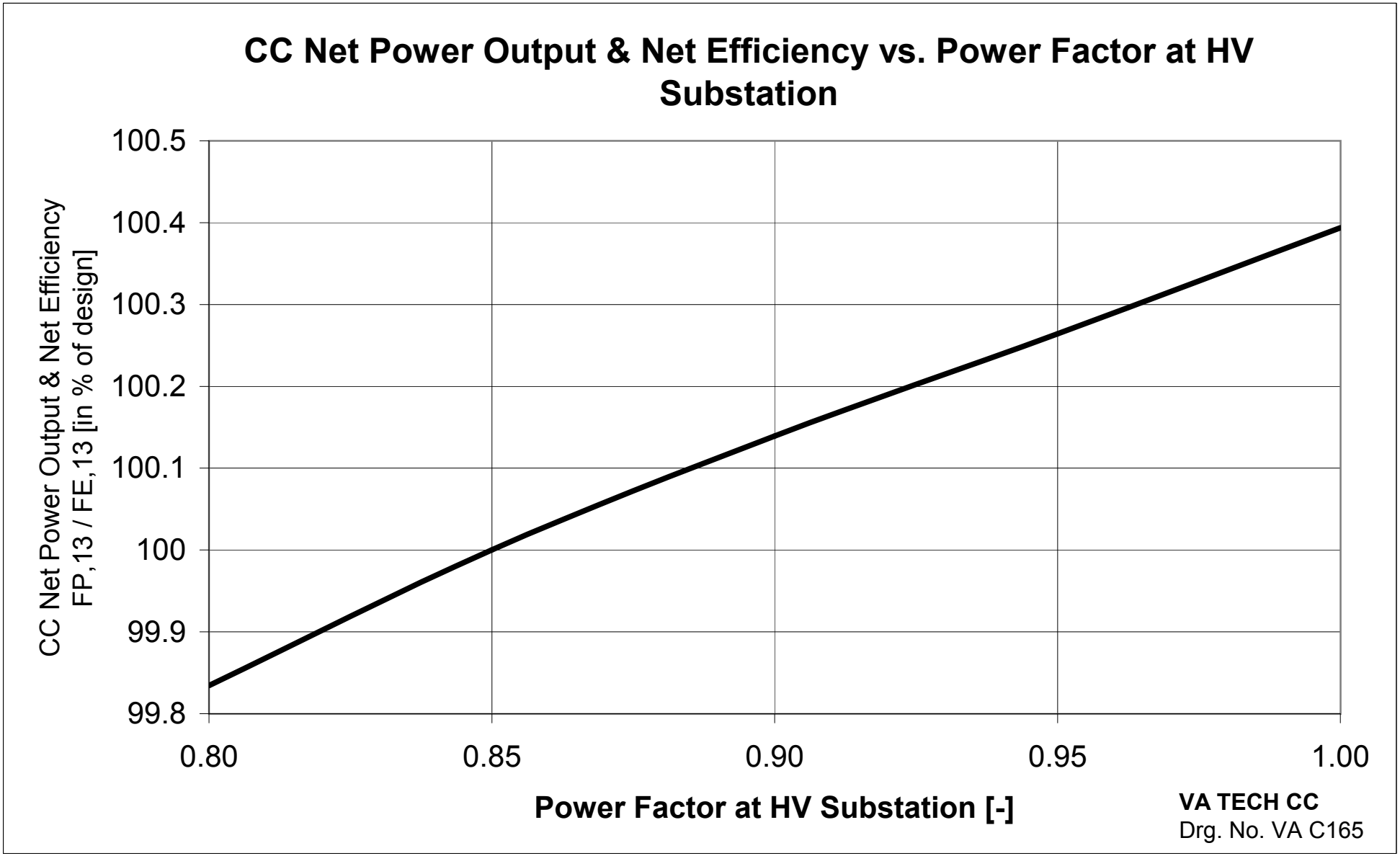


VA TECH CC
Drg. No. VA C130

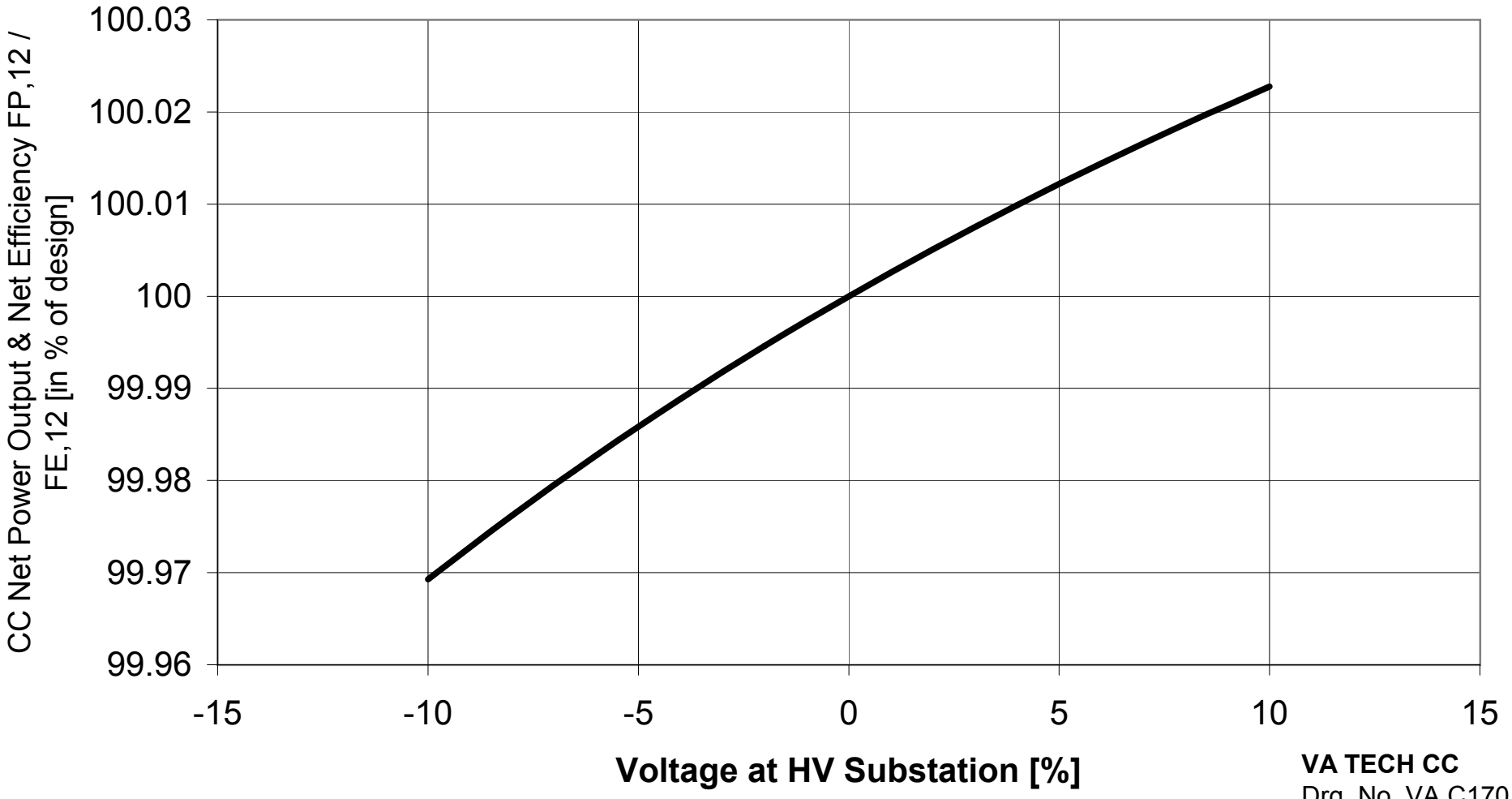
CC Net Power Output & CC Net Efficiency vs. Sulfur in Natural Gas
Expected Values



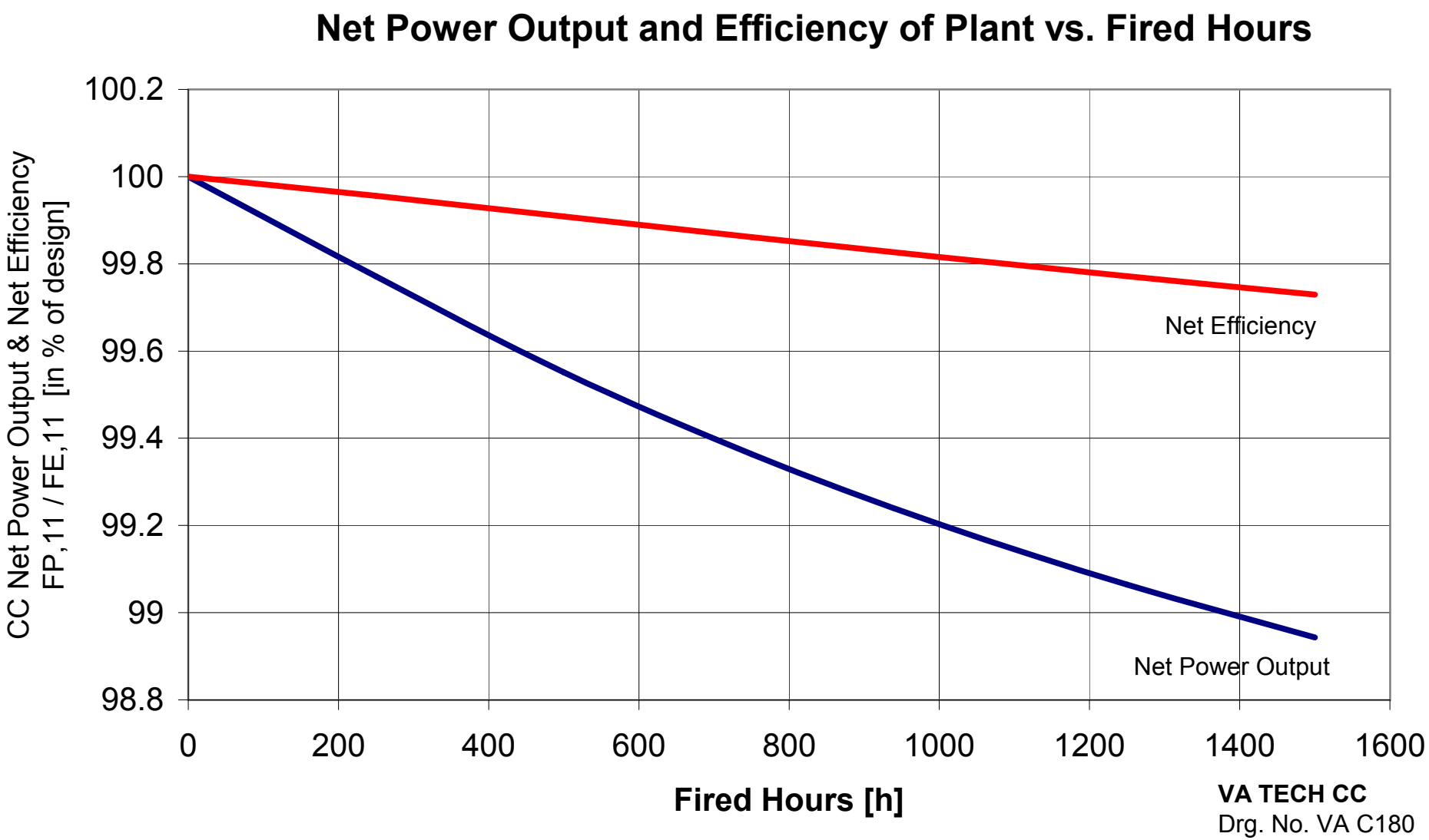
VA TECH CC
Drg. No. VA C140


CC Net Power Output & Net Efficiency vs. Power Factor at HV Substation
CC Net Power Output & Net Efficiency
FP,13 / FE,13 [in % of design]
100.5
100.4
100.3
100.2
100.1
100
99.9
99.8
0.80
0.85
0.90
0.95
1.00
Power Factor at HV Substation [-]
VA TECH CC
Drg. No. VA C165

CC Net Power Output & Net Efficiency vs. Voltage at HV Substation



VA TECH CC
Drg. No. VA C170


Net Power Output and Efficiency of Plant vs. Fired Hours
CC Net Power Output & Net Efficiency
FP,11 / FE,11 [in % of design]
100.2
100
99.8
99.6
99.4
99.2
99
98.8
0
200
400
600
800
1000
1200
1400
1600
Fired Hours [h]
Net Efficiency
Net Power Output
VA TECH CC
Drg. No. VA C180

VA TECH COMBINED CYCLE

TECHNIP ITALY S.p.A.

Energia Molise Power Plant

Measurement List Performance Test

Project: H410.110012

Document No.: xxxxx&BDC_TER1_PTH00006 **Rev.** C

REV.	ÄNDERUNG/MODIFICATION (letzte 4/last 4)	DATUM/ DATE	NAME	GEPR./ CHECK	GES./ APPR.
A	Original	------	------	------	------
B	Update	03.04.2006	Sengschmied	Vomberg	Vomberg
C	Update	17.07.2006	Sengschmied	Raber	Raber
D					

KUNDE/PURCH.

Energia Molise S.p.A.

LIEFERANT/SUPPLIER

LIEF.DOK.NR./SUPPLIER DOC.NO

BENENNUNG/TITLE

Measurement List

Total Plant

VATECH DOC.NO.

xxxxx&BDC_TER1_PTH00006

SCHUTZVERMERK NACH DIN 34 BEACHTEN!
NOTE PROTECTION DIN 34!

	DATUM/ DATE	NAME
ERST./CREATED	24.10.2005	Sengschmied
GEPR./CHECK	24.10.2005	Vomberg
GES./APPR.	24.10.2005	Vomberg

xxxxx&BDC_TER1_PTH00006

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geändert am / modified	2006.07.18 21:35:03	Raber, Alexander, DI
gedruckt am / printed	2006.07.18 21:35:03	

ELIN

COO.1000.5102.3.673783

Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.
Ambient Parameter							
Air Temperature @ GT Inlet	°C	11MBL10CT401	R	PT 100	Test	+/- 0.01°C	01-06 Transmitter 01
Air Temperature @ GT Inlet	°C	11MBL10CT402	R	PT 100	Test	+/- 0.01°C	02-06 Transmitter 02
Air Temperature @ GT Inlet	°C	11MBL10CT403	R	PT 100	Test	+/- 0.01°C	03-06 Transmitter 03
Air Temperature @ GT Inlet	°C	11MBL10CT404	R	PT 100	Test	+/- 0.01°C	18-06 Transmitter 18
Air Temperature @ GT Inlet	°C	11MBL10CT405	R	PT 100	Test	+/- 0.01°C	17-06 Transmitter 17
Air Temperature @ GT Inlet	°C	12MBL10CT401	R	PT 100	Test	+/- 0.01°C	04-06 Transmitter 04
Air Temperature @ GT Inlet	°C	12MBL10CT402	R	PT 100	Test	+/- 0.01°C	05-06 Transmitter 05
Air Temperature @ GT Inlet	°C	12MBL10CT403	R	PT 100	Test	+/- 0.01°C	06-06 Transmitter 06
Air Temperature @ GT Inlet	°C	12MBL10CT404	R	PT 100	Test	+/- 0.01°C	10-06 Transmitter 10
Air Temperature @ GT Inlet	°C	12MBL10CT405	R	PT 100	Test	+/- 0.01°C	11-06 Transmitter 11
Ambient Air Pressure	mbar	10MBL10CP401	R	Pressure Transm.	Test	0.11 mbar	T06-0549/1
Ambient Air Pressure	mbar	10MBL10CP402	R	Pressure Transm.	Test	0.11 mbar	T06-0549/2
Ambient Air Relative Humidity	%	12MBL10CM406	R	HMP 233	Test	0.6%	KA000559
Temperature @ CT Inlet	°C	10SWA10CT401	R	HMP 233	Test	0.05°C	KA000548
Relative Humidity @ CT Inlet	%	10SWA10CM401	R	HMP 233	Test	0.6%	KA000547
Temperature @ CT Inlet	°C	10SWA10CT402	R	HMP 233	Test	0.05°C	KA000550
Relative Humidity @ CT Inlet	%	10SWA10CM402	R	HMP 233	Test	0.6%	KA000549
Temperature @ CT Inlet	°C	10SWA10CT403	R	HMP 233	Test	0.05°C	KA000552
Relative Humidity @ CT Inlet	%	10SWA10CM403	R	HMP 233	Test	0.6%	KA000551
Temperature @ CT Inlet	°C	10SWA10CT404	R	HMP 233	Test	0.05°C	KA000554
Relative Humidity @ CT Inlet	%	10SWA10CM404	R	HMP 233	Test	0.6%	KA000553
Temperature @ CT Inlet	°C	10SWA10CT405	R	HMP 233	Test	0.05°C	KA000556
Relative Humidity @ CT Inlet	%	10SWA10CM405	R	HMP 233	Test	0.6%	KA000555
Temperature @ CT Inlet	°C	10SWA10CT406	R	HMP 233	Test	0.05°C	KA000558
Relative Humidity @ CT Inlet	%	10SWA10CM406	R	HMP 233	Test	0.6%	KA000557
Wind Velocity	m/s	10SWA10CS401	R	Testo	Manual	0.2 m/s	034095
Electrical Output							
Net el. Power output Plant	kW	10ACA01CE300	G	Power Analyser	Test	0.02%	M830519
Current Plant	A	10ACA01CE100	G	Power Analyser	Test	0.07%	M830519
Voltage Plant	V	10ACA01CE200	G	Power Analyser	Test	0.01%	M830519
Power Factor Plant	-	10ACA01CE900	G	Power Analyser	Test	0.01%	M830519
Frequency Plant	Hz	10ACA01CE500	G	Power Analyser	Test	0.003%	M830519
Net el. Power output GT 1	kW	11BAC01CE300	A	Power Analyser	Test	0.02%	M830521
Current GT 1	A	11BAC01CE100	A	Power Analyser	Test	0.06%	M830521
Voltage GT 1	V	11BAC01CE200	A	Power Analyser	Test	0.02%	M830521
Power Factor GT1	-	11BAC01CE900	R	Power Analyser	Test	0.01%	M830521
Frequency GT 1	Hz	11BAC01CE500	A	Power Analyser	Test	0.003%	M830521
Net el. Power output GT 2	kW	12BAC01CE300	A	Power Analyser	Test	0.02%	M830520
Current GT 2	A	12BAC01CE100	A	Power Analyser	Test	0.07%	M830520
Voltage GT 2	V	12BAC01CE200	A	Power Analyser	Test	0.01%	M830520

G Meas. of Perf. Guarantee Data
R Meas. of Perf. Ref. Data
S Meas. for Singe Component Test
A Meas. of Perf. Add. Ref. Data
* For preliminary Evaluation only

Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.
Power Factor GT 2	-	12BAC01CE900	R	Power Analyser	Test	0.01%	M830520
Frequency GT 2	Hz	12BAC01CE500	A	Power Analyser	Test	0.003%	M830520
Net el. Power output ST	kW	13BAA01CE300	A	Power Analyser	Test	0.02%	M830522
Current ST	A	13BAA01CE100	A	Power Analyser	Test	0.07%	M830522
Voltage ST	V	13BAA01CE200	A	Power Analyser	Test	0.01%	M830522
Power Factor ST	-	13BAA01CE900	R	Power Analyser	Test	0.01%	M830522
Frequency ST	Hz	13BAA01CE500	A	Power Analyser	Test	0.003%	M830522
Net el. Power output Aux	kW	11BBA01CE300	A	Power Analyser	Test	0.04%	M830523
Current Aux	A	11BBA01CE100	A	Power Analyser	Test	0.38%	M830523
Voltage Aux	V	11BBA01CE200	A	Power Analyser	Test	0.01%	M830523
Power Factor Aux	-	11BBA01CE900	R	Power Analyser	Test	0.02%	M830523
Frequency Aux	Hz	11BBA01CE500	A	Power Analyser	Test	0.003%	M830523
Fuel Gas							
Fuel Gas Inlet Temperature	°C	10EKA10CT001	G	PT 100	DCS		
Fuel Gas Inlet Pressure	bar	10EKA10CP001	G	Pressure Transm.	DCS		
Fuel Gas Metering Temperature	°C	10EKG20CT402	R	PT 100	Test	+/- 0.01°C	08-06 Transmitter 08
Fuel Gas Metering Temperature	°C	10EKG20CT403	R	PT 100	Test	+/- 0.01°C	07-06 Transmitter 07
Fuel Gas Metering Pressure	bara	10EKG20CP401	R	Pressure Transm.	Test	0.017 bar	T06-0763/1
Fuel Gas Metering Pressure	bara	10EKG20CP402	R	Pressure Transm.	Test	0.009 bar	T06-0763/2
Fuel Gas Metering 1 Temperature	°C	10EKG20CT001	A	PT 100	DCS		
Fuel Gas Metering 2 Temperature	°C	10EKG20CT002	A	PT 100	DCS		
Fuel Gas Metering 1 Pressure	bar	10EKG20CP001	A	Pressure Transm.	DCS		
Fuel Gas Metering 2 Pressure	bar	10EKG20CP002	A	Pressure Transm.	DCS		
Fuel Gas Metering 1 Flow	Pulses	10EKG20CF401	G	turbine meter	Test	<0.22%	3507/2005
Fuel Gas Metering 2 Flow	Pulses	10EKG20CF402	G	turbine meter	Test	<0.20%	3509/2005
Fuel Gas Metering 1 Flow	m³/h	10EKG20CF001	G	turbine meter	DCS		
Fuel Gas Metering 2 Flow	m³/h	10EKG20CF002	G	turbine meter	DCS		
Fuel Gas Flow Computer 1 Flow	Nm³/h	10EKG20CF901	A	turbine meter	DCS		
Fuel Gas Flow Computer 2 Flow	Nm³/h	10EKG20CF902	A	turbine meter	DCS		
GT1 Fuel Gas Metering 1 Flow	Pulses	11EKG40CF401	S	turbine meter	Test	<0.23%	600294-110805
GT2 Fuel Gas Metering 2 Flow	Pulses	12EKG40CF401	S	turbine meter	Test	<0.23%	600295-110805
GT1 Fuel Gas Metering 1 Pressure	bar	11EKG40CP401	S	PT 100	Test	<0.1%	P754-0905
GT2 Fuel Gas Metering 2 Pressure	bar	12EKG40CP401	S	PT 100	Test	<0.1%	P754-0905
GT1 Fuel Gas Metering 1 Temperature	°C	11EKG40CT401	S	Pressure Transm.	Test	+/- 0.05 K	T757-0905
GT2 Fuel Gas Metering 2 Temperature	°C	12EKG40CT401	S	Pressure Transm.	Test	+/- 0.05 K	T757-0905
Lower heating value	MJ/m3	10EKG20GH002_XQ19	A	gas chrom.	DCS		
Methane	Mol-%	10EKG20GH002_XQ09	A	gas chrom.	DCS		
Ethane	Mol-%	10EKG20GH002_XQ11	A	gas chrom.	DCS		
Propane	Mol-%	10EKG20GH002_XQ02	A	gas chrom.	DCS		
iso Butane IC4	Mol-%	10EKG20GH002_XQ03	A	gas chrom.	DCS		
n Butane NC4	Mol-%	10EKG20GH002_XQ04	A	gas chrom.	DCS		

G Meas. of Perf. Guarantee Data
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Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.
neo Pentane C5	Mol-%	10EKG20GH002_XQ07	A	gas chrom.	DCS		
iso Pentane IC5	Mol-%	10EKG20GH002_XQ06	A	gas chrom.	DCS		
Hexane and higher hydroc. (C6+)	Mol-%	10EKG20GH002_XQ01	A	gas chrom.	DCS		
CO2	Mol-%	10EKG20GH002_XQ10	A	gas chrom.	DCS		
N2	Mol-%	10EKG20GH002_XQ08	A	gas chrom.	DCS		
Gas Turbine 1							
GT1 Turbine Wheelspace 1st Stage After Outer	°C	11_TT-WS1AO-1	A		DCS		
GT1 Turbine Wheelspace 1st Stage After Outer	°C	11_TT-WS1AO-2	A		DCS		
GT1 Turbine Wheelspace 1st Stage Forward Inner	°C	11_TT-WS1FI-1	A		DCS		
GT1 Turbine Wheelspace 1st Stage Forward Inner	°C	11_TT-WS1FI-2	A		DCS		
GT1 Turbine Wheelspace 2st Stage After Outer	°C	11_TT-WS2AO-1	A		DCS		
GT1 Turbine Wheelspace 2st Stage After Outer	°C	11_TT-WS2AO-2	A		DCS		
GT1 Turbine Wheelspace 2st Stage Forward Outer	°C	11_TT-WS2FO-1	A		DCS		
GT1 Turbine Wheelspace 2st Stage Forward Outer	°C	11_TT-WS2FO-2	A		DCS		
GT1 Turbine Wheelspace 3st Stage After Outer	°C	11_TT-WS3AO-1	A		DCS		
GT1 Turbine Wheelspace 3st Stage After Outer	°C	11_TT-WS3AO-2	A		DCS		
GT1 Turbine Wheelspace 3st Stage Forward Outer	°C	11_TT-WS3FO-1	A		DCS		
GT1 Turbine Wheelspace 3st Stage Forward Outer	°C	11_TT-WS3FO-2	A		DCS		
CCCW GT1 Return Line Flow	m³/h	11PGB50CF501	S		DCS		
CCCW GT1 Return Line Temperature	°C	11PGB50CT001	S		DCS		
CCCW GT1 Return Line Temperature	°C	11PGB50CT501	S		DCS		
Gas Turbine 2							
GT2 Turbine Wheelspace 1st Stage After Outer	°C	12_TT-WS1AO-1	A		DCS		
GT2 Turbine Wheelspace 1st Stage After Outer	°C	12_TT-WS1AO-2	A		DCS		
GT2 Turbine Wheelspace 1st Stage Forward Inner	°C	12_TT-WS1FI-1	A		DCS		
GT2 Turbine Wheelspace 1st Stage Forward Inner	°C	12_TT-WS1FI-2	A		DCS		
GT2 Turbine Wheelspace 2st Stage After Outer	°C	12_TT-WS2AO-1	A		DCS		
GT2 Turbine Wheelspace 2st Stage After Outer	°C	12_TT-WS2AO-2	A		DCS		
GT2 Turbine Wheelspace 2st Stage Forward Outer	°C	12_TT-WS2FO-1	A		DCS		
GT2 Turbine Wheelspace 2st Stage Forward Outer	°C	12_TT-WS2FO-2	A		DCS		
GT2 Turbine Wheelspace 3st Stage After Outer	°C	12_TT-WS3AO-1	A		DCS		
GT2 Turbine Wheelspace 3st Stage After Outer	°C	12_TT-WS3AO-2	A		DCS		
GT2 Turbine Wheelspace 3st Stage Forward Outer	°C	12_TT-WS3FO-1	A		DCS		
GT2 Turbine Wheelspace 3st Stage Forward Outer	°C	12_TT-WS3FO-2	A		DCS		
CCCW GT2 Return Line Flow	m³/h	12PGB50CF501	S		DCS		
CCCW GT2 Return Line Temperature	°C	12PGB50CT001	S		DCS		
CCCW GT2 Return Line Temperature	°C	12PGB50CT501	S		DCS		

G Meas. of Perf. Guarantee Data
R Meas. of Perf. Ref. Data
S Meas. for Singe Component Test
A Meas. of Perf. Add. Ref. Data
* For preliminary Evaluation only

Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.
HRSG 1							
HRSG1 IP Feedwater Flow	t/h	11HAC60CF001	S		DCS		
HRSG1 IP Feedwater Flow	t/h	11HAC60CF002	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT001	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT002	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT003	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT004	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT005	S		DCS		
HRSG1 Outlet Temperature	°C	11HNE10CT006	S		DCS		
HRSG1 Outlet Temperature	0	11HNE10CT010	S		DCS		
HRSG1 HP Feedwater Flow	t/h	11LAB20CF001	S		DCS		
HRSG1 HP Feedwater Flow	t/h	11LAB20CF002	S		DCS		
HRSG1 HP Main Steam Temperature	°C	11LBA10CT001	A		DCS		
HRSG1 HP Main Steam Temperature	°C	11LBA10CT002	A		DCS		
HRSG1 LP Main Steam Flow	t/h	11LBA80CF001	S		DCS		
HRSG1 LP Main Steam Flow	t/h	11LBA80CF002	S		DCS		
HRSG1 HRH Steam Temperature	°C	11LBB50CT001	A		DCS		
HRSG1 HRH Steam Temperature	°C	11LBB50CT002	A		DCS		
HRSG 2							
HRSG2 IP Feedwater Flow	t/h	12HAC60CF001	S		DCS		
HRSG2 IP Feedwater Flow	t/h	12HAC60CF002	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT001	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT002	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT003	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT004	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT005	S		DCS		
HRSG2 Outlet Temperature	°C	12HNE10CT006	S		DCS		
HRSG2 Outlet Temperature	0	12HNE10CT010	S		DCS		
HRSG2 HP Feedwater Flow	t/h	12LAB20CF001	S		DCS		
HRSG2 HP Feedwater Flow	t/h	12LAB20CF002	S		DCS		
HRSG2 HP Main Steam Temperature	°C	12LBA10CT001	A		DCS		
HRSG2 HP Main Steam Temperature	°C	12LBA10CT002	A		DCS		
HRSG2 LP Main Steam Flow	t/h	12LBA80CF001	A		DCS		
HRSG2 LP Main Steam Flow	t/h	12LBA80CF002	S		DCS		
HRSG2 HRH Steam Temperature	°C	12LBB50CT001	A		DCS		
HRSG2 HRH Steam Temperature	°C	12LBB50CT002	A		DCS		
Steam Turbine							
HP Steam Header Pressure	bar	13LBA20CP004	S		DCS		
HP Steam Header Temperature 1/3	°C	13LBA20CT007	S		DCS		

G Meas. of Perf. Guarantee Data
R Meas. of Perf. Ref. Data
S Meas. for Singe Component Test
A Meas. of Perf. Add. Ref. Data
* For preliminary Evaluation only

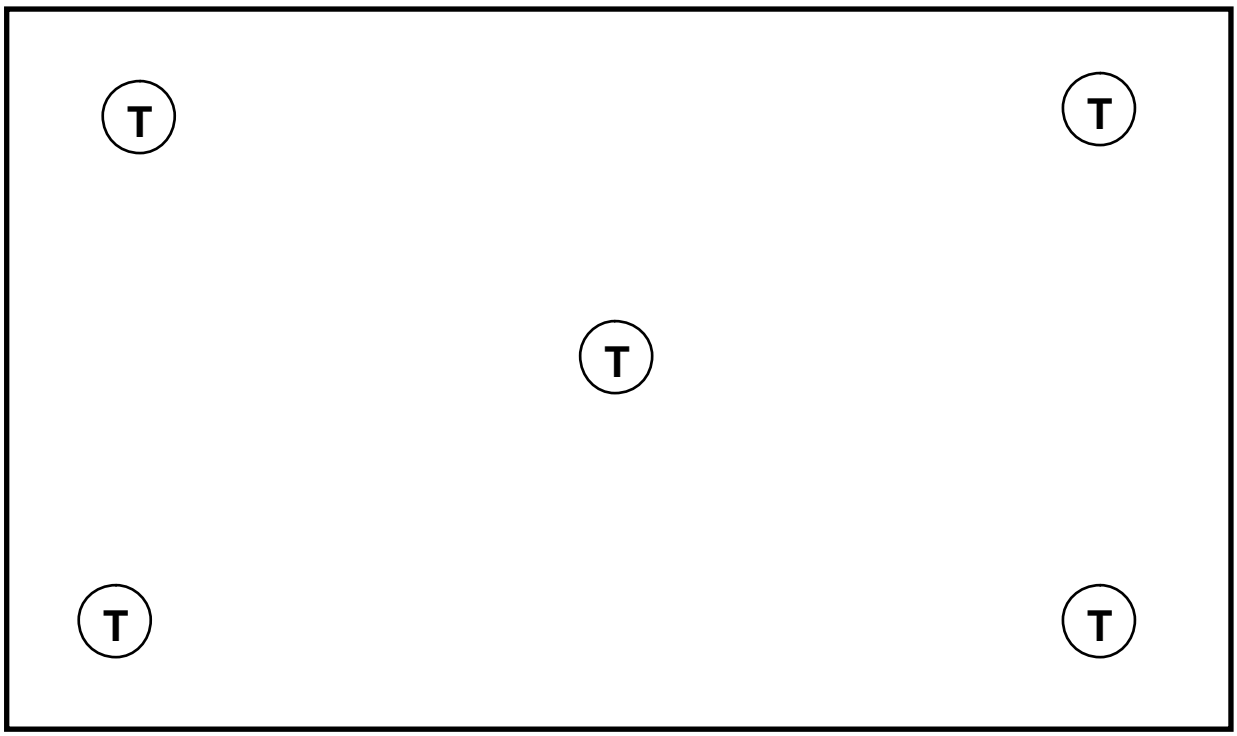
Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.
HP Steam Header Temperature 2/3	°C	13LBA20CT008	S		DCS		
HP Steam Header Temperature 3/3	°C	13LBA20CT009	S		DCS		
ST Generator Cooling Water Flow	m³/h	13PGB50CF001	S		DCS		
ST Generator Cooling Water Temperature	°C	13PGB50CT001	S		DCS		
ST Generator Cooling Water Outlet Temperature	°C	13PGB51CT001	S		DCS		
ST Generator Cooling Water Outlet Temperature	°C	13PGB52CT001	S		DCS		
ST Generator Cooling Water Outlet Temperature	°C	13PGB53CT001	S		DCS		
ST Generator Cooling Water Outlet Temperature	°C	13PGB54CT001	S		DCS		
Cooling System							
Main Cooling Water Supply Flow	m³/h	10PAB20CF001	S		DCS		
Main Cooling Water Condenser Outlet 1 Temperature	°C	10PAB31CT401	S	PT100	Test	+/- 0.01°C	13-06 Transmitter 13
Main Cooling Water Condenser Outlet 1 Temperature	°C	10PAB31CT402	S	PT100	Test	+/- 0.01°C	14-06 Transmitter 14
Main Cooling Water Condenser Outlet 1 Temperature	°C	10PAB31CT403	S	PT100	Test	+/- 0.01°C	15-06 Transmitter 15
Main Cooling Water Condenser Outlet 2 Temperature	°C	10PAB32CT401	S	PT100	Test	+/- 0.01°C	16-06 Transmitter 16
Main Cooling Water Condenser Outlet 2 Temperature	°C	10PAB32CT402	S	PT100	Test	+/- 0.01°C	19-06 Transmitter 19
Main Cooling Water Condenser Outlet 2 Temperature	°C	10PAB32CT403	S	PT100	Test	+/- 0.01°C	20-06 Transmitter 20
Main Cooling Water Condenser Inlet 1 Temperature	°C	10PAB21CT401	S	PT100	Test	+/- 0.01°C	21-06 Transmitter 21
Main Cooling Water Condenser Inlet 2 Temperature	°C	10PAB22CT401	S	PT100	Test	+/- 0.01°C	22-06 Transmitter 22
CT Make Up Temperature	°C		R		DCS		

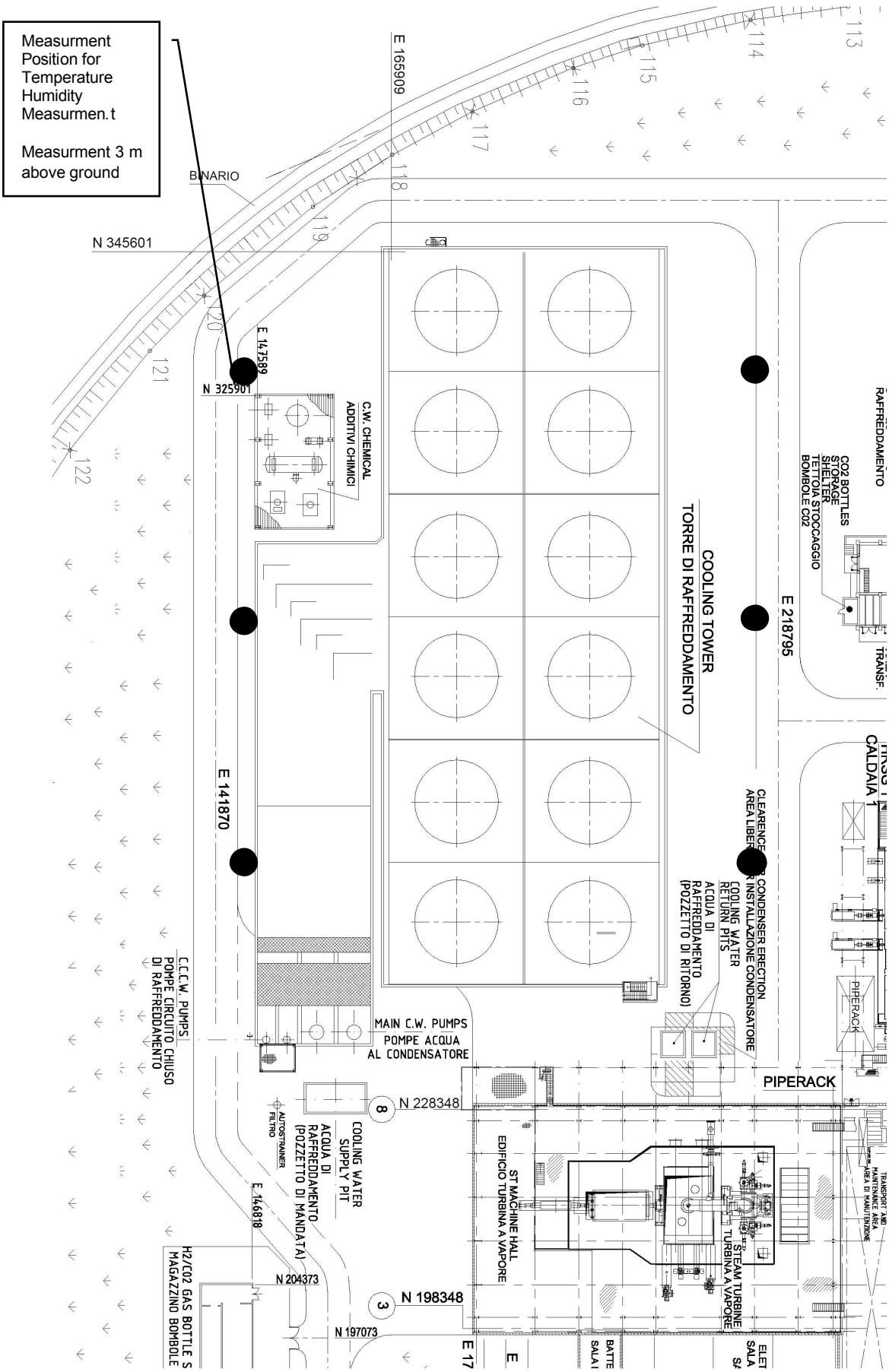
G Meas. of Perf. Guarantee Data
R Meas. of Perf. Ref. Data
S Meas. for Singe Component Test
A Meas. of Perf. Add. Ref. Data
* For preliminary Evaluation only

Measurement	Unit	Notation	Class	Instrument	Source	Accuracy	Calibration Certificate Nr.

G Meas. of Perf. Guarantee Data
R Meas. of Perf. Ref. Data
S Meas. for Singe Component Test
A Meas. of Perf. Add. Ref. Data
* For preliminary Evaluation only

Temperature Measurements at GT inlet
(upstream air filters)




Measurment Position for Temperature Humidity Measurmen.t
Measurment 3 m above ground
BINARIO
N 345601
E 165909
E 147589
N 325901
E 141870
E 218795
N 228348
N 198348
N 204373
N 197073
E 146818
RAFFREDDAMENTO
CO2 BOTTLES STORAGE SHELTER
TETTOIA STOCCAGGIO BOMBOLE CO2
TRANSF.
C.W. CHEMICAL ADDITIVI CHIMICI
COOLING TOWER
TORRE DI RAFFREDDAMENTO
CLEARENCE FOR CONDENSER ERECTION
AREA LIBERA PER INSTALLAZIONE CONDENSATORE
COOLING WATER RETURN PITS
ACQUA DI RAFFREDDAMENTO (POZZETTO DI RITORNO)
CALDAIA 1
PIPERACK
MAIN C.W. PUMPS
POMPE ACQUA AL CONDENSATORE
C.C.C.W. PUMPS
POMPE CIRCUITO CHIUSO DI RAFFREDDAMENTO
AUTOSTRAINER FILTRO
COOLING WATER SUPPLY PIT
ACQUA DI RAFFREDDAMENTO (POZZETTO DI MANDATA)
ST MACHINE HALL
EDIFICIO TURBINA A VAPORE
STEAM TURBINE
TURBINA A VAPORE
TRANSPORT AND MAINTENANCE AREA
AREA DI MANUTENZIONE
H2/CO2 GAS BOTTLE S
MAGAZZINO BOMBOLE

Guidelines for sampling natural gas fuel

1. Background information

These guidelines are provided in order to ensure gas samples are collected in a consistent manner and that the gas analyzed represents the bulk of the gas flowing through the flow-metering assembly.

Capturing a quantity of gas for later analysis is referred to as “spot” sampling. The quality of a spot sample is strongly dependent on the sampling technique.

Natural gas may be categorized as either “”wet” or “dry”. “Wet” gas contains heavy hydrocarbon components that may be liquid at room temperatures. The natural gas delivered to the power plant is normally considered a “dry” gas by pipeline standards but is likely to contain measurable amounts of “wet” constituents.

The calculated heat rate for the combustion turbine is sensitive to the gas sample results in two ways:

The heating value of the fuel determines the caloric content.
The density of the fuel determines the mass flow rate.

A sample containing an excess of heavy, wet constituents will result in an erroneously high fuel density being applied to the gas flow equation. Conversely, analysis of samples depleted of their heavier constituents by improper purging techniques or excessively long sample lines yield erroneously low fuel densities.

Even small errors in fuel density can be extremely significant to the final calculated heat rate.

Obtaining quality samples requires a combination of careful sample point selection, proper equipment, and proper technique.

Sample point selection is discussed in section 3, “Amplifying remarks.

Step by step sampling technique is provided in section 2, “”Required methods” and discussed in section 3.

The required sampling apparatus consists of three sections:

Flow Probe assembly
T manifold (or moisture separator)
Sample bottle ***with pigtail assembly***

These three assemblies are described in detail in the section 3, “Amplifying remarks”.

Safety Warnings
To avoid painful burns from hot gas the probe should not be installed or removed with the gas heater in service.

Do not use plastic ferrules in the sample apparatus since the gas may be hot enough to melt the ferrules during the sample purge.

Some gas will escape during the probe insertion – take appropriate safety precautions.

The ferrule swaged near the sample probe tip will prevent the probe from being ejected during removal from a pressurized pipe. (It will also prevent droplets from traveling down the tube and becoming entrained in the sample flow.)

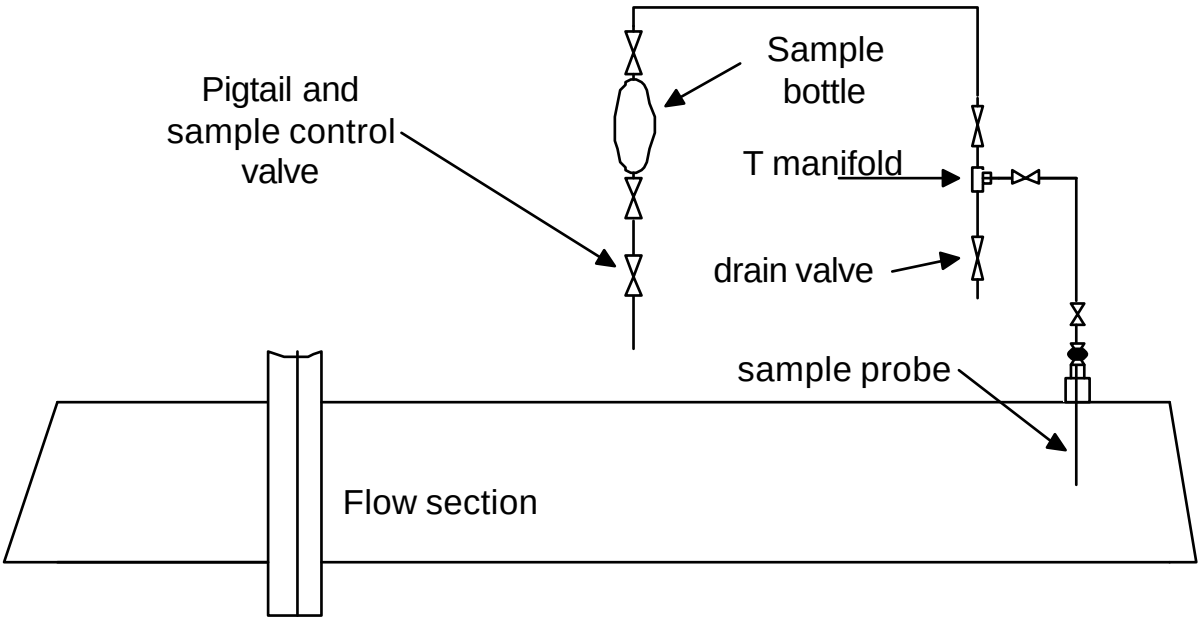
2. Required Methods and Materials

Choose a sample point as near the flow metering device as possible without effecting the flow through the flow section.

Install a sample probe to collect gas from the center of the pipe.

Assemble the sample apparatus as shown below:

Flow thru the sample bottle **must** be vertical in the downward direction
A 2-foot tubing section with a control valve **must** be attached to the sample bottle vent. (the "pigtail")



To capture a spot sample:

1. Before connecting the sample bottle assembly to the T manifold purge the sample lines through the T manifold drain valve until clean, dry gas issues. Purge a small volume of gas through the sample bottle connection on the T manifold. (Or moisture separator) by opening and shutting the T manifold sample outlet valve.

2. Open both valves on the sample bottle and connect the sample bottle to the T manifold by means of a short length of U shaped tubing. Flow through the sample bottle must be down. Attach the pigtail assembly with the sample control valve shut.

3. Purge gas through the T manifold drain until no moisture is present. Then shut the T manifold drain valve.

4. Open the T manifold sample outlet valve.

5. Crack open the sample control valve to obtain a minimal flow rate.

6. Purge the sample bottle of air by maintaining this flow rate for about 30 seconds.
7. Shut the sample control valve and allow the bottle pressure to equalize with line pressure.

8. Shut the T manifold sample outlet valve.

9. Crack open the sample control valve and slowly vent the sample bottle through the sample control valve to almost atmospheric pressure. Shut the sample control valve.

10. Re-open the T manifold sample outlet valve and allow the sample bottle to equalize with line pressure.

11. Repeat steps 8 thru 10 to "fill and empty" the sample bottle a minimum of 5 times. If moisture appears at the end of the sample pigtail at any time start over. A moisture separator may be required.

12. Shut both sample bottle isolation valves and vent the sample line residual pressure through the T manifold drain valve.

13. Remove the sample bottle. Record the sample date, time, location, gas temperature and pressure.

14. Cap or plug the sample bottle isolation valve ports and leak check the bottle by water immersion.

3. Amplifying remarks

1. Selecting the sampling point

Pre-test checklist

The lead performance engineer should communicate these sampling requirements to the site as required by the pre-test checklist. Provide enough lead-time to ensure a suitable sample point is available.

Sample point selection

The fuel flow-metering device will be specified by the contract. The gas sample must be representative of the gas flow at the metering point in order to properly determine the fuel density and accurately calculate the mass flow rate.

The preferred tap location is from the top of a horizontal pipe.

The flow metering point may be upstream of processes that might change the composition of the gas (scrubbers, compressors, moisture separators, etc.). In this case the gas delivered for combustion may have a slightly different heating value than the fuel gas being metered. A second "diagnostic" sample may be drawn nearer the combustion turbine in order to evaluate the significance of any change in heating value from the "official" sample drawn at the flow metering point.

Tubing considerations

Tubing runs should be short and direct. Condensation in long tubing runs can be a significant issue in trying to collect high quality samples.

2. Sample probes

Purpose

Wet gas constituents will tend to collect on the wall of the pipe. Drawing samples from pipe wall taps may result in non-representative samples. This is particularly true if sampling near the bottom of a long length of vertical pipe.

Using a sample probe ensures the sample is drawn from the region of highest flow and therefore most representative of the gas.

Construction

A sample probe can easily be constructed from materials available in the lab. A straight length of quarter inch stainless steel tubing is cut and then filed at a 45-degree angle. A stainless steel ferrule is swaged about 2 inches from the angled end. The other end of the probe is left as-is until ready to install.

Installation

The sample pipe tap should have a ball or gate valve installed which will allow the probe to be installed through the body of the valve. If this valve assembly is not available one should be manufactured and installed. Ensure the components

are suitable for the system pressures. (when in doubt use schedule 80 pipe and fittings)

Once on site the sample probe is cut to length and the prepared end inserted into the gas main sample pipe tap until it contacts the ball valve. A bored-through reducer fitting is slid over the unprepared end of the probe and threaded into the short pipe extension on the sample tap ball valve. The ferrule is snugged but not swaged in order to allow insertion of the probe. A valve is swaged to the exposed end of the sample probe. This sample probe valve is then shut.

The ball valve is opened (see the safety warnings) and the probe inserted to the required depth. The ferrule is then swaged down. The 45-degree cut should be oriented so that the exposed opening faces downstream – it should **not** act as a sample scoop.

Safety Warnings

To avoid painful burns from hot gas the probe should not be installed or removed with the gas heater in service.

Do not use plastic ferrules in the sample apparatus since the gas may be hot enough to melt the ferrules during the sample purge.

Some gas will escape during the probe insertion – take appropriate safety precautions.

The ferrule swaged near the sample probe tip will prevent the probe from being ejected during removal from a pressurized pipe. (It will also prevent droplets from traveling down the tube and becoming entrained in the sample flow.)

3. T manifold and moisture separator

Purpose

A moisture separator may be required if the gas is extremely wet or the sample lines are very cold. If purging the sample lines is not effective in obtaining moisture-free sample flow then install a separating chamber.

If a dry sample can be obtained without a moisture separator a T fitting can be used to provide the required purge and drain paths.

Construction

The T manifold assembly contains a T fitting and two or three valves:
a **sample drain valve** to purge the line
a **sample outlet valve** to isolate the bottle
a **sample inlet valve** to isolate the T fitting

(Try to keep the sample lines short enough to use the sample probe valve for this function)

If the gas is very wet (moisture is still visible after considerable purging) then a moisture separating chamber should be used instead of a T fitting.
A moisture separator can be made from a 1-inch pipe tee (or larger) with adapter fittings. Commercial moisture separators with internal metal filters can be purchased if required.

Installation
Direction of flow is an important factor. Avoid establishing flow paths that would allow condensation in the sample lines to reach the sample bottle or remain in the sample bottle.

4. Sample bottle pigtail

Purpose
Condensation may occur when the pressurized gas expands to atmospheric pressure. It is important to ensure this expansion does not occur into the sample bottle or across the sample bottle vent valve because the resulting sample enrichment will give an unacceptable fuel density result.

To control the point of expansion a short length of tubing and a **sample control valve** must be attached to the sample bottle vent valve. The sample control valve is always throttled to ensure the gas expansion occurs across the sample control valve seat.

Installation
Install the sample bottle so flow through the bottle and pigtail assembly is in the downward direction.

5. Purge sequence

Purpose
Flow paths and purge sequences are the critical elements in obtaining quality samples.

Initial purging of the sample lines through the gas sample bottle should be avoided at all costs. The resulting contamination of the sample bottle can seriously skew the analysis and damage the analysis equipment. The inability to reconcile subsequent sample results with the contaminated sample may compromise the performance test results.

Initial purge should be through a T manifold drain line (see figure). Once the sample line is passing clean gas the T manifold sample outlet valve should be opened briefly to purge the short path to where the sample bottle will be attached.

A thorough purge sequence should be performed for each group of samples drawn. The preferred method of drawing multiple samples is to connect the bottles in series with a pipe nipple. This allows simultaneous purging and sample isolation.

Once the sample bottle is attached to the T manifold the sample drain line is again opened to check for moisture. When clean gas is being passed the sample drain valve is shut and the fill and purge sequence is started. The slow purge and rapid fill sequence described in the procedure has been shown to be the best field capture technique that does not require special equipment.

A continuous purge has been proven to be unreliable and does not produce repeatable results.

6. Cold weather considerations

In order to prevent rapid condensation of heavy gas constituents observe the following additional precautions when temperatures are below 50 deg F.

Purging

Purge the sample lines through the T manifold drain until the entire sample line is at the gas main temperature. Consider insulating the sample lines.

Prior to sampling

Do not store sample bottles outside. Sample bottles should be kept at room temperature (or above) until just prior to use.

Moisture separators

Use of an unheated moisture separator chamber should be avoided.

4. References:

1. GPA Standard 2166-86, "Obtaining Natural Gas Samples for Analysis by Gas Chromatography." Gas Processors Association revised 1986.
2. GRI-99/0194, "Topical Report, Metering Research Facility Program, Natural Gas Sample Collecting and Handling – Phase 1", Gas Research Institute, August 1999.

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EG-VERKLARING VAN OVEREENSTEMMING

EC-DECLARATION OF CONFORMITY / EG-KONFORMITÄTSBESTÄTIGUNG / CE-DÉCLARATION DE CONFORMITÉ

Klantkenmerk *(Customer mark / Kundenmarke / Référence client)*	:
Fabrikant *(Manufacturer / Hersteller / Fabricant)*	: **Instromet B.V.**
Adres *(Address / Adresse / Adresse)*	: **Munstermanstraat 6** **7064 KA Silvolde**
Land *(Country / Land / Pays)*	: **Nederland**
Telefoonnummer *(Telephone No. / Telefonnummer / Numéro de téléphone)*	: **+31 (0)315 338911**
Telefaxnummer *(Telefax No. / Telefaxnummer / Numéro de télécopieur)*	: **+31 (0)315 338679**
E-mail *(E-mail / E-mail / Messagerie électronique)*	: **info@instromet.nl**

Verklaart dat het hieronder beschreven product voldoet aan de eisen van de Europese richtlijnen: 97/23/EG en 94/9/EG: CE Ex II2GT170
(Declares that beneath mentioned product is conform the European Directives: 97/23/EC and 94/9/EC: CE Ex II2GT170./
Erklärt, dass das unten genannte Produkt laut der europäischen Richtlinien 97/23/EG und 94/9/EG: CE Ex II2GT170 übereinstimmt./
Déclare que le produit repris ci-dessous est conforme à la directives européenne: 97/23/CE et 94/9/CE: CE Ex II2GT170.)

Het product is beoordeeld volgens en in overeenstemming met beoordelingsprocedure: Categorie III – Module H.
(The product is judged according to and in conformity with assessment procedure: Category III - Module H. /
Das Produkt wurde beurteilt nach und in Übereinstimmung mit Beurteilungsprozedur: Kategorie III - Modul H. /
Le produit est jugé d'après et conforme à la procédure relative à la catégorie III - Module H.)

Ontwerpcode *(Design code / Entwurfkode / Code de construction)*	: **ASME B31.8 , USA**
Ontwerpspecificaties *(Design conditions / Konstruktionsdaten / Conditions d' étude)*	: **Zie specificatieplaat op het product** *(See specification plate on the product / Siehe Typenschild am Produkt / Voir plaque d' identification sur le produit)*

Het kwaliteitsmanagementsysteem wordt periodiek beoordeeld door hieronder genoemde aangemelde instantie.
(The Quality Management System is periodically judged by the beneath mentioned notified body. /
Das Qualität-Management-System wird regelmäßig von der unten genannten gemeldeten Instanz kontrolliert. /
Pour cela, le système qualité est périodiquement audité par l'organisme notifié repris ci-après.)

Stoomwezen B.V., Member of the Lloyds Register Group - Identification No. 0343
Weena Zuid 168 - 3012 NC Rotterdam - The Netherlands

Productnaam *(Product name / Produktname / Nom de produit)*	: **Turbinegasmeter** *(Turbine gas meter / Turbinenradgaszähler / Compteur de gaz à turbine)*
Producttype *(Product type / Produkt Typ / Type de produit)*	: **SM-RI-G4000-300-97,6-K**
Nummer *(Number / Nummer / Numéro)*	: **10402834**
Bouwjaar *(Manufacture year / Baujahr / Année de construction)*	: **2005**

FOGLIO
SHEET
PAGE

Datum: 22-02-2005
(Date / Datum / Date)

B.J. Mulleman
Q.A. Manager *(Works Inspector / Werkssachverständiger / Service Qualité ISM)*

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SECTION	PAGE
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KEURINGSRAPPORT

INSPECTION CERTIFICATE / ABNAHMEPRÜFZEUGNIS / CERTIFICAT DE RECEPTION

NEN-EN 10204 – 3.1.B

Klantkenmerk *(Customer mark / Kundenmarke / Référence client)*	:
Productnaam *(Product name / Produktname / Nom de produit)*	: **Turbinegasmeter** *(Turbine gas meter / Turbinenradgaszähler / Compteur de gaz à turbine)*
Producttype *(Product type / Produkt Typ / Type de produit)*	: **SM-RI-G4000-300-97,6-K**
Nummer *(Number / Nummer / Numéro)*	: **10402834**
Bouwjaar *(Manufacture year / Baujahr / Année de construction)*	: **2005**
Ontwerpdruk *(Design pressure / Entwurfdruck / Pression de calcul)*	: **Pd (±20°C)**

Beproevingsspecificatie *(Test specification / Prüfspezifizierung / Spécification d'épreuve)*

a)	**Sterkebeproeving : EN 12261 : P = 1,5Pd** *(Strengthness test / Festigkeitprüfung / Résistance mécanique)*	: 153,0	bar
a1)	**Testtijd: > 5 min** *(Test time / Prüfdauer / Durée de l'épreuve)*	: 5	min
a2)	**Medium: Water** *(Water / Wasser / Eau)*		
b)	**Dichtheidsbeproeving : EN 12261 : P = 1,1 Pd** *(Leakage test / Dichtheitsprüfung / Test d'étanchéité)*	: 108,0	bar
b1)	**Testtijd : > 5 min** *(Test time / Prüfdauer / Durée de l'épreuve)*	: 5	min
b2)	**Medium : Lucht** *(Air / Luft / Air)*		

Opmerkingen:
(Remarks / Bemerkungen / Observations)

Hiermede bevestigen wij dat de afdichtingen van bovengenoemd product bij kamertemperatuur beproefd en dicht zijn en het product conform de bij de opdrachtaanname geaccepteerde specificaties is.

We hereby certify, that the packing of the product described above has been tested at room temperature and is tight. It is further certified, that the product complies with the accepted terms of the order contract.

Hiermit bestätigen wir, dass die Abdichtungen vom obengenannten Produkt bei Raumtemperatur geprüft wurde und dicht sein, und dass der Produkt den Vereinbarungen bei der Bestellannahme entspricht.

Nous certifions que l'étanchéité du produit décrit ci-dessus a été testée à température ambiante et qu'aucun défaut n'a été constaté. Nous certifions, de plus, que le produit est conforme aux termes acceptés de la commande.

Instromet B.V., Silvolde, Nederland

Datum: 22-02-2005
(Date / Datum / Date)

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B.J. Mulleman

Q.A. Manager *(Works Inspector / Werkssachverständiger / Service Qualité ISM)*

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pigsar™

National Standard of Germany for volume of high-pressure natural gas

PTB

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Calibration Certificate

Number 3507/2005
Order 2004005346
Date 2005-02-14

Applicant Instromet B.V.

Meter under test

Description:	Turbine meter
Manufacturer:	Instromet
Type:	SM-RI-K
Serial number:	10402834
Nominal size:	G4000
Range of flowrate:	320...6500 m³/h
Year of manufacture:	2005
Nominal diameter of meter:	300 mm
Nominal diameter of flange:	300 mm
Nominal flange pressure:	ANSI 600

Date of test: 2005-02-14

Results: The results of the calibration are presented on page 3 of 4

Test facility *pigsar* represents the National Standard of the Federal Republic of Germany for the unit of volume for high pressure natural gas under supervision of PTB.
pigsar disseminates the harmonised values for the unit of volume for high pressure gas flow measurements of the Federal Republic of Germany and the Netherlands.

Traceability The presented results of the calibration are based on the unified Dutch-German reference values for the unit of volume for high-pressure gas flow measurements. In Dordrecht, on 1999-June-02, PTB (Physikalisch-Technische Bundesanstalt) and NMi VSL (Netherlands Measurement Institute Van Swinden Laboratorium) have agreed on the harmonization (unification) and the use of these reference values, see page 2.

Dorsten, 2005-02-14

National Standard of Germany for Volume of high-pressure natural gas pigsar

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National Standard of Germany for volume of high-pressure natural gas

SECTION	PAGE
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Certificate Number: 3507/2005
Order: 2004005346
Date: 2005-02-14

Applicant
Name Customer Organization
Instromet B.V.

Meter under Test

Type	Turbine meter SM-RI-K
Manufacturer	Instromet
Serial number	10402834
Nominal Size	G4000
Year of manufacture	2005

Testing Conditions

p (absolute) =	43,29 bar	T =	11,7 °C
ρ (average) =	37,160 kg/m³	η =	12,28 x 10^{-6} Pa s

Testing medium
Natural gas (analysis)

H_2 =	0,00 Vol.%	CO_2 =	1,4 Vol.%
H_s =	10,342 kWh/m³	K-ratio =	0,9129

ρ_n = 0,8277 kg/m3 at normal reference conditions (273,15 K; 101,325 kPa)

Results

Q / Q_{max}	Q (m³/h)	Reynoldsnumber	Deviation (%)	U_{tot} (%)
0,05	321,52	1,13 *10^6	0,22	0,21
0,10	646,99	2,27 *10^6	0,17	0,18
0,25	1595,70	5,62 *10^6	0,19	0,17
0,40	2606,48	9,18 *10^6	0,11	0,16
0,69	4454,88	15,74 *10^6	0,05	0,18
0,99	6444,58	24,67 *10^6	-0,07	0,16

The *deviation* is defined as:

$$\text{Deviation} = \frac{(\text{Indicated Volume} - \text{Reference Volume})}{(\text{Reference Volume})} \cdot 100\%$$

where the reference volume refers to the conditions at the meter under test. The reported values of this deviation are the arithmetical meansof *n* single measurements at each flow-rate.

The reported *total uncertainty* is defined as:

$$U_{tot} = \sqrt{U^2_{harmonized} + (k \cdot u_{meter})^2}; (k = 2)$$

where *Uharmonized* is the expanded uncertainty of 0.16% of the harmonized reference volume, stated as the standard uncertainty of measurement multiplied by the coverage factor *k*=2, and u_{meter} is the standard uncertainty of the meter under test determined on the base of n single measurements of the meter under test at each flow-rate.

The *deviation according to OIML/R32, determined as a weighed mean average* amounts to 0,07 %.

Remarks Security marks are applied

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Tested in Dorsten at *pigsar*, on 2005-02-14 Görgülü

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Nederlands Meetinstituut

Certificate

SECTION	PAGE
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Certificatenumber : G1/S/2578
Projectnumber : 412451
Page : 1 of 2

Applicant : Instromet B.V.
Munstermanstraat 6
7064 KA Silvolde

Meter under test : Type of meter : Turbine gas meter
Manufacturer : INSTROMET B.V.
Type : SM-RI-K
Serial number : 10402834

Test Method : The actual flow rate of the gas meter is established with the aid of standard gas meters pressure- and temperature transmitters.
In the determination of this flow rate the pressure measurement point noted with P_r is normatively established.

Test date : See page 2 of 2

Results : The measurement results are stated on page 2 of 2. The total measurement inaccuracy is based upon 2x the standard deviation (2s).

Traceability : The measurements have been executed using standards for which the traceability to primary, and/or (inter)national standards has been demonstrated.

Silvolde, February 21, 2005
NMi Certin B.V.

B. Pastoor
Verification Department

NMi Certin B.V.

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PAGE

NMi Certin B.V.
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3314 EG Dordrecht
P.O. Box 394, 3300 AJ Dordrecht, NL
phone +31 78 6332 332
fax +31 78 6332 309
certinsales@nmi.nl www.nmi.nl

Parties concerned can lodge objection against this decision, within six weeks after the date of submission, to the general manager of NMi B.V. (see "Regulation objection and appeal against decisions of NMi B.V.")

NMi B.V., chamber of comm. no. 27.228.701
NMi Certin B.V., chamber o.c. nr. 27.233.418

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Nederlands Meetinstituut

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Certificatenumber : G1/S/2578
Projectnumber : 412451
Page : 2 of 2

Meter kind	: Turbine gas meter
Manufacturer	: INSTROMET B.V.
Number/year	: 10402834/2005
G-size/type/diam.	: G4000/SM-RI-K/300 mm
Q_{max}/Q_{min}	: 6500/320 m^3/h
P_{max}	: 97,6 bar
Density	: *** kg/m^3
Seals	: EC05
Final index reading	: 00000161 m^3

Gear wheel meterside	: 51
Gear wheel indexside	: 59
Pulses per m^3	:
LF Index head	: 0,1
HF Index head	: 38,1538
HF Turbine wheel	:
HF Serrated disk	:

Flow m^3/h	Error [%]
6500	0,1
4550	0,3
2600	0,5
1600	0,5
650	0,5
320	0,8

Comment Error
1. Silvolde, 050210, Air atm. 20 °C

$$Error = \frac{V_{indicated} - V_{real}}{V_{real}} \times 100\ \%$$

The measurement inaccuracy equals to 0,25% .

NMi Certin B.V.

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SHEET
PAGE .....

Instromet®

EG-VERKLARING VAN OVEREENSTEMMING

EC-DECLARATION OF CONFORMITY / EG-KONFORMITÄTSBESTÄTIGUNG / CE-DÉCLARATION DE CONFORMITÉ

Klantkenmerk *(Customer mark / Kundenmarke / Référence client)*	:
Fabrikant *(Manufacturer / Hersteller / Fabricant)*	: **Instromet B.V.**
Adres *(Address / Adresse / Adresse)*	: **Munstermanstraat 6** **7064 KA Silvolde**
Land *(Country / Land / Pays)*	: **Nederland**
Telefoonnummer *(Telephone No. / Telefonnummer / Numéro de téléphone)*	: **+31 (0)315 338911**
Telefaxnummer *(Telefax No. / Telefaxnummer / Numéro de télécopieur)*	: **+31 (0)315 338679**
E-mail *(E-mail / E-mail / Messagerie électronique)*	: **info@instromet.nl**

Verklaart dat het hieronder beschreven product voldoet aan de eisen van de Europese richtlijnen: 97/23/EG en 94/9/EG: CE Ex II2GT170
(Declares that beneath mentioned product is conform the European Directives: 97/23/EC and 94/9/EC: CE Ex II2GT170./ Erklärt, dass das unten genannte Produkt laut der europäischen Richtlinien 97/23/EG und 94/9/EG: CE Ex II2GT170 übereinstimmt./ Déclare que le produit repris ci-dessous est conforme à la directives européenne: 97/23/CE et 94/9/CE: CE Ex II2GT170.)

Het product is beoordeeld volgens en in overeenstemming met beoordelingsprocedure: Categorie III – Module H.
(The product is judged according to and in conformity with assessment procedure: Category III - Module H. / Das Produkt wurde beurteilt nach und in Übereinstimmung mit Beurteilungsprozedur: Kategorie III - Modul H. / Le produit est jugé d'après et conforme à la procédure relative à la catégorie III - Module H.)

Ontwerpcode *(Design code / Entwurfkode / Code de construction)*	: **ASME B31.8 , USA**
Ontwerpspecificaties *(Design conditions / Konstruktionsdaten / Conditions d' étude)*	: **Zie specificatieplaat op het product** *(See specification plate on the product / Siehe Typenschild am Produkt / Voir plaque d' identification sur le produit)*

Het kwaliteitsmanagementsysteem wordt periodiek beoordeeld door hieronder genoemde aangemelde instantie.
(The Quality Management System is periodically judged by the beneath mentioned notified body. / Das Qualität-Management-System wird regelmäßig von der unten genannten gemeldeten Instanz kontrolliert. / Pour cela, le système qualité est périodiquement audité par l'organisme notifié repris ci-après.)

Stoomwezen B.V., Member of the Lloyds Register Group - Identification No. 0343
Weena Zuid 168 - 3012 NC Rotterdam - The Netherlands

Productnaam *(Product name / Produktname / Nom de produit)*	: **Turbinegasmeter** *(Turbine gas meter / Turbinenradgaszähler / Compteur de gaz à turbine)*
Producttype *(Product type / Produkt Typ / Type de produit)*	: **SM-RI-G4000-300-97,6-K**
Nummer *(Number / Nummer / Numéro)*	: **10402835**
Bouwjaar *(Manufacture year / Baujahr / Année de construction)*	: **2005**

Datum: 22-02-2005
(Date / Datum / Date)

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PAGE

B.J. Mulleman
Q.A. Manager *(Works Inspector / Werkssachverständiger / Service Qualité ISM)*

Deze verklaring is gemaakt met elektronische dataverwerking en is ook zonder handtekening rechtsgeldig.
(This declaration is made by means of electronic data processing and is also legal without signature. / Diese Erklärung wurde maschinell erstellt und ist auch ohne Unterschrift rechtverbindlich. / Cette déclaration est fait au moyen d'un outil informatique, pour cette raison, il n'est pas signé individuellement.)

Instromet®

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KEURINGSRAPPORT

INSPECTION CERTIFICATE / ABNAHMEPRÜFZEUGNIS / CERTIFICAT DE RECEPTION

NEN-EN 10204 – 3.1.B

Klantkenmerk *(Customer mark / Kundenmarke / Référence client)*	:
Productnaam *(Product name / Produktname / Nom de produit)*	: **Turbinegasmeter** *(Turbine gas meter / Turbinenradgaszähler / Compteur de gaz à turbine)*
Producttype *(Product type / Produkt Typ / Type de produit)*	: **SM-RI-G4000-300-97,6-K**
Nummer *(Number / Nummer / Numéro)*	: **10402835**
Bouwjaar *(Manufacture year / Baujahr / Année de construction)*	: **2005**
Ontwerpdruk *(Design pressure / Entwurfdruck / Pression de calcul)*	: **Pd (±20°C)**

Beproevingsspecificatie *(Test specification / Prüfspezifizierung / Spécification d'épreuve)*

a)	**Sterkebeproeving : EN 12261 : P = 1,5Pd** *(Strengthness test / Festigkeitprüfung / Résistance mécanique)*	: **153,0**	bar
a1)	**Testtijd: > 5 min** *(Test time / Prüfdauer / Durée de l'épreuve)*	: **5**	min
a2)	**Medium: Water** *(Water / Wasser / Eau)*		
b)	**Dichtheidsbeproeving : EN 12261 : P = 1,1 Pd** *(Leakage test / Dichtheitsprüfung / Test d'étanchéité)*	: **108,0**	bar
b1)	**Testtijd : > 5 min** *(Test time / Prüfdauer / Durée de l'épreuve)*	: **5**	min
b2)	**Medium : Lucht** *(Air / Luft / Air)*		

Opmerkingen:
(Remarks / Bemerkungen / Observations)

Hiermede bevestigen wij dat de afdichtingen van bovengenoemd product bij kamertemperatuur beproefd en dicht zijn en het product conform de bij de opdrachtaanname geaccepteerde specificaties is.

We hereby certify, that the packing of the product described above has been tested at room temperature and is tight. It is further certified, that the product complies with the accepted terms of the order contract.

Hiermit bestätigen wir, dass die Abdichtungen vom obengenannten Produkt bei Raumtemperatur geprüft wurde und dicht sein, und dass der Produkt den Vereinbarungen bei der Bestellannahme entspricht.

Nous certifions que l'étanchéité du produit décrit ci-dessus a été testée à température ambiante et qu'aucun défaut n'a été constaté. Nous certifions, de plus, que le produit est conforme aux termes acceptés de la commande.

Instromet B.V., Silvolde, Nederland

Datum: 22-02-2005
(Date / Datum / Date)

FOGLIO
SHEET
PAGE .....

B.J. Mulleman

Q.A. Manager *(Works Inspector / Werkssachverständiger / Service Qualité ISM)*

Dit keuringsrapport is gemaakt met elektronische dataverwerking en is ook zonder handtekening rechtsgeldig.
(This inspection certificate is made by means of electronic data processing and is also legal without signature. / Dieses Abnahmeprüfzeugnis wurde maschinell erstellt und ist auch ohne Unterschrift rechtsverbindlich. / Ce certificat de réception est fait au moyen d'un outil informatique, pour cette raison, il n'est pas signé individuellement.)

pigsar™

National Standard of Germany for volume of high-pressure natural gas

PTB

Calibration Certificate

Number 3509/2005
Order 2004005346
Date 2005-02-14

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Applicant Instromet B.V.

Meter under test

Description:	Turbine meter
Manufacturer:	Instromet
Type:	SM-RI-K
Serial number:	10402835
Nominal size:	G4000
Range of flowrate:	320...6500 m³/h
Year of manufacture:	2005
Nominal diameter of meter:	300 mm
Nominal diameter of flange:	300 mm
Nominal flange pressure:	ANSI 600

Date of test: 2005-02-14

Results: The results of the calibration are presented on page 3 of 4

Test facility *pigsar* represents the National Standard of the Federal Republic of Germany for the unit of volume for high pressure natural gas under supervision of PTB.
pigsar disseminates the harmonised values for the unit of volume for high pressure gas flow measurements of the Federal Republic of Germany and the Netherlands.

Traceability The presented results of the calibration are based on the unified Dutch-German reference values for the unit of volume for high-pressure gas flow measurements. In Dordrecht, on 1999-June-02, PTB (Physikalisch-Technische Bundesanstalt) and NMi VSL (Netherlands Measurement Institute Van Swinden Laboratorium) have agreed on the harmonization (unification) and the use of these reference values, see page 2.

Dorsten, 2005-02-14

National Standard of Germany for Volume of high-pressure natural gas pigsar™

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SHEET
PAGE

J. Aldenhoff

Test Certificates without signature and seal are not valid. This Test Certificate may not be reproduced otherwise than completely except with written permission of the signing authority.

Certificate Number: 3509/2005
Order: 2004005346
Date: 2005-02-14

Applicant
Name Customer Organization
Instromet B.V.

Meter under Test

Type	Turbine meter SM-RI-K
Manufacturer	Instromet
Serial number	10402835
Nominal Size	G4000
Year of manufacture	2005

Testing Conditions

p (absolute) =	43,37 bar	T =	12,3 °C
ρ (average) =	37,060 kg/m³	η =	12,37 x 10^{-6} Pa s

Testing medium
Natural gas (analysis)

H_2 =	0,00 Vol.%	CO_2 =	1,37 Vol.%
H_s =	10,233 kWh/m³	K-ratio =	0,9151

ρ_n = 0,8279 kg/m3 at normal reference conditions (273,15 K; 101,325 kPa)

Results

Q / Q_{max}	Q (m³/h)	Reynoldsnumber	Deviation (%)	U_{tot} (%)
0,05	319,99	1,11 *10^6	0,09	0,17
0,10	652,63	2,26 *10^6	0,01	0,19
0,25	1605,30	5,57 *10^6	0,00	0,18
0,40	2593,64	9,03 *10^6	-0,06	0,17
0,71	4583,36	16,10 *10^6	-0,09	0,16
1,00	6480,73	24,53 *10^6	-0,24	0,16

The *deviation* is defined as:

$$\text{Deviation} = \frac{(\text{Indicated Volume} - \text{Reference Volume})}{(\text{Reference Volume})} \cdot 100\%$$

where the reference volume refers to the conditions at the meter under test. The reported values of this deviation are the arithmetical meansof *n* single measurements at each flow-rate.

The reported *total uncertainty* is defined as:

$$U_{tot} = \sqrt{U^2_{harmonized} + (k \cdot u_{meter})^2}; (k=2)$$

where $U_{harmonized}$ is the expanded uncertainty of 0.16% of the harmonized reference volume, stated as the standard uncertainty of measurement multiplied by the coverage factor *k*=2, and u_{meter} is the standard uncertainty of the meter under test determined on the base of n single measurements of the meter under test at each flow-rate.

The *deviation according to OIML/R32, determined as a weighed mean average* amounts to -0,09 %.

Remarks Security marks are applied

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PAGE .....

Tested in Dorsten at *pigsar*, on 2005-02-14 Hüwener

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Nederlands Meetinstituut

Certificate

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Certificatenumber : G1/S/2577
Projectnumber : 412451
Page : 1 of 2

Applicant : Instromet B.V.
Munstermanstraat 6
7064 KA Silvolde

Meter under test :
Type of meter : Turbine gas meter
Manufacturer : INSTROMET B.V.
Type : SM-RI-K
Serial number : 10402835

Test Method : The actual flow rate of the gas meter is established with the aid of standard gas meters pressure- and temperature transmitters.
In the determination of this flow rate the pressure measurement point noted with P_r is normatively established.

Test date : See page 2 of 2

Results : The measurement results are stated on page 2 of 2. The total measurement inaccuracy is based upon 2x the standard deviation (2s).

Traceability : The measurements have been executed using standards for which the traceability to primary, and/or (inter)national standards has been demonstrated.

Silvolde, February 21, 2005
NMi Certin B.V.

B. Pastoor
Verification Department

NMi Certin B.V.

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NMi Certin B.V.
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Nederlands Meetinstituut

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Certificatenumber : G1/S/2577
Projectnumber : 412451
Page : 2 of 2

Meter kind	: Turbine gas meter
Manufacturer	: INSTROMET B.V.
Number/year	: 10402835/2005
G-size/type/diam.	: G4000/SM-RI-K/300 mm
Q_{max}/Q_{min}	: 6500/320 m^3/h
P_{max}	: 97,6 bar
Density	: *** kg/m^3
Seals	: EC05
Final index reading	: 00000050 m^3

Gear wheel meterside	: 55
Gear wheel indexside	: 64
Pulses per m^3	:
LF Index head	: 0,1
HF Index head	: 38,3772
HF Turbine wheel	:
HF Serrated disk	:

Flow m^3/h	Error [%]
6500	-0,1
4550	0,0
2600	0,2
1600	0,2
650	0,2
320	0,5

Comment Error
1. Silvolde, 050210, Air atm. 20 °C

$$Error = \frac{V_{indicated} - V_{real}}{V_{real}} \times 100\ \%$$

The measurement inaccuracy equals to 0,25% .

NMi Certin B.V.

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TRENCH

Siemens AG
PTD H2 FP6
z. Hd. H. Kittinger
13623 Berlin

U. ZEICHEN	ANSPRECHPARTNER	TEL.	FAX	DATUM
04.01.0098.01	Fr. Hanske	+49 951 1803 271	+49 951 1803 215	29.11.2004

Sehr geehrte Damen und Herren
wir übersenden Ihnen folgende Unterlagen:

36 Seiten Prüfprotokolle für 9 Stromwandler
SA 0,5/420

Unsere Auftragsnummer 04.01.0098.01

Ihre Bestelldaten:

Anlagentyp	8DQ1
Bestellnummer	4500423414
Kennwort	Termoli Powerplant Italien

Mit freundlichen Grüssen
TRENCH GERMANY GMBH

rpt_siemensneu 22.10.200

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -8191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 120
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli /Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) /(125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 16.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 16.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 16.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 16.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 16.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 16.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH - Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 120

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1.2	60 / 0.8	+0,67	+2,6	1,2	1,2
			1.0	" "	+0,66	+2,8		
800	5	251-252	1.2	60 / 0,8	+0,69	+2,3	1,2	1,2
			1.0	" "	+0,68	+2,5		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,4	1,2	2,7
			1.2	60 / "	−0,02	+0,3		
			1.0	" "	−0,02	+0,3		
			0,2	" "	−0,03	+1,1		
			0,05	" "	−0,04	+1,7		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,8		
			1.2	30 / "	−0,03	+0,2		
			1.0	" "	−0,03	+0,3		
			0.2	" "	−0,07	+2,1		
			0,05	" "	−0,09	+3,6		
800	5	351-352	1.0	3.75 / 1	+0,08	+2,7		
			1.2	15 / 0.8	−0,05	+0,2		
			1.0	" "	−0,06	+0,5		
			0,2	" "	−0,13	+4,2		
			0,05	" "	−0,17	+6,9		

Data 16.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 120

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	451-454	1.2	60 / 0.8	+0,18	+0,5	0,7	4,5
			1.0	" "	+0,18	+0,5		
1600	5	451-453	1.2	30 / 0.8	+0,35	+1,0		
			1.0	" "	+0,35	+1,1		
800	5	451-452	1.2	15 / 0.8	+0,69	+2,3		
			1.0	" "	+0,68	+2,4		
800	5	551-552	1.0	7.5 / 0.8	+0,08	+1,2	1,2	0,4
			1.2	30 / "	-0,03	-0,2		
			1.0	" "	-0,04	±0		
			0,2	" "	-0,12	+3,3		
			0,05	" "	-0,16	+6,0		
3200	5	651-654	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1.2	30 / 0.8	+0,34	+1,0		
			1.0	" "	+0,33	+1,1		
800	5	651-652	1.2	15 / 0.8	+0,67	+2,2		
			1.0	" "	+0,66	+2,3		

Data 16.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 120

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,228	0,278	2,63	394	0,360	0,24
251-252	60	5P	30	0,228	0,278		"	0,280	0,187
451-454	60	5P	30	0,543	0,662	2,96	443	0,058	0,039
451-453	30	5P	30	0,284	0,346	1,49	224	0,119	0,079
451-452	15	5P	30	0,149	0,182	0,75	113	0,245	0,163
651-654	60	5P	30	0,543	0,662		"	0,058	0,039
651-653	30	5P	30	0,284	0,346		"	0,119	0,079
651-652	15	5P	30	0,149	0,182		"	0,243	0,162

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,392	0,478	2,80	140	49,0	3,50
351-353	30	10	5	0,210	0,256	1,41	71	24,5	3,47
351-352	15	10	5	0,113	0,138	0,71	36	12,4	3,49
551-552	30	10	5	0,121	0,148	1,32	66	23,2	3,51

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 16.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -B191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 121
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale — ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 17.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 17.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 17.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

Data 29.11.04

Firma TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 121

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,65	+1,2	1,2	1,2
			1.0	" "	+0,63	+1,3		
800	5	251-252	1.2	60 / 0,8	+0,66	+2,8	1,2	1,2
			1.0	" "	+0,65	+3,0		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	−0,01	±0		
			1.0	" "	−0,01	+0,1		
			0,2	" "	−0,03	+0,9		
			0,05	" "	−0,04	+1,4		
1600	5	351-353	1.0	7,5 / 0,8	+0,04	+0,7		
			1.2	30 / "	−0,01	±0		
			1.0	" "	−0,02	+0,1		
			0.2	" "	−0,05	+1,8		
			0,05	" "	−0,07	+3,0		
800	5	351-352	1.0	3,75 / 1	+0,09	+2,4		
			1.2	15 / 0,8	−0,03	+0,1		
			1.0	" "	−0,04	+0,4		
			0,2	" "	−0,10	+3,7		
			0,05	" "	−0,14	+6,0		

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 121

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	451-453	1.2	30 / 0,8	+0,35	+1,1		
			1.0	" "	+0,34	+1,2		
800	5	451-452	1,2	15 / 0,8	+0,69	+2,3		
			1.0	" "	+0,68	+2,5		
800	5	551-552	1.0	7,5 / 0,8	+0,07	+1,2	1,2	0,4
			1.2	30 / "	-0,05	-0,1		
			1.0	" "	-0,06	+0,1		
			0,2	" "	-0,13	+3,5		
			0.05	" "	-0,17	+6,1		
3200	5	651-654	1,2	60 / 0,8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1,2	30 / 0,8	+0,35	+1,0		
			1.0	" "	+0,34	+1,1		
800	5	651-652	1.2	15 / 0,8	+0,69	+2,2		
			1.0	" "	+0,68	+2,3		

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 121

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,229	0,279		394	0,220	0,147
251-252	60	5P	30	0,228	0,278		"	0,360	0,24
451-454	60	5P	30	0,544	0,664		443	0,058	0,039
451-453	30	5P	30	0,286	0,349		224	0,120	0,08
451-452	15	5P	30	0,149	0,182		113	0,246	0,164
651-654	60	5P	30	0,543	0,662		"	0,056	0,037
651-653	30	5P	30	0,284	0,346		"	0,115	0,077
651-652	15	5P	30	0,149	0,182		"	0,234	0,156

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,391				49,9	3,56
351-353	30	10	5	0,210				25,0	3,55
351-352	15	10	5	0,113				12,6	3,55
551-552	30	10	5	0,122				22,9	3,47

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -8A91	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 122
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale — ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 17.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 17.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 17.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 17.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH - Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 122

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,64	+2,0	1,2	1,2
			1.0	" "	+0,62	+2,2		
800	5	251-252	1,2	60 / 0,8	+0,71	+2,4	1,2	1,2
			1.0	" "	+0,71	+2,6		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	±0	±0		
			1.0	" "	±0	+0,1		
			0,2	" "	−0,02	+0,7		
			0,05	" "	−0,03	+1,2		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,9		
			1.2	30 / "	−0,02	+0,3		
			1.0	" "	−0,02	+0,3		
			0.2	" "	−0,05	+1,7		
			0,05	" "	−0,07	+2,8		
800	5	351-352	1.0	3,75 / 1	+0,09	+2,3		
			1.2	15 / 0,8	−0,03	+0,3		
			1.0	" "	−0,03	+0,4		
			0,2	" "	−0,09	+3,4		
			0,05	" "	−0,13	+5,6		

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 122

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	451-453	1.2	30 / 0.8	+0,34	+1,0		
			1.0	" "	+0,34	+1,0		
800	5	451-452	1.2	15 / 0.8	+0,67	+2,1		
			1.0	" "	+0,67	+2,3		
800	5	551-552	1.0	7,5 / 0.8	+0,07	+1,3	1,2	0,4
			1.2	30 / "	−0,05	±0		
			1.0	" "	−0,06	+0,2		
			0,2	" "	−0,14	+3,8		
			0,05	" "	−0,18	+6,5		
3200	5	651-654	1.2	60 / 0.8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1.2	30 / 0.8	+0,34	+1,0		
			1.0	" "	+0,33	+1,1		
800	5	651-652	1.2	15 / 0.8	+0,67	+2,2		
			1.0	" "	+0,66	+2,3		

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 122

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,228	0,278		394	0,290	0,193
251-252	60	5P	30	0,229	0,279		"	0,240	0,16
451-454	60	5P	30	0,546	0,666		443	0,060	0,04
451-453	30	5P	30	0,286	0,349		224	0,124	0,083
451-452	15	5P	30	0,150	0,183		113	0,253	0,169
651-654	60	5P	30	0,543	0,662		"	0,062	0,041
651-653	30	5P	30	0,284	0,346		"	0,128	0,085
651-652	15	5P	30	0,149	0,182		"	0,262	0,175

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,393				50,2	3,59
351-353	30	10	5	0,211				25,2	3,57
351-352	15	10	5	0,113				12,7	3,58
551-552	30	10	5	0,121				22,8	3,45

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_T)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 17.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -8191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 123
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale — ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 24.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 24.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 24.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

Data 29.11.04 Firma

TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 123

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,62	+1,0	1,2	1,2
			1.0	" "	+0,60	+1,1		
800	5	251-252	1,2	60 / 0,8	+0,61	+1,3	1,2	1,2
			1.0	" "	+0,59	+1,5		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,4	1,2	2,7
			1.2	60 / "	−0,01	+0,3		
			1.0	" "	−0,01	+0,3		
			0,2	" "	−0,03	+1,0		
			0,05	" "	−0,04	+1,6		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,8		
			1.2	30 / "	−0,02	±0		
			1.0	" "	−0,02	+0,1		
			0.2	" "	−0,06	+1,7		
			0,05	" "	−0,08	+3,0		
800	5	351-352	1.0	3,75 / 1	+0,08	+2,4		
			1.2	15 / 0,8	−0,04	±0		
			1.0	" "	−0,05	+0,2		
			0,2	" "	−0,11	+3,3		
			0,05	" "	−0,15	+5,7		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 123

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	451-454	1,2	60 / 0,8	+0,17	+0,5	0,7	4,5
			1,0	" "	+0,17	+0,5		
1600	5	451-453	1,2	30 / 0,8	+0,34	+0,8		
			1,0	" "	+0,34	+0,9		
800	5	451-452	1,2	15 / 0,8	+0,68	+2,0		
			1,0	" "	+0,67	+2,1		
800	5	551-552	1,0	7,5 / 0,8	+0,07	+1,2	1,2	0,4
			1,2	30 / "	−0,05	−0,1		
			1,0	" "	−0,05	±0		
			0,2	" "	−0,13	+3,6		
			0,05	" "	−0,18	+6,4		
3200	5	651-654	1,2	60 / 0,8	+0,18	+0,5	0,7	4,5
			1,0	" "	+0,17	+0,6		
1600	5	651-653	1,2	30 / 0,8	+0,35	+1,1		
			1,0	" "	+0,34	+1,2		
800	5	651-652	1,2	15 / 0,8	+0,69	+2,4		
			1,0	" "	+0,68	+2,5		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 123

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,228	0,278		394	0,260	0,173
251-252	60	5P	30	0,228	0,278		"	0,280	0,187
451-454	60	5P	30	0,545	0,665		443	0,057	0,038
451-453	30	5P	30	0,285	0,348		224	0,116	0,077
451-452	15	5P	30	0,150	0,183		113	0,238	0,159
651-654	60	5P	30	0,545	0,665		"	0,060	0,04
651-653	30	5P	30	0,285	0,348		"	0,122	0,081
651-652	15	5P	30	0,150	0,183		"	0,253	0,169

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,393				49,1	3,51
351-353	30	10	5	0,211				24,6	3,49
351-352	15	10	5	0,113				12,4	3,49
551-552	30	10	5	0,122				22,8	3,45

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -B191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 124
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 24.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 24.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 24.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 124

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,71	+2,5	1,2	1,2
			1.0	" "	+0,70	+2,6		
800	5	251-252	1,2	60 / 0,8	+0,64	+1,3	1,2	1,2
			1.0	" "	+0,62	+1,4		
3200	5	351-354	1.0	15 / 0,8	-0,02	+0,3	1,2	2,7
			1.2	60 / "	-0,01	±0		
			1.0	" "	-0,01	+0,1		
			0,2	" "	-0,03	+0,8		
			0,05	" "	-0,04	+1,4		
1600	5	351-353	1.0	7,5 / 0,8	+0,02	+1,3		
			1.2	30 / "	-0,03	+0,5		
			1.0	" "	-0,03	+0,5		
			0.2	" "	-0,07	+2,2		
			0,05	" "	-0,09	+3,6		
800	5	351-352	1.0	3,75 / 1	+0,08	+2,5		
			1.2	15 / 0,8	-0,04	+0,1		
			1.0	" "	-0,05	+0,4		
			0,2	" "	-0,12	+3,8		
			0,05	" "	-0,16	+6,3		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 124

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0,8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	451-453	1.2	30 / 0,8	+0,34	+0,8		
			1.0	" "	+0,33	+0,9		
800	5	451-452	1.2	15 / 0,8	+0,66	+1,9		
			1.0	" "	+0,66	+2,0		
800	5	551-552	1.0	7,5 / 0,8	+0,08	+1,2	1,2	0,4
			1.2	30 / "	-0,04	-0,1		
			1.0	" "	-0,05	+0,1		
			0,2	" "	-0,12	+3,5		
			0,05	" "	-0,17	+6,1		
3200	5	651-654	1.2	60 / 0,8	+0,18	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1.2	30 / 0,8	+0,35	+0,9		
			1.0	" "	+0,34	+1,0		
800	5	651-652	1.2	15 / 0,8	+0,69	+2,1		
			1.0	" "	+0,68	+2,2		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 124

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,230	0,281		394	0,250	0,167
251-252	60	5P	30	0,230	0,281		"	0,230	0,153
451-454	60	5P	30	0,545	0,665		443	0,061	0,041
451-453	30	5P	30	0,285	0,348		224	0,123	0,082
451-452	15	5P	30	0,149	0,182		113	0,252	0,168
651-654	60	5P	30	0,547	0,667		"	0,054	0,036
651-653	30	5P	30	0,286	0,349		"	0,109	0,073
651-652	15	5P	30	0,150	0,183		"	0,224	0,149

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,395				49,4	3,53
351-353	30	10	5	0,212				24,8	3,52
351-352	15	10	5	0,113				12,5	3,52
551-552	30	10	5	0,121				22,8	3,45

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -B191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 125
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale — ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 24.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 24.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 24.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 24.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH - Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 125

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1.2	60 / 0.8	+0,71	+2,5	1,2	1,2
			1.0	" "	+0,70	+2,7		
800	5	251-252	1.2	60 / 0.8	+0,70	+2,1	1,2	1,2
			1.0	" "	+0,69	+2,3		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,4	1,2	2,7
			1.2	60 / "	−0,01	+0,1		
			1.0	" "	−0,01	+0,2		
			0.2	" "	−0,03	+1,0		
			0.05	" "	−0,04	+1,6		
1600	5	351-353	1.0	7,5 / 0.8	+0,04	+0,8		
			1.2	30 / "	−0,02	+0,2		
			1.0	" "	−0,02	+0,3		
			0.2	" "	−0,06	+2,1		
			0,05	" "	−0,08	+3,4		
800	5	351-352	1.0	3,75 / 1	+0,09	+2,8		
			1.2	15 / 0.8	−0,04	+0,5		
			1.0	" "	−0,05	+0,7		
			0,2	" "	−0,12	+4,4		
			0,05	" "	−0,15	+7,0		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 125

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	451-453	1.2	30 / 0.8	+0,34	+1.0		
			1.0	" "	+0,33	+1,1		
800	5	451-452	1.2	15 / 0,8	+0,67	+2,3		
			1.0	" "	+0,66	+2,4		
800	5	551-552	1.0	7,5 / 0,8	+0,07	+1,2	1,2	0,4
			1.2	30 / "	-0,04	-0,2		
			1.0	" "	-0,05	±0		
			0,2	" "	-0,13	+3,4		
			0,05	" "	-0,18	+6,2		
3200	5	651-654	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	651-653	1.2	30 / 0.8	+0,34	+1,1		
			1.0	" "	+0,33	+1,2		
800	5	651-652	1.2	15 / 0.8	+0,67	+2,3		
			1.0	" "	+0,66	+2,4		

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 125

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,228	0,278		394	0,257	0,171
251-252	60	5P	30	0,228	0,278		"	0,288	0,192
451-454	60	5P	30	0,548	0,668		443	0,059	0,039
451-453	30	5P	30	0,286	0,349		224	0,120	0,08
451-452	15	5P	30	0,150	0,183		113	0,246	0,164
651-654	60	5P	30	0,545	0,665		"	0,059	0,039
651-653	30	5P	30	0,285	0,348		"	0,121	0,081
651-652	15	5P	30	0,149	0,182		"	0,246	0,164

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,393				49,6	3,54
351-353	30	10	5	0,212				24,8	3,52
351-352	15	10	5	0,113				12,6	3,55
551-552	30	10	5	0,121				22,7	3,44

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S /(235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100/(I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c/(F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess}/(I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 24.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -B191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 126
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 25.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 25.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 25.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 126

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,62	+1,0	1,2	1,2
			1.0	" "	+0,60	+1,2		
800	5	251-252	1,2	60 / 0,8	+0,63	+0,7	1,2	1,2
			1.0	" "	+0,61	+0,9		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	-0,01	+0,1		
			1.0	" "	-0,01	+0,1		
			0,2	" "	-0,03	+0,8		
			0,05	" "	-0,04	+1,4		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,9		
			1.2	30 / "	-0,02	+0,3		
			1.0	" "	-0,03	+0,4		
			0.2	" "	-0,06	+2,0		
			0,05	" "	-0,09	+3,3		
800	5	351-352	1.0	3,75 / 1	+0,08	+2,8		
			1.2	15 / 0,8	-0,05	+0,5		
			1,0	" "	-0,05	+0,7		
			0,2	" "	-0,12	+3,9		
			0,05	" "	-0,16	+6,5		

Data 25.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 126

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	451-453	1.2	30 / 0.8	+0,34	+1,0		
			1.0	" "	+0,34	+1,1		
800	5	451-452	1.2	15 / 0.8	+0,68	+2,2		
			1.0	" "	+0,67	+2,4		
800	5	551-552	1.0	7,5 / 0.8	+0,07	+1,2	1,2	0,4
			1.2	30 / "	-0,04	-0,2		
			1.0	" "	-0,05	±0		
			0.2	" "	-0,13	+3,4		
			0.05	" "	-0,18	+6,0		
3200	5	651-654	1.2	60 / 0.8	+0,17	+0,6	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	651-653	1.2	30 / 0.8	+0,34	+1,2		
			1.0	" "	+0,34	+1,3		
800	5	651-652	1.2	15 / 0.8	+0,68	+2,5		
			1.0	" "	+0,68	+2,7		

Data 25.11.04 Firma [illegible]

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 126

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,229	0,279		394	0,272	0,181
251-252	60	5P	30	0,228	0,278		"	0,259	0,173
451-454	60	5P	30	0,545	0,665		443	0,060	0,04
451-453	30	5P	30	0,285	0,348		224	0,124	0,083
451-452	15	5P	30	0,149	0,182		113	0,255	0,17
651-654	60	5P	30	0,545	0,665		"	0,060	0,04
651-653	30	5P	30	0,285	0,348		"	0,123	0,082
651-652	15	5P	30	0,149	0,182		"	0,253	0,169

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,391				49,6	3,54
351-353	30	10	5	0,211				24,8	3,52
351-352	15	10	5	0,113				12,6	3,55
551-552	30	10	5	0,121				23,0	3,48

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_T)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 25.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

Tipo	AMT 420 -8191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 127
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 25.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 25.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 25.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 25.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 127

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,68	+2,9	1,2	1,2
			1.0	" "	+0,67	+3,1		
800	5	251-252	1,2	60 / 0,8	+0,69	+2,3	1,2	1,2
			1.0	" "	+0,68	+2,4		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	−0,01	+0,1		
			1.0	" "	−0,01	+0,1		
			0,2	" "	−0,03	+0,8		
			0,05	" "	−0,04	+1,4		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,8		
			1.2	30 / "	−0,02	+0,2		
			1.0	" "	−0,03	+0,4		
			0.2	" "	−0,07	+2,0		
			0,05	" "	−0,09	+3,3		
800	5	351-352	1.0	3,75 / 1	+0,08	+2,2		
			1.2	15 / 0,8	−0,03	−0,1		
			1.0	" "	−0,04	+0,1		
			0,2	" "	−0,10	+3,1		
			0,05	" "	−0,14	+5,4		

Data 25.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 127

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	451-454	1,2	60 / 0,8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,4		
1600	5	451-453	1,2	30 / 0,8	+0,34	+0,9		
			1.0	" "	+0,34	+0,9		
800	5	451-452	1,2	15 / 0,8	+0,68	+1,8		
			1.0	" "	+0,67	+2,0		
800	5	551-552	1.0	7,5 / 0,8	+0,07	+1,2	1,2	0,4
			1,2	30 / "	−0,05	−0,1		
			1.0	" "	−0,06	+0,1		
			0,2	" "	−0,13	+3,6		
			0,05	" "	−0,18	+6,4		
3200	5	651-654	1,2	60 / 0,8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1,2	30 / 0,8	+0,34	+1,0		
			1.0	" "	+0,34	+1,1		
800	5	651-652	1,2	15 / 0,8	+0,68	+2,0		
			1.0	" "	+0,67	+2,2		

Data 25.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	041063 127

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,227	0,277		394	0,360	0,24
251-252	60	5P	30	0,228	0,278		"	0,280	0,187
451-454	60	5P	30	0,543	0,662		443	0,054	0,036
451-453	30	5P	30	0,283	0,345		224	0,110	0,073
451-452	15	5P	30	0,148	0,181		113	0,225	0,15
651-654	60	5P	30	0,544	0,664		"	0,055	0,037
651-653	30	5P	30	0,284	0,346		"	0,112	0,075
651-652	15	5P	30	0,149	0,182		"	0,229	0,153

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,387				49,5	3,54
351-353	30	10	5	0,208				24,8	3,52
351-352	15	10	5	0,111				12,6	3,55
551-552	30	10	5	0,121				22,9	3,47

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 25.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 - 8191	TG N. d'ordine	04.01.0098.01
Certificato di prova	IEC 60044 - 1	N. di fabbrica	04/063 128
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z —	Classe isolante	E

Trasmissione nominale — ext. 120%

I_{prim}	A 800	800	3200-1600-800	3200-1600-800	800
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60	VA 60	VA 60-30-15	VA 60-30-15	VA 30
Classe	5P	5P	0,2	5P	0,2
Fattore di sovracorrente	30	30	10	30	10
Nucleo	1	2	3	4 + 6	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 26.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 26.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 26.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 26.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 26.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 26.11.04

Data 29.11.04 Firma

TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 128

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
800	5	151-152	1,2	60 / 0,8	+0,69	+3,3	1,2	1,2
			1.0	" "	+0,68	+3,5		
800	5	251-252	1,2	60 / 0,8	+0,66	+2,6	1,2	1,2
			1.0	" "	+0,65	+2,8		
3200	5	351-354	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	−0,01	± 0		
			1.0	" "	−0,01	± 0		
			0,2	" "	−0,03	+0,8		
			0,05	" "	−0,04	+1,3		
1600	5	351-353	1,0	7,5 / 0,8	+0,03	+0,7		
			1.2	30 / "	−0,02	+0,2		
			1.0	" "	−0,03	+0,3		
			0.2	" "	−0,06	+2,0		
			0,05	" "	−0,09	+3,3		
800	5	351-352	1.0	3,75 / 1	+0,08	+2,8		
			1.2	15 / 0.8	−0,04	± 0		
			1.0	" "	−0,05	+0,2		
			0,2	" "	−0,11	+3,4		
			0,05	" "	−0,15	+5,8		

Data 26.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 128

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.2	60 / 0.8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	451-453	1.2	30 / 0.8	+0,34	+1,0		
			1.0	" "	+0,34	+1,1		
800	5	451-452	1.2	15 / 0.8	+0,68	+1,9		
			1.0	" "	+0,67	+2,1		
800	5	551-552	1.0	7,5 / 0.8	+0,07	+1,3	1,2	0,4
			1.2	30 / "	−0,05	−0,1		
			1.0	" "	−0,06	+0,1		
			0,2	" "	−0,14	+3,8		
			0,05	" "	−0,19	+6,6		
3200	5	651-654	1.2	60 / 0.8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	651-653	1.2	30 / 0.8	+0,34	+1,1		
			1.0	" "	+0,33	+1,2		
800	5	651-652	1.2	15 / 0.8	+0,67	+2,3		
			1.0	" "	+0,66	+2,4		

Data 26.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.01	N. di fabbrica	04/063 128

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-152	60	5P	30	0,228	0,278		394	0,370	0,247
251-252	60	5P	30	0,228	0,278		"	0,350	0,233
451-454	60	5P	30	0,546	0,666		443	0,060	0,04
451-453	30	5P	30	0,285	0,348		224	0,123	0,082
451-452	15	5P	30	0,149	0,182		113	0,251	0,167
651-654	60	5P	30	0,547	0,667		"	0,061	0,041
651-653	30	5P	30	0,287	0,350		"	0,125	0,083
651-652	15	5P	30	0,150	0,183		"	0,256	0,171

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
351-354	60	10	5	0,392				49,4	3,53
351-353	30	10	5	0,211				24,8	3,52
351-352	15	10	5	0,113				12,6	3,55
551-552	30	10	5	0,122				22,6	3,42

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 26.11.04 Firma

TRENCH

Siemens AG
PTD H2 FP6
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04.01.0098.02	Fr. Hanske	+49 951 1803 271	+49 951 1803 215	29.11.2004

Sehr geehrte Damen und Herren
wir übersenden Ihnen folgende Unterlagen:

18 Seiten Prüfprotokolle für 3 Stromwandler
SA 0,5/420

Unsere Auftragsnummer 04.01.0098.02

Ihre Bestelldaten:

Anlagentyp	8DQ1
Bestellnummer	4500423414
Kennwort	Termoli Powerplant Italien

Mit freundlichen Grüssen
TRENCH GERMANY GMBH

rpt_siemensneu 22.10.200

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 - 8192	TG N. d'ordine	04.01.0098.02
Certificato di prova	VDE0414/IEC 60044-1	N. di fabbrica	04/063 129
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z 311 / 464	Classe isolante	E

Trasmissione nominale

I_{prim}	A 3200 — 1600 — 800 ext 120%				
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15
Classe	5P	0,2	0,1	0,1	5P
Fattore di sovracorrente	30	10	10	10	30
Nucleo	1	2	3 Z	4 Z	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 18.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 18.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 18.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 18.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 18.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 18.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH - Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 129

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	i_N x	Ü kV
3200	5	151-154	1,2	60 / 0,8	+0,17	+0,4	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	151-153	1.2	30 / 0,8	+0,35	+1,1		
			1.0	" "	+0,34	+1,2		
800	5	151-152	1.2	15 / 0,8	+0,69	+2,4		
			1.0	" "	+0,68	+2,5		
3200	5	251-254	1.0	15 / 0,8	+0,02	+0,4	1,2	2,7
			1.2	60 / "	-0,01	±0		
			1.0	" "	-0,01	+0,1		
			0,2	" "	-0,03	+0,9		
			0,05	" "	-0,04	+1,5		
1600	5	251-253	1.0	7,5 / 0,8	+0,03	+0,8		
			1.2	30 / "	-0,02	+0,2		
			1.0	" "	-0,03	+0,2		
			0,2	" "	-0,06	+2,0		
			0,05	" "	-0,09	+3,4		
800	5	251-252	1.0	3.75 / 1	+0,08	+2,7		
			1.2	15 / 0,8	-0,05	+0,3		
			1.0	" "	-0,06	+0,5		
			0,2	" "	-0,13	+4,2		
			0,05	" "	-0,17	+6,9		

Data 18.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 129

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	351-354	1.0	15 / 0,8	+0,01	+0,2	1,2	4,0
			1,2	60 / "	±0	+0,1		
			1,0	" "	±0	+0,1		
			0,2	" "	−0,01	+0,5		
			0,05	" "	−0,02	+0,7		
1600	5	351-353	1.0	7,5 / 0,8	+0,03	+0,4		
			1,2	30 "	±0	+0,2		
			1.0	" "	±0	+0,3		
			0,2	" "	−0,02	+1,0		
			0,05	" "	−0,03	+1,5		
800	5	351-352	1.0	3.75 / 1	+0,07	+1,4		
			1.2	15 / 0.8	−0,01	+0,5		
			1.0	" "	−0,01	+0,7		
			0.2	" "	−0,04	+2,1		
			0.05	" "	−0,06	+3,1		

Data 18.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 129

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	451-454	1.0	15 / 0.8	+0,02	+0,1	1,2	4,0
			1,2	60 / "	±0	±0		
			1,0	" "	±0	+0,1		
			0,2	" "	−0,01	+0,4		
			0,05	" "	−0,01	+0,6		
1600	5	451-453	1.0	7,5 / 0.8	+0,03	+0,4		
			1,2	30 "	±0	+0,2		
			1.0	" "	±0	+0,3		
			0,2	" "	−0,02	+1,0		
			0,05	" "	−0,03	+1,4		
800	5	451-452	1.0	3.75 / 1	+0,07	+1,3		
			1.2	15 / 0.8	±0	+0,6		
			1.0	" "	±0	+0,7		
			0.2	" "	−0,03	+2,0		
			0,05	" "	−0,05	+3,1		

Data 18.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 129

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	551-554	1.2	60 / 0,8	+0,17	+0,6	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	551-553	1.2	30 / 0.8	+0,34	+1,2		
			1.0	" "	+0,34	+1,3		
800	5	551-552	1.2	15 / 0.8	+0,68	+2,5		
			1.0	" "	+0,67	+2,7		

Data 18.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 129

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151-154	60	5P	30	0,550	0,671	2,96	445	0,061	0,041
151-153	30	5P	30	0,290	0,354	1,50	225	0,121	0,081
151-152	15	5P	30	0,151	0,184	0,75	113	0,244	0,163
551-554	60	5P	30	0,550	0,671		"	0,058	0,039
551-553	30	5P	30	0,289	0,353		"	0,119	0,079
551-552	15	5P	30	0,151	0,184		"	0,242	0,161

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
251-254	60	10	5	0,401	0,489	2,81	140	49,0	3,49
251-253	30	10	5	0,215	0,262	1,42	71	24,6	3,46
251-252	15	10	5	0,115	0,140	0,72	36	12,4	3,44
351-354	60	10	5	0,312	0,381	2,71	136	94,8	7,00
351-353	30	10	5	0,169	0,206	1,37	68	47,2	6,89
351-352	15	10	5	0,088	0,107	0,69	34	23,8	6,90
451-454	60	10	5	0,310				96,4	7,11
451-453	30	10	5	0,168				48,0	7,01
451-452	15	10	5	0,089				24,3	7,04

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 18.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 - 8192	TG N. d'ordine	04,01,0098,02
Certificato di prova	VDE0414/IEC 60044-1	N. di fabbrica	04/063 130
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z 311 / 464	Classe isolante	E

Trasmissione nominale

I_{prim}	A 3200 — 1600 — 800 ext 120%				
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15
Classe	5P	0,2	0,1	0,1	5P
Fattore di sovracorrente	30	10	10	10	30
Nucleo	1	2	3 2	4 2	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 19.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 19.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 19.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 19.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 19.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 19.11.04

Data 29.11.04 Firma TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 130

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	151-154	1,2	60 /0,8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	151-153	1.2	30 /0,8	+0,34	+1,1		
			1.0	" "	+0,33	+1,2		
800	5	151-152	1.2	15 /0,8	+0,67	+2,5		
			1.0	" "	+0,66	+2,6		
3200	5	251-254	1.0	15 /0,8	+0,01	+0,8	1,2	2,7
			1.2	60 / "	−0,01	±0		
			1.0	" "	−0,01	+0,1		
			0,2	" "	−0,03	+0,8		
			0,05	" "	−0,04	+1,4		
1600	5	251-253	1.0	7,5 /0,8	+0,03	+0,7		
			1.2	30 / "	−0,02	±0		
			1.0	" "	−0,02	+0,1		
			0,2	" "	−0,06	+1,7		
			0,05	" "	−0,08	+2,9		
800	5	251-252	1.0	3.75 / 1	+0,08	+2,5		
			1.2	15 /0,8	−0,04	+0,2		
			1.0	" "	−0,05	+0,4		
			0,2	" "	−0,12	+3,7		
			0,05	" "	−0,16	+6,1		

Data 19.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 130

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	351-354	1.0	15 / 0.8	+0,02	+0,2	1,2	4,0
			1,2	60 / "	±0	+0,1		
			1,0	" "	±0	+0,1		
			0,2	" "	−0,01	+0,5		
			0,05	" "	−0,02	+0,7		
1600	5	351-353	1.0	7,5 / 0.8	+0,03	+0,4		
			1,2	30 "	±0	+0,2		
			1,0	" "	±0	+0,3		
			0,2	" "	−0,02	+1,0		
			0,05	" "	−0,03	+1,5		
800	5	351-352	1.0	3,75 / 1	+0,07	+1,4		
			1.2	15 / 0.8	−0,01	+0,5		
			1.0	" "	−0,01	+0,7		
			0.2	" "	−0,04	+2,2		
			0.05	" "	−0,06	+3,2		

Data 19.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 130

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	451-454	1.0	15 / 0.8	+0,02	+0,2	1,2	4.0
			1.2	60 / "	± 0	+0,1		
			1,0	" "	± 0	+0,1		
			0,2	" "	−0,01	+0,5		
			0.05	" "	−0,01	+0,6		
1600	5	451-453	1.0	7.5 / 0.8	+0,03	+0,4		
			1,2	30 "	± 0	+0,3		
			1.0	" "	± 0	+0,3		
			0,2	" "	−0,01	+1,1		
			0,05	" "	−0,02	+1,5		
800	5	451-452	1.0	3.75 / 1	+0,07	+1,4		
			1.2	15 / 0.8	± 0	+0,6		
			1.0	" "	± 0	+0,8		
			0.2	" "	−0,03	+2,2		
			0,05	" "	−0,04	+3,1		

Data 19.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 130

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	551-554	1.2	60 / 0,8	+0,17	+0,6	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	551-553	1.2	30 / 0.8	+0,33	+1,2		
			1.0	" "	+0,33	+1,2		
800	5	551-552	1.2	15 / 0,8	+0,66	+2,5		
			1.0	" "	+0,65	+2,7		

Data 19.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 130

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151 – 154	60	5P	30	0,548	0,669		445	0,062	0,041
151 – 153	30	5P	30	0,289	0,353		225	0,126	0,084
151 – 152	15	5P	30	0,151	0,184		113	0,255	0,17
551 – 554	60	5P	30	0,549	0,670		"	0,064	0,043
551 – 553	30	5P	30	0,289	0,353		"	0,131	0,087
551 – 552	15	5P	30	0,151	0,184		"	0,265	0,177

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
251 – 254	60	10	5	0,399				49,2	3,50
251 – 253	30	10	5	0,214				24,7	3,48
251 – 252	15	10	5	0,115				12,5	3,47
351 – 354	60	10	5	0,310				96,0	7,08
351 – 353	30	10	5	0,169				47,8	6,98
351 – 352	15	10	5	0,091				24,1	6,98
451 – 454	60	10	5	0,310				95,3	7,03
451 – 453	30	10	5	0,169				47,5	6,93
451 – 452	15	10	5	0,091				24,0	6,96

① per 20°C temperatura ambiente — $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C — $R_{CT} = 310 \cdot R_S / (235 + \vartheta_T)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $\quad Z_b = \frac{S_n}{I_{sn}^2}$ $\quad S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ $\quad$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ $\quad$ ($\varepsilon_c = 10$ % $\quad F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ $\quad$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 19.11.04 Firma

SIEMENS

VERBALE DI PROVA — TRASFORMATORE DI CORRENTE

Tipo	AMT 420 - B192	TG N. d'ordine	04,01,0038,02
Certificato di prova	VDE0414/IEC 60044-1	N. di fabbrica	04/063 131
Livello di isolamento	(420/520/1425/1050)	Riferimento del cliente	Termoli Italien
Frequenza nominale	Hz 50	I_{th} / I_{dyn}	kA (50) / (125)
PTB segno di ammissione	Z 311 / 464	Classe isolante	E

Trasmissione nominale

I_{prim}	A 3200 — 1600 — 800 ext 120%				
I_{sec}	A 5	A 5	A 5	A 5	A 5
Potenza	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15	VA 60-30-15
Classe	5P	0,2	0,1	0,1	5P
Fattore di sovracorrente	30	10	10	10	30
Nucleo	1	2	3 ⊐	4 ⊐	5

1. **Controllo della precisione** (vedi foglio separato)

Controllo della polarità	Data/sigla 22.11.04

2. **Prova di avvoglimenti degli avvoglimenti secondari**

4 kV	60 s	50 Hz	Data/sigla 22.11.04

3. **Controllo dei contrassegni degli attacchi e della targa d'identificazione**

Secondo il disegno	Data/sigla 22.11.04

4. **Resistenze di avvoglimento** (vedi foglio separato)

Prova eseguito	Data/sigla 22.11.04

5. **Definizione del errore complessivo** (vedi foglio separato)

Prova eseguito	Data/sigla 22.11.04

6. **Definizione del fattore di limitazione della sovracorrente** (vedi foglio separato)

Prova eseguito	Data/sigla 22.11.04

Data 29.11.04 Firma

TRENCH GERMANY GMBH
- Quality assurance -

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 131

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	151-154	1,2	60 / 0,8	+0,17	+0,5	0,7	4,5
			1.0	" "	+0,17	+0,5		
1600	5	151-153	1.2	30 / 0,8	+0,34	+1,1		
			1.0	" "	+0,33	+1,2		
800	5	151-152	1.2	15 / 0,8	+0,67	+2,4		
			1.0	" "	+0,66	+2,6		
3200	5	251-254	1.0	15 / 0,8	+0,02	+0,3	1,2	2,7
			1.2	60 / "	-0,01	±0		
			1.0	" "	-0,01	+0,1		
			0,2	" "	-0,02	+0,7		
			0,05	" "	-0,04	+1,3		
1600	5	251-253	1.0	7,5 / 0,8	+0,04	+0,7		
			1.2	30 / "	-0,02	+0,3		
			1.0	" "	-0,02	+0,3		
			0,2	" "	-0,05	+1,7		
			0,05	" "	-0,08	+2,9		
800	5	251-252	1.0	3,75 / 1	+0,09	+2,4		
			1.2	15 / 0,8	-0,04	+0,4		
			1.0	" "	-0,04	+0,5		
			0,2	" "	-0,10	+3,4		
			0,05	" "	-0,15	+5,7		

Data 22.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 131

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	351-354	1.0	15 / 0.8	+0,02	+0,2	1,2	4,0
			1.2	60 / "	± 0	+0,1		
			1.0	" "	± 0	+0,1		
			0,2	" "	−0,01	+0,4		
			0,05	" "	−0,02	+0,6		
1600	5	351-353	1.0	7,5 / 0.8	+0,03	+0,4		
			1.2	30 "	± 0	+0,2		
			1.0	" "	± 0	+0,3		
			0,2	" "	−0,02	+1,0		
			0,05	" "	−0,03	+1,5		
800	5	351-352	1.0	3.75 / 1	+0,07	+1,4		
			1.2	15 / 0.8	−0,01	+0,4		
			1.0	" "	−0,01	+0,6		
			0,2	" "	−0,04	+2,1		
			0,05	" "	−0,06	+3,2		

Data 22.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 131

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Û kV
3200	5	451-454	1.0	15 / 0.8	+0,02	+0,2	1.2	4,0
			1.2	60 / "	± 0	+0,1		
			1,0	" "	± 0	+0,1		
			0,2	" "	−0,01	+0,5		
			0.05	" "	−0,02	+0,7		
1600	5	451-453	1.0	7.5 / 0.8	+0,03	+0,4		
			1,2	30 "	± 0	+0,2		
			1.0	" "	± 0	+0,3		
			0,2	" "	−0,02	+1,1		
			0.05	" "	−0,03	+1,6		
800	5	451-452	1.0	3.75 / 1	+0,07	+1,4		
			1.2	15 / 0.8	−0,01	+0,6		
			1.0	" "	−0,01	+0,7		
			0,2	" "	−0,04	+2,3		
			0.05	" "	−0,05	+3,3		

Data 22.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	04/063 131

CONTROLLO DELLA PRECISIONE

							Prova delle spire 60s	
I_{prim} / A	I_{sec}/A	Attacchi	I_N x	VA / cos ß	F %	∂ min	I_N x	Ü kV
3200	5	551-554	1.2	60 / 0.8	+0,17	+0,6	0,7	4,5
			1.0	" "	+0,17	+0,6		
1600	5	551-553	1.2	30 / 0.8	+0,34	+1,2		
			1.0	" "	+0,33	+1,3		
800	5	551-552	1.2	15 / 0.8	+0,67	+2,7		
			1.0	" "	+0,66	+2,8		

Data 22.11.04 Firma

SIEMENS

VERBALE DI PROVA TRASFORMATORE DI CORRENTE

TG N. d'ordine	04.01.0098.02	N. di fabbrica	041063 131

Definizione del errore complessivo per nuclei di protezione

Attacchi	Potenza VA	Classe	ALF	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ③	I_{mess} / A	ε_c / % ④
151 – 154	60	5P	30	0,547	0,667		445	0,064	0,043
151 – 153	30	5P	30	0,287	0,350		225	0,131	0,087
151 – 152	15	5P	30	0,150	0,183		113	0,264	0,176
551 – 554	60	5P	30	0,546	0,666		"	0,063	0,042
551 – 553	30	5P	30	0,286	0,349		"	0,129	0,086
551 – 552	15	5P	30	0,149	0,182		"	0,262	0,175

Definizione del fattore di limitazione della sovracorrente (FS) per nuclei di misura secondo IEC

Attacchi	Potenza VA	FS	I_{exc} / A ⑤	R_s Ω per 20 °C	R_{ct} Ω ①	Z_g Ω ②	U_{alc} / V ⑥	U_{mess} V ≤ U_{alc}	FS_{calc} ≤ FS ⑦
251 – 254	60	10	5	0,398				49,6	3,53
251 – 253	30	10	5	0,214				24,9	3,51
251 – 252	15	10	5	0,115				12,6	3,50
351 – 354	60	10	5	0,309				95,0	7,01
351 – 353	30	10	5	0,168				47,3	6,91
351 – 352	15	10	5	0,090				23,9	6,93
451 – 454	60	10	5	0,309				95,6	7,05
451 – 453	30	10	5	0,168				47,6	6,95
451 – 452	15	10	5	0,091				24,1	6,98

① per 20°C temperatura ambiente $R_{CT} = 1.216 \cdot R_S$
per differenze di più di 5 °C $R_{CT} = 310 \cdot R_S / (235 + \vartheta_r)$

② $Z_g = \sqrt{R_{ct}^2 + Z_b^2 + 2 \cdot R_{ct} \cdot Z_b \cdot \cos\beta}$ $Z_b = \frac{S_n}{I_{sn}^2}$ $S_n < 5$ VA : $\cos\beta = 1$; $S_n \geq 5$ VA : $\cos\beta = 0.8$

③ $U_{alc} = Z_g \cdot I_{sn} \cdot ALF$ ④ $\varepsilon_c = I_{mess} \cdot 100 / (I_{sn} \cdot ALF)$

⑤ $I_{exc} = I_{sn} \cdot FS \cdot \varepsilon_c / (F_c \cdot 100)$ ($\varepsilon_c = 10$ % $F_c = 1$)

⑥ $U_{alc} = Z_g \cdot I_{sn} \cdot FS$ ⑦ $FS_{calc} = U_{mess} / (I_{sn} \cdot Z_g)$

ALF = Accuracy limiting factor = Fattore di limitazione della precisione

FS = Instrument security factor = Fattore di limitazione della sovracorrente

Data 22.11.04 Firma

TRENCH

Siemens AG
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Sehr geehrte Damen und Herren
wir übersenden Ihnen folgende Unterlagen:

24 Seiten Prüfprotokolle für 12 Spannungswandler
SSU 420/S22STL

Unsere Auftragsnummer 04.01.0092.01

Ihre Bestelldaten:

Anlagentyp	8DQ1
Bestellnummer	4500422421
Kennwort	Termoli Powerplant Italien

Mit freundlichen Grüssen
TRENCH GERMANY GMBH

rpt_siemensneu 22.10.200

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 077
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.01.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.01.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 077

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	Output 2a – 2n	Output 3a - 3n		F %	δ'
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,15	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,12	-7,2
		100		"	"	"		-0,14	-7,2
		120		"	"	"		-0,16	-7,3
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,15	+0,7
		80		50/0.8	100/0.8	200/0.8		-0,14	-6,9
		100		"	"	"		-0,16	-6,9
		120		"	"	"		-0,17	-7,0
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,16	+0,7
		80		50/0.8	100/0.8	200/0.8		-0,15	-6.0
		100		"	"	"		-0,16	-6.0
		120		"	"	"		-0,18	-6.1
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,09	+0,4
		2		50/0.8	100/0.8	200/0.8		-0,19	-5,6
		5		"	"	"		-0,19	-5,1
		100		"	"	"		-0,25	-4,2
		150		"	"	"		-0,29	-4,6

Date 11. 01. 2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 078
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.01.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 10.1.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Ullmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

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TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 078

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	2a – 2n	3a - 3n		F %	∂
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,15	+0,5
		80		50/0.8	100/0.8	200/0.8		-0,12	-7,3
		100		"	"	"		-0,14	-7,3
		120		"	"	"		-0,16	-7,4
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,15	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,14	-7,0
		100		"	"	"		-0,16	-7,0
		120		"	"	"		-0,17	-7,1
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,17	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,14	-5,8
		100		"	"	"		-0,16	-5,8
		120		"	"	"		-0,18	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,08	+0,3
		2		50/0.8	100/0.8	200/0.8		-0,21	-5,7
		5		"	"	"		-0,21	-5,3
		100		"	"	"		-0,26	-4,3
		150		"	"	"		-0,31	-4,7

Date 11.01.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 079
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{pnm}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.1.05 Chh.

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.1.05 Chh.

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.1.05 Chh.

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.1.05 Chh.

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.1.05 Hk.

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Mmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

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TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 079

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	2a – 2n	3a - 3n		F %	∂'
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,14	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,14	-7,3
		100		"	"	"		-0,15	-7,3
		120		"	"	"		-0,17	-7,4
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,13	+0,7
		80		50/0.8	100/0.8	200/0.8		-0,15	-7,0
		100		"	"	"		-0,17	-7,0
		120		"	"	"		-0,19	-7,1
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,15	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,15	-5,8
		100		"	"	"		-0,17	-5,8
		120		"	"	"		-0,19	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,04	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,25	-5,6
		5		"	"	"		-0,25	-5,0
		100		"	"	"		-0,30	-4,0
		150		"	"	"		-0,35	-4,4

Date 11.1.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 080
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.01.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 10.1.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Ulmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

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TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 080

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output				F %	δ'
				1a – 1n	2a – 2n	3a - 3n			
380/√3	100/√3	80	1a' – 1n	12.5/0.8	0	0		+0,17	+0,7
		80		50/0.8	100/0.8	200/0.8		-0,10	-7,2
		100		"	"	"		-0,12	-7,2
		120		"	"	"		-0,13	-7,2
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,17	+0,8
		80		50/0.8	100/0.8	200/0.8		-0,11	-6,8
		100		"	"	"		-0,13	-6,9
		120		"	"	"		-0,15	-7,0
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,16	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,14	-5,8
		100		"	"	"		-0,16	-5,8
		120		"	"	"		-0,18	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,08	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,20	-5,4
		5		"	"	"		-0,20	-5,0
		100		"	"	"		-0,26	-4,0
		150		"	"	"		-0,30	-4,4

Date 11.1.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 081
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.01.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 12.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 12.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 12.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.01.05 Vogel

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Uhmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 081

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	Output 2a – 2n	Output 3a - 3n		F %	δ
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0.15	+0.7
		80		50/0.8	100/0.8	200/0.8		-0.12	-7.2
		100		"	"	"		-0.14	-7.2
		120		"	"	"		-0.16	-7.3
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0.15	+0.8
		80		50/0.8	100/0.8	200/0.8		-0.14	-6.9
		100		"	"	"		-0.16	-6.9
		120		"	"	"		-0.18	-7.0
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0.16	+1.2
		80		50/0.8	100/0.8	200/0.8		-0.15	-5.5
		100		"	"	"		-0.17	-5.6
		120		"	"	"		-0.19	-5.6
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0.01	+1.0
		2		50/0.8	100/0.8	200/0.8		-0.29	-5.0
		5		"	"	"		-0.29	-4.5
		100		"	"	"		-0.34	-3.7
		150		"	"	"		-0.33	-4.2

Date 12.01.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 082
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 10.1.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) / kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) / kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.1.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.1.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.1.05

5. Gas tightness test

Leakage rate < 0,5 % p. a.	date/sign 10.1.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 082

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	2a – 2n	3a - 3n		F %	∂'
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,16	+0,3
		80		50/0.8	100/0.8	200/0.8		-0,12	-7,5
		100		"	"	"		-0,14	-7,5
		120		"	"	"		-0,16	-7,6
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,15	+0,4
		80		50/0.8	100/0.8	200/0.8		-0,13	-7,2
		100		"	"	"		-0,15	-7,2
		120		"	"	"		-0,17	-7,3
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,16	+1,0
		80		50/0.8	100/0.8	200/0.8		-0,15	-5,8
		100		"	"	"		-0,17	-5,8
		120		"	"	"		-0,19	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,03	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,26	-5,5
		5		"	"	"		-0,26	-5,0
		100		"	"	"		-0,31	-4,0
		150		"	"	"		-0,36	-4,4

Date 11.1.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 083
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{pnm}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.01.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.1.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.1.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.1.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.01.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature

TRENCH GERMANY GMBH
- Qualitätssicherung -

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TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 083

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	2a – 2n	3a - 3n		F %	∂
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,17	+0,5
		80		50/0.8	100/0.8	200/0.8		-0,11	-7,3
		100		"	"	"		-0,12	-7,3
		120		"	"	"		-0,15	-7,4
380/√3	100/√3	80	1a – 1n	12,5/0.8	0	0		+0,16	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,12	-7,0
		100		"	"	"		-0,14	-7,0
		120		"	"	"		-0,16	-7,0
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,17	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,13	-5,7
		100		"	"	"		-0,15	-5,7
		120		"	"	"		-0,17	-5,7
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,07	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,22	-5,3
		5		"	"	"		-0,22	-4,9
		100		"	"	"		-0,27	-3,9
		150		"	"	"		-0,32	-4,3

Date 11.01.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 084
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 11.1.05 Chl.

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.1.05 Chl.

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.1.05 Chl.

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.1.05 Chl.

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.1.05 Ha.

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Wmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 084

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	Output 2a – 2n	Output 3a - 3n		F %	δ
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,13	+0,7
		80		50/0.8	100/0.8	200/0.8		-0,15	-7,2
		100		"	"	"		-0,17	-7,2
		120		"	"	"		-0,19	-7,3
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,12	+0,8
		80		50/0.8	100/0.8	200/0.8		-0,16	-6,9
		100		"	"	"		-0,18	-6,9
		120		"	"	"		-0,20	-6,9
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,17	+0,8
		80		50/0.8	100/0.8	200/0.8		-0,14	-5,9
		100		"	"	"		-0,16	-5,9
		120		"	"	"		-0,18	-6,0
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,04	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,26	-5,5
		5		"	"	"		-0,26	-5,0
		100		"	"	"		-0,31	-4,0
		150		"	"	"		-0,35	-4,4

Date 11.1.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 085
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 10.1.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 12.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 12.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 12.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 10.1.05

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Ullmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

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TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 085

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output 1a – 1n	Output 2a – 2n	Output 3a - 3n		F %	δ'
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,15	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,13	-7,3
		100		"	"	"		-0.15	-7,3
		120		"	"	"		-0,17	-7,4
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,14	+0,7
		80		50/0.8	100/0.8	200/0.8		-0.14	-7,0
		100		"	"	"		-0.16	-7.0
		120		"	"	"		-0,18	-7.0
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0.16	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,15	-5.8
		100		"	"	"		-0,17	-5.8
		120		"	"	"		-0,19	-5.8
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0.05	+0,6
		2		50/0.8	100/0.8	200/0.8		-0,25	-5,5
		5		"	"	"		-0,24	-5,1
		100		"	"	"		-0,29	-4.0
		150		"	"	"		-0,34	-4.4

Date 12.01.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 086
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 10.1.05

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 12.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 12.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 12.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 12.01.05 Vogel

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 086

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output				F %	∂'
				1a – 1n	2a – 2n	3a - 3n			
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0.19	+0,5
		80		50/0.8	100/0.8	200/0.8		-0,09	-7.4
		100		"	"	"		-0,10	-7,4
		120		"	"	"		-0,12	-7,4
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0.18	+0.6
		80		50/0.8	100/0.8	200/0.8		-0,10	-7.0
		100		"	"	"		-0,12	-7,0
		120		"	"	"		-0,14	-7,1
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,18	+0,9
		80		50/0.8	100/0.8	200/0.8		-0,13	-5,8
		100		"	"	"		-0,14	-5,8
		120		"	"	"		-0,16	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,09	+0,5
		2		50/0.8	100/0.8	200/0.8		-0,20	-5.6
		5		"	"	"		-0,21	-5.2
		100		"	"	"		-0,25	-4,2
		150		"	"	"		-0,30	-4,6

Date 12.01.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 087
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 10.1.05 Chl.

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) / kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) / kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 11.1.05 Chl.

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 11.1.05 Chl.

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 11.1.05 Chl.

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 10.1.05 Ro.

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Hmann

TRENCH GERMANY GMBH
- Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 087

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output				F %	∂
				1a – 1n	2a – 2n	3a - 3n			
380/√3	100/√3	80	1a'– 1n	12.5/0.8	0	0		+0,19	+0,5
		80		50/0.8	100/0.8	200/0.8		-0,08	-7,4
		100		"	"	"		-0,10	-7,4
		120		"	"	"		-0,12	-7,4
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0,19	+0,6
		80		50/0.8	100/0.8	200/0.8		-0,10	-7,1
		100		"	"	"		-0,12	-7,0
		120		"	"	"		-0,14	-7,1
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0,16	+0,8
		80		50/0.8	100/0.8	200/0.8		-0,15	-5,9
		100		"	"	"		-0,17	-5,9
		120		"	"	"		-0,19	-5,9
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0,08	+0,5
		2		50/0.8	100/0.8	200/0.8		-0,21	-5,5
		5		"	"	"		-0,21	-5,1
		100		"	"	"		-0,26	-4,1
		150		"	"	"		-0,32	-4,1

Date 11.1.2005 Signature

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TRENCH

Type	SSU 420/S 22 STL	TG Order No.	04.01.0092.01
Test standard	IEC 60044-2	Serial- No	04/063 088
Insulation level	420/520/1425 kV	Customers' ref.	Termoli Powerplant Italien
Rated frequency	50 Hz	Rated voltage factor	1,5 x U_N 30 s
Gas pressure (20 °C)	4.0 bar(abs)	Insulation class	E
PTB certification mark	Z 321//402		

Ratio

U_{prim}	380 000/√3 V			
U_{sec}	100/√3 V	100/√3 V	100/√3 V	V
Output	50 VA	100 VA	200 VA	VA
Class	0.2 Z	0.2	3P	

1. Power-frequency withstand test of primary winding and measurement of partial discharges

520 kV	60 s	100 Hz	date/sign 10.1.05 Chl.

U	kV		0	242	266	291	416	520	
PD	pC	⇒	1	1	1	1	1	1	U_E*) — kV
PD	pC	⇐	1	1	1	1	1	1	U_A**) — kV

*) Inception voltage **) Extinction voltage

Correction factor (has been considered) Measuring frequency 1.0 MHz sel.

2. Measurement of accuracy (see additional printouts)

Polarity check	date/sign 12.01.05

3. Power-frequency withstand test of secondary windings

3 kV	60 s	50 Hz	date/sign 12.01.05

4. Verification of terminal markings and check of rating plate

Acc. drawing	date/sign 12.01.05

5. Gas tightness test

Leakage rate < 0.5 % p. a.	date/sign 11.01.05 Vogel

The pressure vessels were pressure tested according to the valid guideline for pressure vessels.

Date 17.1.05 Signature Wmann TRENCH GERMANY GMBH - Qualitätssicherung -

TRENCH GERMANY GMBH

ROUTINE TEST REPORT POTENTIAL TRANSFORMER

TG Order No.	04.01.0092.01	Serial No.	04/063 088

MEASUREMENT OF ACCURACY

U_{prim} kV	U_{sec} V	U_N x	Winding	Output				F %	∂
				1a – 1n	2a – 2n	3a - 3n			
380/√3	100/√3	80	1a' – 1n	12.5/0.8	0	0		+0.14	+0.8
		80		50/0.8	100/0.8	200/0.8		-0.14	-7.1
		100		"	"	"		-0.15	-7.1
		120		"	"	"		-0.17	-7.2
380/√3	100/√3	80	1a – 1n	12.5/0.8	0	0		+0.13	+0.9
		80		50/0.8	100/0.8	200/0.8		-0.15	-6.8
		100		"	"	"		-0.17	-6.8
		120		"	"	"		-0.19	-6.9
380/√3	100/√3	80	2a – 2n	0	25/0.8	0		+0.16	+0.8
		80		50/0.8	100/0.8	200/0.8		-0.15	-5.9
		100		"	"	"		-0.16	-5.9
		120		"	"	"		-0.18	-6.0
380/√3	100/√3	100	3a – 3n	0	0	50/0.8		+0.08	+0.6
		2		50/0.8	100/0.8	200/0.8		-0.22	-5.5
		5		"	"	"		-0.22	-5.0
		100		"	"	"		-0.27	-4.0
		150		"	"	"		-0.31	-4.5

Date 12.01.2005

Signature

Energia Molise Power Plant

Single Component Performances

Technip
TECHNIP ITALY S.p.A.

VATECH

Project: H.410.110012 **COMBINED CYCLE**

Document No.: xxxxx&BDC_TER1_PTH00010 **Rev.** C

REV.	ÄNDERUNG/MODIFICATION (letzte 4/last 4)	DATUM/DATE	NAME	GEPR./CHECK	GES./APPR.
A	ORIGINAL	24.10.05	Sengschmied	Vomberg	---------
B	Update	26.04.06	Sengschmied	Vomberg	Vomberg
C	Update	30.06.06	Sengschmied	Vomberg	Vomberg
D					

KUNDE/PURCH.
Energia Molise S.p.A.

LIEFERANT/SUPPLIER

LIEF.DOK.NR./SUPPLIER DOC.NO

BENENNUNG/TITLE
Performance Test
Total Plant
Single Component Performances

VATECH DOC.NO.
xxxxx&BDC_TER1_PTH00010

SCHUTZVERMERK NACH DIN 34 BEACHTEN!
NOTE PROTECTION DIN 34!

	DATUM/DATE	NAME
ERST./CREATED	24.10.2005	Sengschmied
GEPR./CHECK	24.10.2005	Vomberg
GES./APPR.	24.10.2005	Vomberg

For each of the following plant components the listed performances shall be achieved, at the reference conditions as per contract Exhibit S.

	Equipment	Parameter	Component Performance Level
1	Gas turbine	Minimum gross power output [MW]	245
2	Gas turbine	Maximum gross Heat Rate [kJ/kWh]	9,850
3	HRSG	Minimum HP superheating [°C]	560
4	HRSG	Minimum HRH superheating [°C]	560
5	HRSG	Maximum HP pinch point [°K]	14
6	HRSG	Maximum IP pinch point [°K]	14
7	HRSG	Maximum LP pinch point [°K]	13
8	HRSG	Maximum stack temperature [°C]	102
9	Steam turbine	Maximum swallowing capacity	100
10	Steam turbine	Minimum gross power output [MW]	274
11	Auxiliary equipment	Electrical Own Consumption and losses– 100 % load [MW]	17.5
12	Condenser	Maximum TTD [°K] (b)	4.5
13	Condenser	Maximum vacuum [mbar]	70
14	Cooling tower	Maximum drift factor [%]	0.01
15	Cooling tower	Maximum approach temperature [-]	8.0
16	Feedwater	Oxygen in feedwater [ppb]	10
17	DCS system (a)	Update time operation pictures [sec]	< 2
18	DCS system (a)	Changing time of operating pictures [sec]	<1.5
19	GT Generator	Generator loss 100 % load [MW]	3.5
20	ST Generator	Generator loss 100 % load [MW]	4.7
21	Vibration	Vibration Gas Turbine	A
22	Vibration	Vibration Steam Turbine	A

Notes

(a) For screen picture with 50 analogue values , 10 binary values and 15 operating objects

(b) Terminal Temperature Difference between cooling water and condensate

1 Gas Turbine minimum gross power output

Objective of the Test:
To demonstrate, that gas turbine gross power output is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of gas turbine gross power output is done during the performance test.

Evaluation:
The gas turbine generator net power output will be corrected from the test conditions to the rated conditions.

CGNPO = Corrected gas turbine generator net power output, kW

$$CGNPO = GNPO \prod_{i=1}^{n} \frac{1}{Fi_P}$$

where:

GNPO = Gas turbine generator net power output, kW

F1P = Factor to correct power from the measured compressor inlet temperature to the rated compressor inlet temperature

F2P = Factor to correct power from the measured compressor inlet relative humidity to the rated compressor inlet relative humidity.

F3P = Factor to correct power from the measured barometric pressure to the rated barometric pressure

F4P = Factor to correct power from the measured turbine shaft speed to the rated turbine shaft speed

F5P = Factor to correct power from the measured generator power factor to the rated generator power factor

$$= 1 + \frac{F5_{P(a)} - F5_{(b)P}}{GNPO}$$

where:

F5P(a) = Generator losses at the measured generator net power output (GNPO) and rated generator power factor

F5PR(b) = Generator losses at the measured generator net power output (GNPO) and measured generator power factor

F6P = Factor to correct power from the total fired hours accumulated prior to the test to the allowable total accumulated fired hours, as long as the total fired hours accumulated exceeds the allowable fired hours

$$=1-\frac{F6_{P(b-a)}}{100}$$

where:

F6P(b-a) = Generator output degradation correction factor

at the total fired hours accumulated prior to the

performance test less the allowable fired hours

F11P = Factor to correct power from the test fuel composition to

the rated fuel composition.

Measurement signals are listed in Appendix C, Class S.

For GT correction curves see Appendix B.

Acceptance Criteria:
If the determined value for gas turbine gross power output is above or equal to the minimum performance levels, then gas turbine gross power output shall be considered in compliance with the contract.

2 Gas turbine maximum gross heat rate

Objective of the Test:
To demonstrate, that gas turbine gross heat rate is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of gas turbine gross power output and heat consumption rate is done during the performance test.

Evaluation:
Gas turbine generator net heat rate will be calculated from the measured rate of heat consumption

and the measured generator net power output.

GNHR = Gas turbine generator net heat rate, KJ/KWh

GNHR = HC / GNPO, KJ/KWh

where:

HC = Heat consumption rate, KJ/hr

GNPO = Generator net pow er output, kW

Gas turbine rate of heat consumption w ill be calculated from the measured fuel flow rate and the fuel low er heating value at constant pressure (LHV_P).

Gas turbine generator net heat rate w ill be corrected from the test conditions to the rated conditions:

CGNHR = Corrected gas turbine generator net heat rate, KJ/KWh

$$CGNHR = GNHRO \prod_{i=1}^{n} \frac{1}{Fi_{HR}}$$

where:

GNHR = Gas turbine generator net heat rate, KJ/KWh.

$F1_{HR}$ = Factor to correct heat rate from the measured compressor inlet temperature to the rated compressor inlet temperature

$F2_{HR}$ = Factor to correct heat rate from the measured compressor inlet relative humidity to the rated compressor inlet relative humidity.

$F3_{HR}$ = Factor to correct heat rate from the measured barometric pressure to the rated barometric pressure

$F4_{HR}$ = Factor to correct heat rate from the measured turbine shaft speed to the rated turbine shaft speed

$F5_{HR}$ = Factor to correct heat rate from the measured generator pow er factor to the rated generator pow er factor

$$= 1 + \frac{F5_{HR(a)} - F5_{HR(b)}}{GNPO}$$

where:

$F5_{HR(a)}$ = Generator losses at the measured generator net pow er output (GNPO) and rated generator pow er factor

$F5_{HR(b)}$ = Generator losses at the measured generator net power output (GNPO) and measured generator pow er factor

$F6_{HR}$ = Factor to correct heat rate from the total fired hours accumulated prior to the test to the allow able total accumulated fired hours, as long as the total fired hours accumulated exceeds the allow able fired hours

$$=1-\frac{F6_{HR(b-a)}}{100}$$

where:

$F6_{HR(b-a)}$ = Thermal efficiency degradation correction factor at the total fired hours accumulated prior to the performance test less the allow able fired hours

Measurement signals are listed in Appendix C, Class S.

$F11_{HR}$ = Factor to correct heat rate from the test fuel composition to the rated fuel composition

Acceptance Criteria:
If the determined value for gas turbine gross heat rate is below or equal to the minimum performance levels, then gas turbine gross heat rate shall be considered in compliance with the contract.

For GT correction curves see Appendix B.

3 HRSG HP min superheating

Objective of the Test:
To demonstrate, that HP superheating is in compliance w ith the contractual minimum performance levels w ithin acceptable industry tolerances.

Course of the Test:
Measurement of HP superheating is done during the performance test.

Ev aluation:
The measured value of the parameter to be corrected w ill be corrected as:

$$CP_{HP-Temp,corrected} = CP_{HP-Temp,measured}\prod_{k=1}^{n} c_{HP-Temp,k}$$

where:

$CP_{HP-Temp,corrected}$ Corrected value HP Temperature

$CP_{HP\text{-}Temp,measured}$ Measured value HP Temperature

$c_{HP\text{-}Temp,k}$ Correction of HP Temperature due to affecting parameter

Measurement signals are listed in Appendix C, Class S.

For HRSG correction curves see Appendix B.

Acceptance Criteria:
If the determined value for HP superheating is above or equal to the minimum performance levels, then HP superheating shall be considered in compliance with the contract.

4 HRSG HRH min superheating

Objective of the Test:
To demonstrate, that HRH superheating is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of HRH superheating is done during the performance test.

Evaluation:
The measured value of the parameter to be corrected will be corrected as:

$$CP_{HP-Temp,corrected} = CP_{HP-Temp,measured} \prod_{k=1}^{n} c_{HP-Temp,k}$$

where:

$CP_{HP\text{-}Temp,corrected}$ Corrected value HP Temperature

$CP_{HP\text{-}Temp,measured}$ Measured value HP Temperature

$c_{HP\text{-}Temp,k}$ Correction of HP Temperature due to affecting parameter

Measurement signals are listed in Appendix C, Class S.

For HRSG correction curves see Appendix B.

Acceptance Criteria:
If the determined value for HRH superheating is above or equal to the minimum performance levels, then HRH superheating shall be considered in compliance with the contract.

8 HRSG max. stack temperature

Objective of the Test:
To demonstrate that the max. stack temperature is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of stack temperature is done during the performance. HRSG preheater inlet temperature is 60°C.

Acceptance Criteria:
If the determined value for the stack temperature is below or equal to the minimum performance levels, then the stack temperature shall be considered in compliance with the contract.

9 Maximum swallowing capacity

Objective of the Test:
To demonstrate that the maximum swallowing capacity is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of HP steam temperature, HP Mass Flow and HP pressure is done during the performance test as outlined in chapter 4.3 of performance test procedure.

Evaluation:
Swallowing capacity is calculated as follows according to DIN 1943 and ASME PTC6:

$$m_{\max} = m_{measured} \frac{\sqrt{\frac{v_{measured}}{p_{measured}}}}{\sqrt{\frac{v_{design}}{p_{design}}}}$$

$$v = f(p,t)$$

where:

p = HP steam pressure steam at turbine inlet

t = HP steam temperature steam at turbine inlet

m = HP steam mass flow at steam turbine inlet

v = specific volume steam turbine inlet

10 Steam Turbine Minimum Gross Power Output

Objective of the Test:
To demonstrate, that steam turbine gross power output is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of steam turbine gross power output is done during the performance test.

Evaluation:
For the correction of test conditions deviating from specification correction curves for power output are used.

The corrected gross power output is expressed as:

$$P_{corrected} = P_{measured} * \left(1 + \sum_{i=1}^{n} f_i / 100\right)$$

where f_i = correction factors [%] with i = 1 to n ; wherein n = number of correction curves.

The given curves are only valid for the range that is presented. An extrapolation is not permitted.

Measurement signals are listed in Appendix C, Class S.

For steam turbine correction curves see Appendix B.

Acceptance Criteria:
If the determined value for steam turbine gross power output is above or equal to the minimum performance levels, then steam turbine gross power shall be considered in compliance with the contract.

11 Electrical Own Consumption and losses

Objective of the Test:
To demonstrate, that electrical own consumption and losses are in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of electrical own consumption and losses is done during the performance test. Only one unit transformer will be in operation during the test.

Evaluation:
Electrical own consumption and loss = Power measured at unit transformer minus Power consumption for GT excitation.

Acceptance Criteria:
If the determined value for electrical own consumption and losses is below or equal to the minimum performance levels, then electrical own consumption and losses shall be considered in compliance with the contract.

12 Maximum TTD:

Objective of the Test:
To demonstrate, that TTD is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of TTD is done during the plant performance test.

Evaluation:
To correct the measured terminal temperature difference TTD to reference conditions, following equations are applied:

$$TTD_{corr} = \frac{TTD_{design}}{TTD_{fromCC}} TTD_{measured}$$

with

TTD corr: to reference conditions corrected terminal temperature difference [K]
TTD design: design terminal temperature difference [K]
TTD measured: measured terminal temperature difference [K]
TTD fromCC: expected terminal temperature difference at measured cooling water inlet temperature and cooling water mass flow taken from condenser curves.

The respective condenser curves by 90%, 100% and 110% cooling water mass flow are attached.

Acceptance Criteria:
If the determined value for TTD is below or equal to the minimum performance levels, then TTD shall be considered in compliance with the contract.

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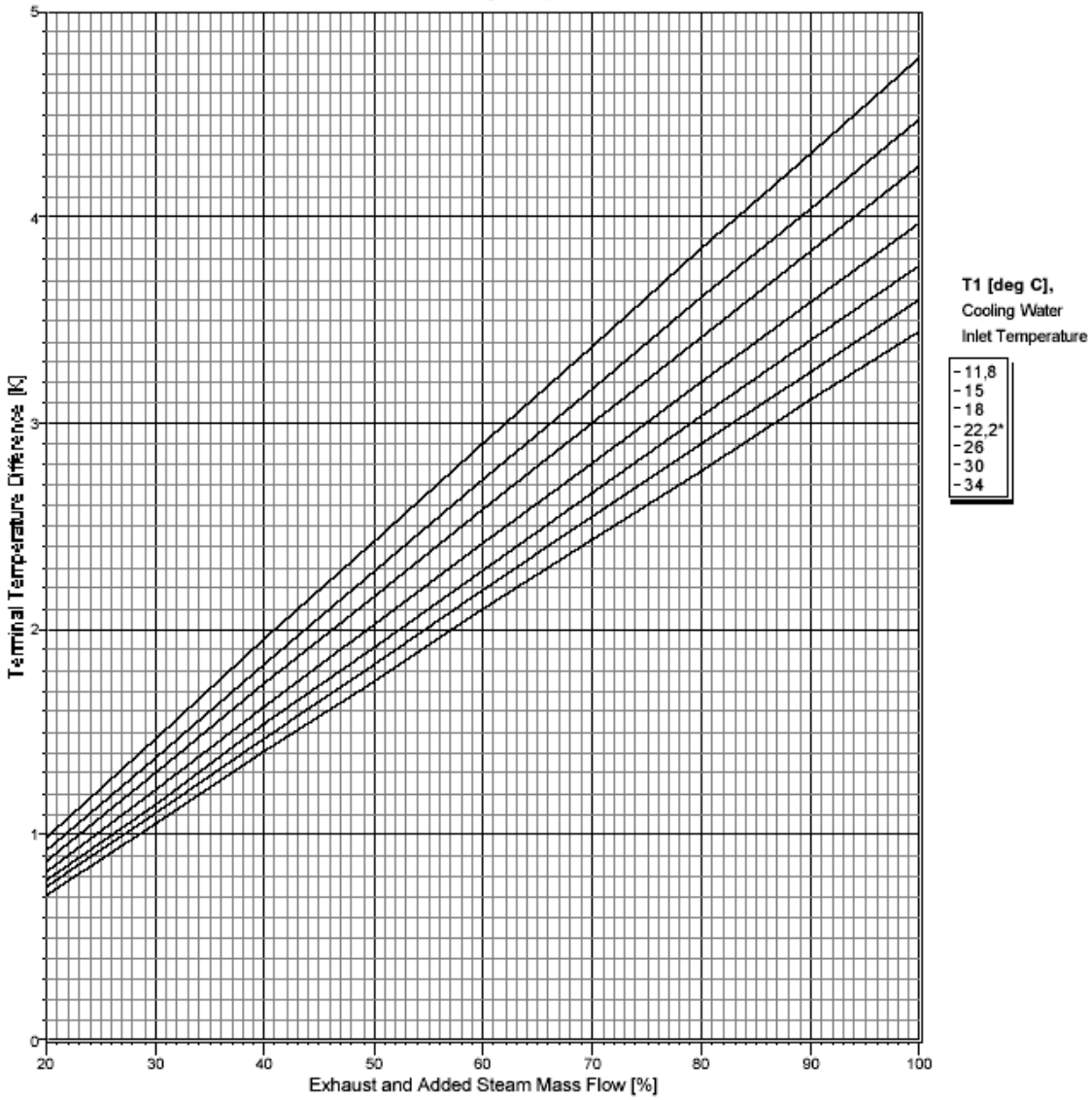
PROJECT NAME: Termoli 90% cw flow

Order Number: 10810
Plant ID: ITL364
Working Condenser Surface: 15217,66 m2 (100%)
Cooling Water Mass Flow: 9963 kg/s (100%)
Heat Flow: 456477 kJ/s

1.1 Normal Operation with 100% Working Surface Area
*' * ' denotes Design Temperature*



Department:	Prepared by:		Date:		Signature:		Document Number:
NBCON	Checked by:		Date:		Signature:		

2006. 06. 16. 12:30:47

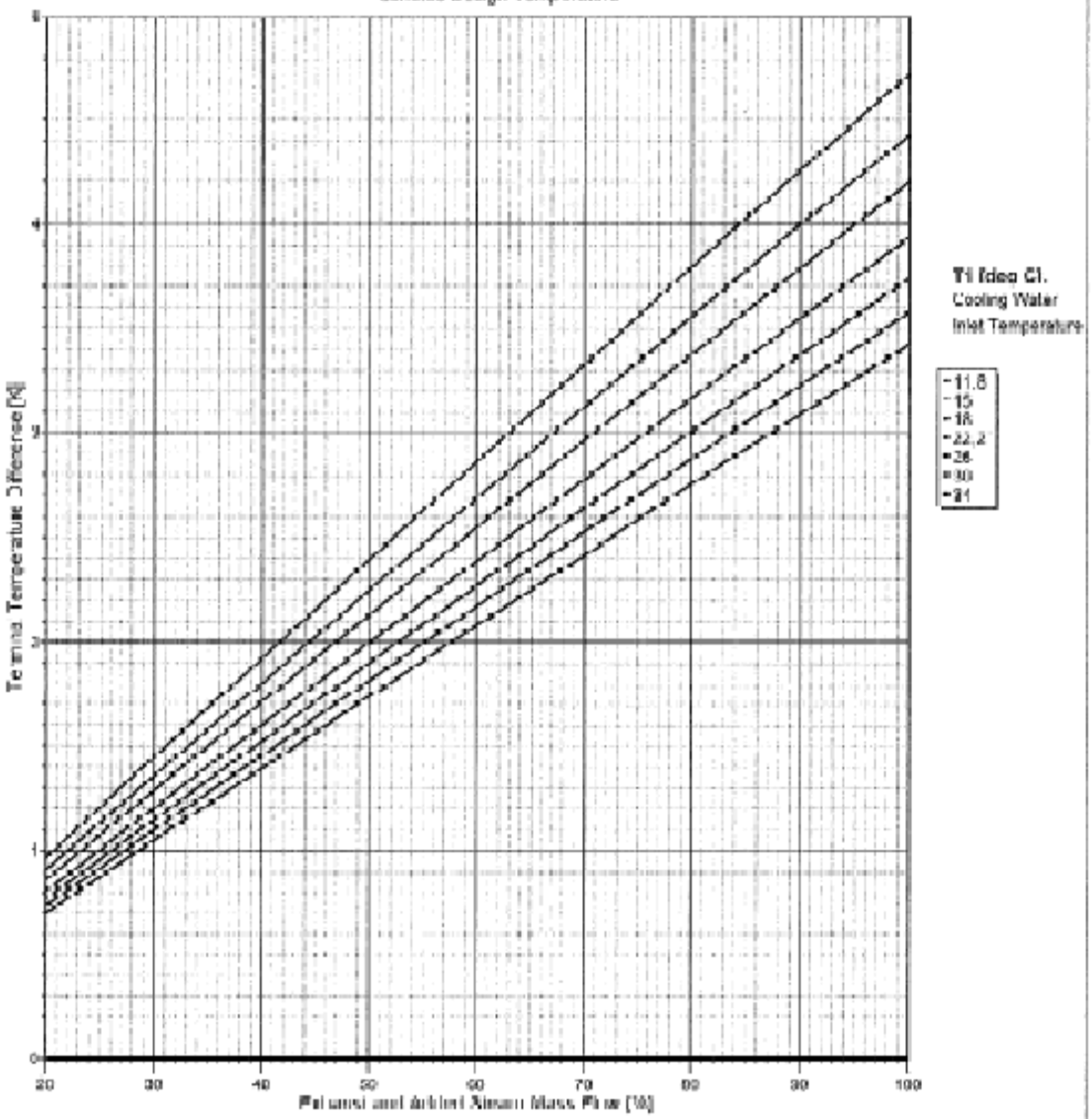
TERMINAL TEMPERATURE DIFFERENCE

SIEMENS PG CondDocs v1.0.1

PROJECT NAME: Termoli

Order Number: 10919
Plant ID: ITL364
Working Condenser Surface: 15217,88 m2 (100%)
Cooling Water Mass Flow: 11070 kg/s (100%)
Heat Flow: 45 / 427,4 kJ/s

1.1 Normal Operation with 100% Working Surface Area
*** denotes Design Temperature



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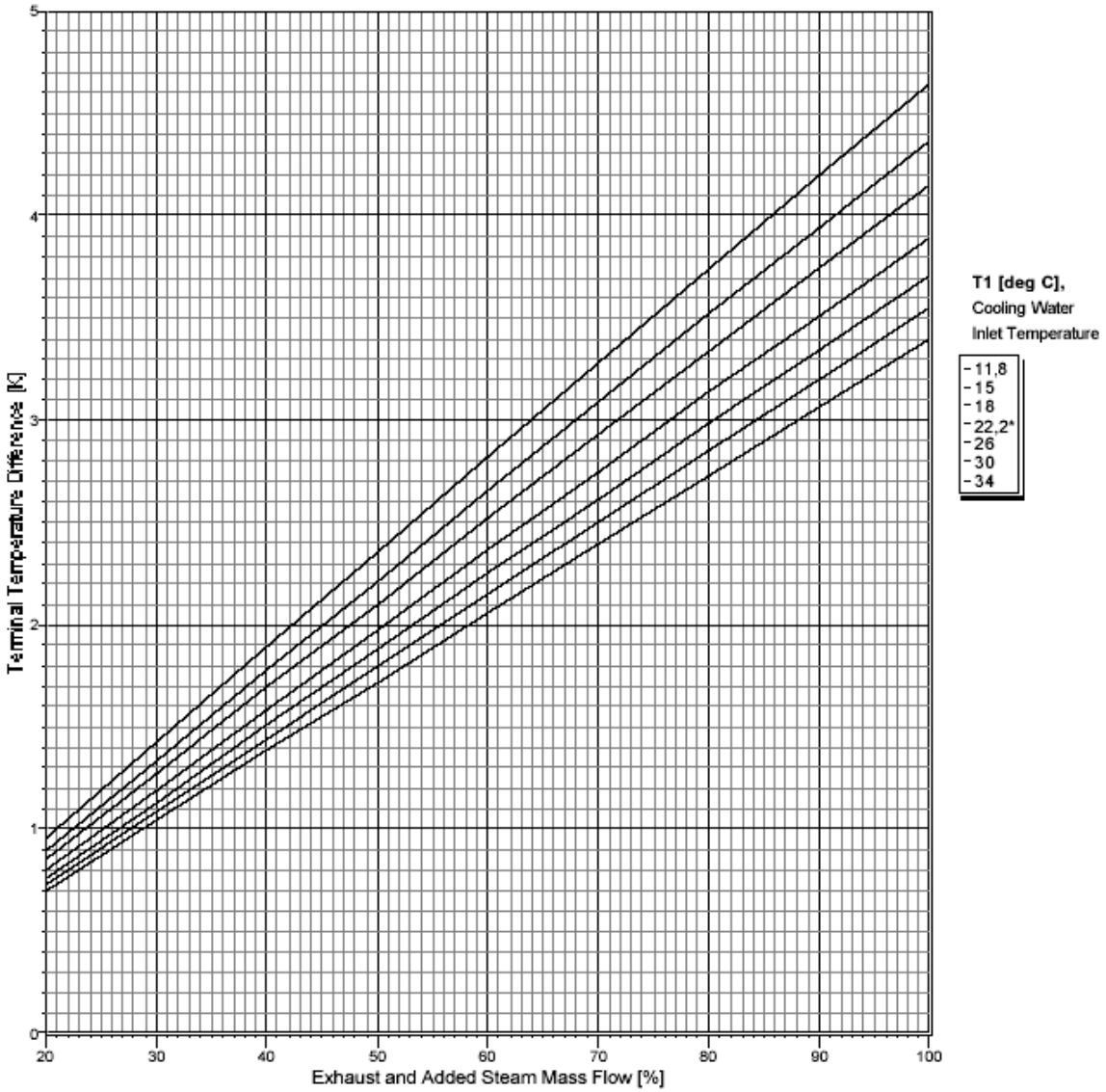
NBCON	Approved by:	Lajko	Date:		Signature:		16816-941641/002

2006. 04. 04. 13:51:50	TERMINAL TEMPERATURE DIFFERENCE	SIEMENS PG CondDocs v2.0.2

PROJECT NAME: Termoli 110% cw flow

Order Number: 10810
Plant ID: ITL364
Working Condenser Surface: 15217,66 m2 (100%)
Cooling Water Mass Flow: 12177 kg/s (100%)
Heat Flow: 458218,4 kJ/s

1.1 Normal Operation with 100% Working Surface Area
*' * ' denotes Design Temperature*



Department:	Prepared by:		Date:		Signature:		Document Number:
NBCON	Checked by:		Date:		Signature:		

13 Condenser maximum vacuum

Objective of the Test:

To demonstrate, that condenser vacuum is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:

Measurement of condenser vacuum is done during the performance test as outlined in chapter 4.3 of performance test procedure.

Evaluation:

Measured cooling water inlet temperature is corrected to the corrected cooling water inlet water temperature $T_{in,corr}$ with the help of cooling tower correction curves. Saturation temperature T_s of exhaust steam is the sum of the corrected values of cooling water inlet temperature, temperature rise and terminal temperature difference.

$$T_{S,corr} = T_{in,corr} + TR_{corr} + TTD_{corr}$$

Corrected cooling water temperature rise is calculated as follows:

$$TR_{corr} = TR_{measured} \frac{Q_{design}}{Q_{measured}} \frac{m_{CW,measured}}{m_{CW,design}}$$

Condenser vacuum is a function of saturated steam temperature:

$$p_{s,corr} = f(T_{s,corr})$$

Acceptance Criteria:

If the determined value for condenser vacuum is below or equal to the minimum performance levels, then condenser vacuum shall be considered in compliance with the contract.

14 Cooling Tower Maximum Drift Factor

Refer to procedure “Instruction for the estimation of the drift losses” (B615A04-D108-6, Cooling Tower test procedure, Appendix III).

15 Cooling Tower Maximum Approach Temperature

Refer to procedure “Instruction for the estimation of the drift losses” (B615A04-D108-6, Cooling Tower test procedure, Appendix II).

16 Oxygen in Feedwater

Objective of the Test:
To demonstrate that oxygen content of condensate is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Water/steam cycle cleaned up after initial commissioning and all chemistry values within specification of VGB guidelines R450L. Overall plant in steady state power operation for at least 60 minutes at constant compined cycle load between 40-100%. No load changes during sampling and monitoring.

The sampling system QU is in service. Oxygen probe shall be calibrated and sampling flows should be adjusted according to manufacturer's instructions and kept constant.

Boiler blowdown lines shall be opened in order to achieve water losses and the need for permanent make-up.

Test duration shall be 3 hours.

Oxygen content of condensate shall be measured with the existing online measurement at the sampling system QU. Condensate flow rate and makeup flow rate shall be measured with existing online flow meters. Alternativly, the makeup flow rate can be calculated from the demin water tank level drop during the measuring period.

Evaluation:
Test performance shall be documented by means of OM printouts of pre-configered OM-curves (oxygen content, condensate flow, makeup flow)

Acceptance Criteria:
If the determined value for oxygen content of condensate is below or equal to the minimum performance levels, the content of condensate shall be considered in compliance with the contract.

17 Update time operation pictures

To clarify the meaning of "Update time operating pictures" The following definition will be used:

The guaranteed elapsed time between the change of the status of current plant information and the change of that information on a current display screen. Shall not exceed 2 seconds under the most arduous operating conditions.

Objective of the Test:
To demonstrate that the up-dating time of the operation pictures is in compliance with the minimal performance levels within acceptable industrial tolerances.

Course of the test:

1. Test Station

One DCS Operation Station must be made available for carrying out the performance test.

2 Test Priorities

Any actions carried out during the performance test should not interfere or disturb the normal operation of the plant.

3 Operation Pages

All graphic pages should be made available so that the performance test can be implemented on any page required. Therefore all graphic pages on the DCS operator station used for the test, should be up-to-date on the DCS file servers.

4 Implementation

Select an operation page from the menu on the left side of operator screen. Within that page select am operation faceplate, and implement a command that w ill change the display. Note at all times item 3.2 above.

An accurate and reliable stop w atch can be used to record the elapsed time from the implementation of the command to the change in display. The time must not exceed 2 seconds.

Return any displays changed for the purpose of the test back to the original status.

A minimum of ten different operation faceplates should be tested on various pages, all having the display change times recorded.

Ev aluation:

The time specified of < 2 seconds, is the maximum time needed for a command issued from an operator station to be processed in the DCS and sent to an in tented target, and then the action completed on the target to be feedback and processed through the DCS and displayed on the operator station.

Therefore care must be taken on selecting commands to certain targets, for example valves. As the feedback signal time to the displays w ill be effected by other factors outside the scope of the DCS such as the valve response time.

Acceptance Criteria:

If the determined value for the “Update time of the operation pictures” is above or equal to the minimum performance levels, then “Update time of the operation pictures” shall be considered in compliance w ith the contract.

18 Changing time of operating pictures

To clarify the meaning of “Changing time of operating pictures”. The follow ing definition w ill be used:

The guaranteed elapsed time between the completion of a command request for a change in display and the appearance of that display with current plant information shall not exceed 1.5 seconds under the most arduous operating conditions.

Objective of the Test:

To demonstrate that the changing time of the operation pictures is in compliance with the Minimal performance levels within acceptable industrial tolerances.

Course of the test:

1. Test Station

One DCS Operation Station must be made available for carrying out the performance test.

2. Test Priorities

Any actions carried out during the performance test should not interfere or disturb the normal operation of the plant.

3. Operation Pages

All graphic pages should be made available so that the performance test can be implemented on any page required. Therefore all graphic pages on the DCS operator station used for the test, should be up-to-date on the DCS file servers.

4. Implementation

Select an operation page from the menu on the left side of operator screen.

Select another operation page anywhere in the menu. With an accurate and reliable stop watch record the time taken for the page to change from one display to the other.

Repeat the test for a minimum of ten different pages, recording each change time.

Evaluation:

The time specified of < 1.5 seconds, is the maximum time it should take for the change of display from one page to another.

Factors effecting the display change time are mainly the amount of items displayed on the individual screens. The more symbols on the display the longer the time to change the page.

Acceptance Criteria:

If the determined value for the “Changing time of the operation pictures” is above or equal to the minimum performance levels, then “Changing time of the operation pictures” shall be considered in compliance with the contract.

19 Gas turbine generator loss 100% load

Objective of the Test:

To demonstrate, that gas turbine generator loss is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:

Measurement of generator cooling load and generator power factor during the performance test.

Evaluation:

Measured calorimetric quantities:

a) Qa = rate of flow of cooling water through generator and lube oil coolers.

b) Dta = T2 - T1 = temperature rise of the cooling water, i.e. difference of water temperatures from cooler inlet T1 to cooler outlet T2

d) mean temperature difference Dt1-n between machine reference surface(s) and external ambient air temperature (for instance generator covers, turbine side etc. Dt1-n is used for calculating Pi2)

Determination of losses from calorimetric quantities:

A “reference surface” is defined which completely surrounds the machine or the thrust/guide bearing(s) respectively when measured separately. Total losses Pi produced inside the reference surface are dissipated to the external in form of heat Pi1 through generator and lube oil coolers and to some smaller extent Pi2 through the surfaces:

$Pi = Pi1 + Pi2$

These loss components are determined from calorimetric quantities that are measured during the test run of the generator at base load und steady state conditions.

The losses Pi1 which are dissipated by the cooling circuits are determined from measured values of Q and Dt:

$P_{i1} = \rho_a * Cp_a * Q_a * Dt_a - \rho_b * Cp_b * Q_b * Dt_b$

Both density ρ and specific heat capacity Cp of the cooling water are temperature dependent. These values are determined with the measured cooler inlet and outlet temperatures T1 and T2 according IAPWS-IF 97 for water.

Through the reference surface, parts of the losses Pi2 are dissipated by convection and radiation. Normally only surface temperature rises are measured. Dissipated losses are then calculated with the formula:

$Pi2 = h * area * Dt1\text{-}n$

The heat dissipation factor h (assuming low velocity of ambient air: v = 1 m/s) shall be taken as

$h = 11 + 3v = 14\ (W/m^2K)$

Losses dissipated by conduction into the foundations and into the shaft (or gained from it) are neglected.

Total measured loss Pi is corrected to design power factor.

Measurement signals are listed in Appendix C, Class S.

Acceptance Criteria:
If the corrected value for gas turbine generator loss is below or equal to the minimum performance levels, then gas turbine generator loss shall be considered in compliance with the contract.

20 Steam turbine generator loss 100% load

Objective of the Test:
To demonstrate, that steam turbine generator loss is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Course of the Test:
Measurement of generator cooling load and generator power factor during the performance test.

Evaluation:
Measured calorimetric quantities:

a) Qa = rate of flow of cooling water through generator and lube oil coolers.

b) Dta = T2 - T1 = temperature rise of the cooling water, i.e. difference of water temperatures from cooler inlet T1 to cooler outlet T2

d) mean temperature difference Dt1-n between machine reference surface(s) and external ambient air temperature (for instance generator covers, turbine side etc. Dt1-n is used for calculating Pi2)

Determination of losses from calorimetric quantities:

A “reference surface” is defined which completely surrounds the machine or the thrust/guide bearing(s) respectively when measured separately. Total losses Pi produced inside the reference surface are dissipated to the external in form of heat Pi1 through generator and lube oil coolers and to some smaller extent Pi2 through the surfaces:

Pi = Pi1 + Pi2

These loss components are determined from calorimetric quantities that are measured during the test run of the generator at base load und steady state conditions.

The losses Pi1 which are dissipated by the cooling circuits are determined from measured values of Q and Dt:

$$P_{i1} = \rho_a * Cp_a * Q_a * Dt_a - \rho_b * Cp_b * Q_b * Dt_b$$

Both density ρ and specific heat capacity Cp of the cooling water are temperature dependent. These values are determined with the measured cooler inlet and outlet temperatures T1 and T2 according IAPWS-IF 97 for water.

Through the reference surface, parts of the losses Pi2 are dissipated by convection and radiation. Normally only surface temperature rises are measured. Dissipated losses are then calculated w ith the formula:

Pi2 = h * area * Dt1-n

The heat dissipation factor h (assuming low velocity of ambient air: v = 1 m/s) shall be taken as

h = 11 + 3v = 14 (W/m²K)

Losses dissipated by conduction into the foundations and into the shaft (or gained from it) are neglected.

Total measured loss Pi is corrected to design pow er factor.

Measurement signals are listed in Appendix C, Class S.

Acceptance Criteria:
If the corrected value for steam turbine generator loss is below or equal to the minimum performance levels, then steam turbine generator loss shall be considered in compliance with the contract.

21 Vibration Gas Turbine

Refer to procedure for “Plant Demonstration Tests” (Document No.: ATH01135 Rev. C).

22 Vibration Steam Turbine

Refer to procedure for “Plant Demonstration Tests” (Document No.: ATH01135 Rev. C).

Energia Molise Power Plant

Guaranteed plant operation constraints

Technip TECHNIP ITALY S.p.A. VATECH

Project: H.410.110012 **COMBINED CYCLE**

Document No.: xxxxx&BDC_TER1_PTH00011 **Rev.** A

REV.	ÄNDERUNG/MODIFICATION (letzte 4/last 4)	DATUM/DATE	NAME	GEPR./CHECK	GES./APPR.
A	ORIGINAL	24.10.05	Sengschmied	Vomberg	---------
B					
C					
D					

KUNDE/PURCH.

Energia Molise S.p.A.

LIEFERANT/SUPPLIER

LIEF.DOK.NR./SUPPLIER DOC.NO

BENENNUNG/TITLE

Performance Test
Total Plant
Guaranteed plant operation constraints

VATECH DOC.NO.

xxxxx&BDC_TER1_PTH00011

SCHUTZVERMERK NACH DIN 34 BEACHTEN!
NOTE PROTECTION DIN 34!

	DATUM/DATE	NAME
ERST./CREATED	24.10.2005	Sengschmied
GEPR./CHECK	24.10.2005	Vomberg
GES./APPR.	24.10.2005	Vomberg

1. Power plant start up test

1.1. Objective of the Test:

To demonstrate, that the power plant start up time is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Parameter	Minimum Performance Levels
Cold start up [min] (a) (b) (e)	≤ 280
Warm start up [min] (b) (c) (e)	≤ 170
Hot start up [min] (b) (d) (e)	≤ 80

Notes

a) Cold condition: after more than 90 hr stop

b) Precondition as for Exhibit V – Chapter 4.7.4

c) Warm condition: between 8 and 60 hr stop

d) Hot condition: between 0 and 8 hr stop

e) Start up time is time from start from DCS to Maximum Plant Load

1.2. Course of the Test:

The unit is shut down. Start up preparations and systems in operation as per document ATH00112. The power plant is started, synchronised and brought to full load.

Start up time is counted between start of gas turbine and achievement of 100 % gas turbine load and steam turbine control valve wide open.

1.3. Acceptance Criteria:

If the determined value for start up time is below or equal to the minimum performance levels, then start up time shall be considered in compliance with the contract.

2. CCGT minimum load test

2.1. Objective of the Test:

To demonstrate, that the CCGT minimum load is in compliance with the contractual minimum performance level of 250 MW within acceptable industry tolerances.

2.2. Course of the Test:

The power plant is operated with one gas turbine at 60% load.

2.3. Acceptance Criteria:

If the corrected value for CCGT minimum load is below or equal to the minimum performance levels, then CCGT minimum load shall be considered in compliance with the contract.

3. Load rate test

3.1. Objective of the Test:

To demonstrate, that the loading rate of the gas turbine and the power plant is in compliance with the contractual minimum performance levels within acceptable industry tolerances.

Parameter	Minimum Performance Levels
Gas turbine loading rate [MW/min](f) (g)	20
CCGT loading rate [MW/min](h)	50

Notes

f) Between 60% and 100% of the load

g) Each GT shall be capable to over fire up to 103 % load for 30 minutes

h) Mean value between 50% and 100% plant load

3.2. Course of the Test:

The gas turbine is ramping up from 60% load to 100% load. Prerequisite is that the gas turbine and the steam turbine are in thermal equilibrium condition. Gas turbine load and plant load is measured during ramping up.

3.3. Acceptance Criteria:

If the determined value the loading rate:

$$LoadingRate[MW/\min] = \frac{P_{100\%} - P_{60\%}[MW]}{timedifference[\min]}$$

is above or equal to the minimum performance levels, then loading rate shall be considered in compliance with the contract.