

Summary of Compliance to the IEEE Std. 603 and IEEE Std. 7-4.3.2

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Prepared: Susumu Okuda Jun. 8, 2015
Susumu Okuda, Engineer
Control & Protection Systems Section Date

Reviewed: Manabu Taniguchi Jun. 8, 2015
Manabu Taniguchi, Manager
Control & Protection Systems Section Date

Approved: Hidetoshi Matsushita Jun. 8, 2015
Hidetoshi Matsushita, Section Manager
Control & Protection Systems Section Date

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Prepared	Susumu Okuda			
Reviewed	Manabu Taniguchi			
Approved	Hidetoshi Matsushita			

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Mitsubishi Electric Corporation
7-3, Marunouchi 2-chome, Chiyoda-ku
Tokyo 100-8310 Japan

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1.0 INTRODUCTION

This document provides the results of the Mitsubishi Electric Total Advanced Controller (MELTAC) platform compliance evaluation to the requirements of IEEE Std. 603 (1991) "Criteria for Safety Systems for Nuclear Power Generating Stations" and IEEE Std. 7-4.3.2 (2003) "Criteria for Digital Computers in Safety Systems for Nuclear Power Generating Stations." These compliance evaluations are contained in Compliance Matrices (CM) presented in sections 4.3 and 4.4.

This document supports the "Safety System Digital Platform - MELTAC - Topical Report" (JEXU-1041-1008) and satisfies the commitment made under Table 1, section 1.16 of the document "Mapping of MELTAC Platform Licensing Documents to the DI&C-ISG-06 Guidance" (JEXU-1041-1012).

2.0 REFERENCES

Table 1 References

No.	Document Name	Document Number	Revision
1	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants	10 CFR 50 Appendix B	Current
2	Criteria for Safety Systems for Nuclear Power Generating Stations	IEEE Std. 603-1991	1991
3	Criteria for Digital Computers in Safety Systems for Nuclear Power Generating Stations	IEEE Std. 7-4.3.2-2003	2003
4	Quality Manual Based on U.S. Nuclear Regulations	ARQ-14P001	Current
5	Safety System Digital Platform – MELTAC–Topical Report	JEXU-1041-1008	Current
6	MELTAC Platform ISG-04 Conformance Analysis	JEXU-1041-1015	Current
7	MELTAC Software Program Manual	JEXU-1041-1016	Current
8	Summary of MELTAC Platform Equipment Qualification	JEXU-1041-1023	Current
9	Summary of MELTAC Platform QA	JEXU-1041-1025	Current
10	Summary of MELTAC Platform Reliability	JEXU-1041-1027	Current
11	MELTAC Platform Software Safety Analysis	JEXU-1041-1030	Current
12	MELTAC Platform Software Tools	JEXU-1041-1031	Current
13	MELTAC Platform Setpoint Methodology	JEXU-1041-1100	Current

3.0 ACRONYMS

Table 2 Acronyms

Acronyms	Terms
CM	Compliance Matrix
ESC	Energy Systems Center
IEEE	Institute of Electrical and Electronic Engineers
MELCO	Mitsubishi Electric Corporation
MELTAC	Mitsubishi Electric Total Advanced Controller
NRC	Nuclear Regulatory Commission
QAP	Quality Assurance Program
SPM	Software Program Manual
Std.	Standard
V&V	Verification and Validation

4.0 MELTAC PLATFORM COMPLIANCE TO IEEE STD. 603 (1991) AND IEEE STD. 7-4.3.2 (2003)

4.1 Scope

IEEE Std. 603 (1991) and IEEE Std. 7-4.3.2 (2003) include many application specific requirements which are dependent on a plant design. Application specific requirements are identified in each CM and are not evaluated. Only those requirements applicable at the platform level are reviewed against the MELTAC platform.

4.2 Compliance Matrices

The compliance evaluations for the MELTAC platform against the requirements of IEEE Std. 603 (1991) and IEEE Std. 7-4.3.2 (2003) have been completed in a matrix format and are provided in sections 4.3 and 4.4.

The following are the columns included in the compliance matrices and content of each column.

Section	The section of the standard being evaluated.
Title	Indicates the title of the evaluated section.
Assessment	Contains the evaluation of the section requirements against the characteristics of the MELTAC platform.
Reference	Identifies the document numbers and applicable sections which support the evaluation provided in the "Assessment" column. No section is given if the entire document is applicable to the evaluation.

4.3 IEEE Std. 603 (1991) Evaluation

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
1.	Scope	General description. No requirement.	None
1.1	Illustration	General description. No requirement.	None
1.2	Application	Guidance on applying the safety system criteria to digital computer-based systems is provided in IEEE Std. 7-4.3.2-2003 as endorsed by RG 1.152, Revision 3. JEXU-1041-1016 commits to IEEE Std. 7-4.3.2-2003 and RG 1.152, Revision 3.	<u>JEXU-1041-1016</u> 3.2.6, 3.3.5, 3.10.8, 3.11.4, 3.12.7, 4.0
2.	Definitions	Definition only. No requirement.	None
3.	References	References only. No requirement.	None
4.	Safety System Designation	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.1	Design Basis Events	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.2	Safety Functions and Corresponding Protective Actions	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.3	Permissive Conditions for Each Operating Bypass Capability	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.4	Variables Required to be Monitored for Protective Action	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
4.5	The Minimum Criteria for Each Action Controlled by Manual Means	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.5.1	Allowed Time and Plant Condition	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.5.2	Justification of Permitting Initiation or Control Subsequent to Initiation	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.5.3	Control Room Habitability	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.5.4	Display of Variable	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.6	Spatially Dependent Variables	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.7	Range of Conditions for Safety System Performance	The MELTAC platform is qualified for the expected transient and steady state conditions at the typical nuclear power plant.	<u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1023</u>
4.8	Functional Degradation of Safety Functions	The MELTAC platform is qualified for the expected safety to non-safety isolation requirements at the typical nuclear power plant.	<u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1023</u>

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
4.9	Reliability	Failure Mode and Effects Analysis (FMEA) and the reliability data for each MELTAC platform module is provided for input to the application level systems analysis.	<u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0 <u>JEXU-1041-1027</u>
4.10	The Critical Points in Time or the Plant Conditions	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.11	Equipment Protective Provisions	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
4.12	Other Special Design Basis	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.	Safety System Criteria	The items contained within this clause are addressed in each sub-clause.	None
5.1	Single-Failure Criterion	This is an application specific item that is dependent on a plant design. The MELTAC platform includes features to minimize the possibility of a single failure affecting the operation of the equipment. The MELTAC platform contains Self-diagnosis features to identify failures. Failure Mode and Effects Analysis (FMEA) and the reliability data for each MELTAC platform module is provided for input to the application level systems analysis.	<u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0 <u>JEXU-1041-1030</u> <u>JEXU-1041-1027</u>

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.2	Completion of Protective Action	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.3	Quality	The MELTAC platform is designed and produced within the MELCO ESC 10 CFR 50 Appendix B Quality Assurance Program, compliant to ASME NQA-1-1994.	<u>JEXU-1041-1008</u> 6.0 <u>JEXU-1041-1016</u> 2.0, 4.0 <u>JEXU-1041-1025</u> <u>ARQ-14P001</u>
5.4	Equipment Qualification	Appropriate testing is performed according to IEEE Std. 323 to substantiate conformance to the performance requirements as specified in the typical plant design. The MELTAC platform is qualified for the expected transient and steady state conditions at the typical nuclear power plant.	<u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1023</u> 3.0
5.5	System Integrity	The MELTAC platform is qualified for the expected transient and steady state conditions at the typical nuclear power plant. The MELTAC platform (including basic software) is designed and produced within the MELCO ESC 10 CFR 50 Appendix B Quality Assurance Program, compliant to ASME NQA-1-1994.	<u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1023</u> 3.0 <u>JEXU-1041-1025</u> <u>ARQ-14P001</u>
5.6	Independence	Header information. No Requirement.	<u>None</u>

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.6.1	Between Redundant Portions of a Safety System	<p>The MELTAC platform is qualified for the expected isolation requirements at the typical nuclear power plant.</p> <p>The MELTAC platform has communication features which allow inter-divisional communications as described in the "MELTAC Platform ISG-04 Conformance Analysis" JEXU-1041-1015.</p>	<p><u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1015</u></p>
5.6.2	Between Safety Systems and Effects of Design Basis Event	<p>The MELTAC platform is qualified for the expected transient and steady state conditions at the typical nuclear power plant.</p>	<p><u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1023</u> 3.0</p>
5.6.3	Between Safety Systems and Other Systems	<p>The MELTAC platform is qualified for the expected isolation requirements at the typical nuclear power plant.</p> <p>The MELTAC platform has communication features which allow inter-divisional communications as described in the "MELTAC Platform ISG-04 Conformance Analysis" JEXU-1041-1015.</p>	<p><u>JEXU-1041-1008</u> 5.0 <u>JEXU-1041-1015</u></p>
5.6.3.1	Interconnected Equipment	<p>The MELTAC platform is qualified for the expected isolation requirements at the typical nuclear power plant.</p> <p>The MELTAC platform has communication features which allow inter-divisional communications as described in the "MELTAC Platform ISG-04 Conformance Analysis" JEXU-1041-1015.</p>	<p><u>JEXU-1041-1008</u> 4.1.2.3, 4.1.2.5, 4.3, 5.0, Appendix A.3, A.4, A.6, A.7 <u>JEXU-1041-1015</u></p>
5.6.3.2	Equipment in Proximity	<p>See IEEE Std. 603 (1991) sections 4.7, 4.8, 5.3, 5.4 and 5.5 above.</p>	<p>See IEEE Std. 603 (1991) sections 4.7, 4.8, 5.3, 5.4 and 5.5 above.</p>

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.6.3.3	Effects of a Single Random Failure	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.6.4	Detailed Criteria	The MELTAC platform components satisfy the criteria of independence related to IEEE Std. 384-1992 as augmented by RG 1.75.	<u>JEXU-1041-1008</u> 4.1.2.3, 4.1.2.5, 4.3, 5.5, Appendix A.3, A.4, A.6, A.7 <u>JEXU-1041-1023</u>
5.7	Capability for Test and Calibration	The MELTAC platform contains Self-diagnosis features to identify failures. Testing and calibration during system operation can be accomplished by the appropriate MEL TAC platform system configuration. This is an application specific item that is dependent on the plant design.	<u>JEXU-1041-1030</u> <u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0 <u>JEXU-1041-1027</u>
5.8	Information Displays	Header information. No requirement.	None
5.8.1	Displays for Manually Controlled Actions	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.8.2	System Status Indication	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.8.3	Indication of Bypasses	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.8.4	Location	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.9	Control of Access	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.10	Repair	The MELTAC platform has Self-diagnosis functions and engineering tool features to facilitate timely recognition, location, replacement, repair, and adjustment of malfunctioning equipment.	<u>JEXU-1041-1008</u> 4.1.4, 4.1.5, 4.2.3
5.11	Identification	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.12	Auxiliary Features	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.13	Multi-Unit Stations	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.14	Human Factors Considerations	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
5.15	Reliability	This is an application specific item that is dependent on the plant design. The MELTAC platform includes features to minimize the possibility of a single failure affecting the operation of the equipment. The MELTAC platform contains Self-diagnosis features to identify failures. Failure Mode and Effects Analysis (FMEA) and the reliability data for each MELTAC platform module is provided for input to the application level systems analysis.	<u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0 <u>JEXU-1041-1030</u> <u>JEXU-1041-1027</u>
6.	Sense and Command Features - Functional and Design Requirements	The items contained within this clause are addressed in each sub-clause.	None
6.1	Automatic Control	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
6.2	Manual Control	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
6.3	Interaction Between the Sense and Command Features and Other Systems	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
6.4	Derivation of System Inputs	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
6.5	Capability for Testing and Calibration	The MELTAC platform contains Self-diagnosis features to identify failures. Testing and calibration during system operation can be accomplished by the appropriate MELTAC platform system configuration. This is an application specific item that is dependent on the plant design.	<u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0 <u>JEXU-1041-1030</u> <u>JEXU-1041-1027</u>
6.6	Operating Bypasses	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
6.7	Maintenance Bypass	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
6.8	Setpoints	This is an application specific requirement that is dependent on a plant design. The actual setpoints and uncertainties will be determined as part of the application. Uncertainties that result from the MELTAC platform are documented in "MELTAC Platform Setpoint Methodology" (JEXU-1041-1100).	<u>JEXU-1041-1100</u>

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
7.	Executive Features - Functional and Design Requirements	Header information. No Requirement.	None
7.1	Automatic Control	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
7.2	Manual Control	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
7.3	Completion of Protective Action	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
7.4	Operating Bypass	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
7.5	Maintenance Bypass	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None
8	Power Source Requirements	This is an application specific requirement that is dependent on a plant design. Therefore this requirement is not addressed for the MELTAC platform.	None

Table 3 IEEE Std. 603 (1991) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
Annex A	Illustration of Some Basic Concepts for Developing the Scope of a Safety System	General description. No requirement.	None
Annex B	Other Standards That Provide Additional Information That May Be Useful in Applying IEEE Std. 603-1991	General description. No requirement.	None

4.4 IEEE Std. 7-4.3.2 (2003) Evaluation

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
1.	Scope	<p>IEEE Std. 603 (1998) is not NRC endorsed. 10 CFR 50.55a(h) incorporates IEEE Std. 603 (1991) and the correction sheet dated January 30, 1995 into the federal regulations by reference.</p> <p>The MELTAC Platform Topical Report and Software Program commit to the applicable requirements of IEEE Std. 7-4.3.2 (2003), IEEE Std. 603 (1991) and RG 1.152 R3.</p>	<p>JEXU-1041-1016 3.2.6, 3.3.5, 3.6.5, 3.10.8, 3.11.4, 3.12.7, 4.0 <u>JEXU-1041-1008</u> 3.0</p>
2.	References	<p>IEEE Std. 603 (1998) is not NRC endorsed. 10 CFR 50.55a(h) incorporates IEEE Std. 603 (1991) and the correction sheet dated January 30, 1995 into the federal regulations by reference.</p> <p>IEEE Std. 1012 (1998) is not the current NRC endorsed standard. IEEE Std. 1012 (2004) is the standard endorsed by RG 1.168 R2.</p> <p>IEEE/EIA Std. 12207.0-1996 is not endorsed and is not used.</p> <p>ISO/IEC 12207: 1995 (ISO/IEC 12207) is not endorsed and is not used.</p> <p>The MELTAC Platform Software Program commits to IEEE Std. 1012 (2004), IEEE Std. 603 (1991). IEEE Std. 1042 (1987) is not NRC endorsed however it is used as guidance.</p>	<p>JEXU-1041-1016 3.2.6, 3.10.8, 3.12.7, 4.0 <u>JEXU-1041-1008</u> 3.0</p>
3.	Definitions and abbreviations	Definitions and abbreviations only. No requirements.	None

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
4.	Safety system design basis	<p>No requirements.</p> <p>IEEE Std. 603 (1998) is not NRC endorsed. The NRC (RG 1.152 R3) concluded that Annex A, Mapping of IEEE Std. 603 (1998) to IEEE Std. 7-4.3.2 (2003), does not provide any new guidance or requirements.</p> <p>The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex B, Diversity Requirements Determination due to inadequate guidance.</p>	None
5.	Safety system criteria	The items contained within this clause are addressed in each sub-clause.	None
5.1	Single-failure criterion	No requirements beyond IEEE Std. 603.	None
5.2	Completion of protective action	No requirements beyond IEEE Std. 603.	None

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.3	Quality	<p>Hardware quality is addressed in IEEE Std. 603 (1991).</p> <p>IEEE/EIA Std. 12207.0-1996 is not NRC endorsed and is not used.</p> <p>The MELTAC platform development activities include the development of hardware and software.</p> <p>The integration of the MELTAC platform is addressed in the development process in accordance with MELCO QAP which is compliant with 10 CFR 50 Appendix B and ASME NQA-1(1994) (this is referred to as MELCO's App.B-based QAP).</p> <p>The integration of the MELTAC platform with the safety system cannot be assessed in the context of the MELTAC platform, because the MELTAC platform is a generic digital safety platform and does not include specific applications.</p>	<p><u>JEXU-1041-1008</u> 4.1.3, 4.2.2, 6.0</p> <p><u>JEXU-1041-1016</u> 3.1.4, 3.2.4, 3.2.5, 3.2.6, 3.4, 3.5, 4.0, 3.9.3, 3.10, 3.11, 3.12.3.6</p> <p><u>ARQ-14P001</u></p>
5.3.1	Software development	<p>MELTAC platform software is developed, modified, or accepted in accordance with MELCO's App.B-based QAP that is an approved software quality assurance (QA) plan. The "MELTAC Platform Software Program Manual" (JEXU-1041-1016) provides the generic plans that are followed under MELCO's App.B-based QAP for all activities related to the basic software life cycle.</p> <p>IEEE/EIA Std. 12207.0-1996, IEC 60880 and IEEE Std. 730 (1998) are not NRC endorsed and are not used.</p>	<p><u>JEXU-1041-1016</u> 3.3</p> <p><u>ARQ-14P001</u></p>

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.3.1.1	Software quality metrics	<p>The use of MELTAC platform software quality metrics is described in the "MELTAC Platform Software Program Manual" (JEXU-1041-1016). The software quality metrics are used throughout the software life cycle to assess whether software quality requirements are being met.</p> <p>IEEE Std. 1061(1998) "IEEE Standard for a Software Quality Metrics Methodology" is not NRC endorsed and is not used.</p>	<u>JEXU-1041-1016</u> 3.3
5.3.2	Software tools	Method b described in section 5.3.2 of this standard is used to confirm that the MELTAC platform software tools are suitable for use.	<u>JEXU-1041-1016</u> 3.1.4.5, 3.11.3.2 <u>JEXU-1041-1031</u>
5.3.3	Verification and validation	The V&V activities for the MELTAC platform basic software are described in the "MELTAC Platform Software Program Manual" (JEXU-1041-1016).	<u>JEXU-1041-1016</u> 3.2.6, 3.3.5, 3.10, 3.11.4, 3.12.7, 4.0
5.3.4	Independent V&V (IV&V) requirements	The V&V activities and organization for the MELTAC platform basic software are described in the "MELTAC Platform Software Program Manual" (JEXU-1041-1016).	<u>JEXU-1041-1016</u> 3.1.2, 3.10

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.3.5	Software configuration management	<p>IEEE Std. 828 (1998) is not the current NRC endorsed standard. IEEE Std. 828 (2005) is the standard endorsed by RG 1.169 R1.</p> <p>The MELTAC Platform Software Program commits to IEEE Std. 828 (2005).</p> <p>The activities regarding software configuration management of the MELTAC platform are described in the "MELTAC Platform Software Program Manual" (JEXU-1041-1016).</p>	<p><u>JEXU-1041-1016</u> 3.11.4, 3.3, 3.11.3.2, 4.0</p>
5.3.6	Software project risk management	<p>Risk management of the MELTAC platform basic software is performed throughout all phases of the basic software lifecycle.</p> <p>IEEE Std. 1540-2001, "IEEE Standard for Life Cycle Processes – Risk Management." is not NRC endorsed and is not used.</p>	<p><u>JEXU-1041-1016</u> 3.1.4.4, 3.2.4, 3.3, 3.9.3, 3.10.3</p>
5.4.	Equipment qualification	<p>The items contained within this clause are addressed in each sub-clause.</p>	None
5.4.1	Computer system testing	<p>The MELTAC platform satisfies the computer system testing requirements given in this section.</p>	<p><u>JEXU-1041-1008</u> 4.1.5, 4.3, 5.0, 6.0 <u>JEXU-1041-1016</u> 3.12.3.3.1</p>

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.4.2.	Qualification of existing commercial computers	<p>The requirements in this section are not addressed for the MELTAC platform.</p> <p>The MELTAC platform is designed and produced by MELCO using no existing commercial computers therefore qualification of Existing Commercial Computers is not applicable.</p>	None
5.5.	System integrity	The items contained within this clause are addressed in each sub-clause.	None
5.5.1	Design for computer integrity	<p>The MELTAC platform is qualified for the expected transient and steady state conditions at the typical nuclear power plant. Actual plant conditions are dependent on the plant specific design.</p> <p>The MELTAC platform (including basic software) is designed and produced within MELCO's App.B-based QAP, compliant to ASME NQA-1-1994.</p>	<p><u>JEXU-1041-1008</u> 4.1, 4.1.3, 4.2.2, 5.0, 6.0</p> <p><u>JEXU-1041-1016</u> <u>JEXU-1041-1023</u> <u>JEXU-1041-1025</u> <u>ARQ-14P001</u> <u>JEXU-1041-1030</u></p>
5.5.2	Design for test and calibration	<p>The MELTAC platform contains resident Self-diagnosis features to identify failures.</p> <p>Testing and calibration during system operation can be accomplished by the appropriate MELTAC platform system configuration. This is an application specific item that is dependent on a plant design.</p>	<p><u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 7.0</p> <p><u>JEXU-1041-1016</u> 3.3, 3.10, 3.11</p> <p><u>JEXU-1041-1027</u> <u>JEXU-1041-1030</u> <u>ARQ-14P001</u></p>

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.5.3	Fault detection and self-diagnostics	<p>The MELTAC platform satisfies the requirement that the Self-diagnosis functions do not affect the ability of the computer system to perform its safety function or cause spurious actuations of the safety function.</p> <p>The MELTAC platform basic software, including Self-diagnosis functions is verified by V&V activities.</p>	<p><u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 6.1.1, 7.0 <u>JEXU-1041-1016</u> 3.10 <u>JEXU-1041-1027</u> <u>JEXU-1041-1030</u></p>
5.6	Independence	<p>The MELTAC platform is qualified for the expected isolation requirements at the typical nuclear power plant. The specific independence and isolation requirements are dependent on the actual plant design.</p> <p>The MELTAC platform has communication features which allow inter-divisional communications as described in the "MELTAC Platform ISG-04 Conformance Analysis" (JEXU-1041-1015).</p> <p>There is no non-safety firmware or software in the MELTAC platform. Therefore the issue that safety and non-safety reside on same computer is not applicable for MELTAC platform.</p> <p>The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex E, Communication Independence due to insufficient guidance.</p>	<p><u>JEXU-1041-1008</u> 4.0, 4.1.2.5, 4.3.2.3, 4.3.3.3, 5.0, <u>JEXU-1041-1015</u> <u>JEXU-1041-1030</u></p>
5.7	Capability for test and calibration	No requirements beyond IEEE Std. 603.	None
5.8	Information displays	No requirements beyond IEEE Std. 603.	None
5.9	Control of access	No requirements beyond IEEE Std. 603.	None
5.10	Repair	No requirements beyond IEEE Std. 603.	None

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
5.11	Identification	The MELTAC platform basic software program documented in "MELTAC Platform Software Program Manual" (JEXU-1041-1016) assures that the computer system hardware and software are installed in the appropriate system configuration.	<u>JEXU-1041-1008</u> 6.1.7 <u>JEXU-1041-1016</u> 3.5, 3.11.3 <u>ARQ-14P001</u>
5.12	Auxiliary features	No requirements beyond IEEE Std. 603.	None
5.13	Multi-unit stations	No requirements beyond IEEE Std. 603.	None
5.14	Human factor considerations	No requirements beyond IEEE Std. 603.	None
5.15	Reliability	Reliability analysis for the MELTAC platform includes software and hardware. The MELTAC platform reliability analysis is summarized in "Summary of MELTAC Platform Reliability" (JEXU-1041-1027). The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex F, Computer reliability due to inadequate guidance.	<u>JEXU-1041-1008</u> 4.1.5, 4.2.3, 6.1.8, 7.0 <u>JEXU-1041-1016</u> 3.2.5.2, 3.3 <u>JEXU-1041-1027</u> 4.1.2, 5.2, 7.2
6.	Sense and command features - functional and design requirements	No requirements beyond IEEE Std. 603.	None
7.	Execute features - functional and design requirements	No requirements beyond IEEE Std. 603.	None
8.	Power source requirements	No requirements beyond IEEE Std. 603.	None

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
Annex A	Mapping of IEEE Std. 603-1998 to IEEE Std. 7-4.3.2-2003	No requirements. IEEE Std. 603 (1998) is not NRC endorsed. The NRC (RG 1.152 R3) concluded that Annex A, Mapping of IEEE Std. 603 (1998) to IEEE Std. 7-4.3.2 (2003), does not provide any new guidance or requirements.	None
Annex B	Diversity requirements determination	No requirements. The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex B, Diversity requirements determination due to inadequate guidance.	None
Annex C	Dedication of existing commercial computers	No requirements. The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex C, Dedication of existing commercial computers due to inadequate guidance.	None
Annex D	Identification and resolution of hazards	No requirements. The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex D, Identification and resolution of hazards due to inadequate guidance.	None
Annex E	Communication independence	No requirements. The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex E, Communication independence due to insufficient guidance.	None

Table 4 IEEE Std. 7-4.3.2 (2003) Compliance Matrix

Section	Title	Assessment	References <Document Number Sections>
Annex F	Computer reliability	<p>No requirements.</p> <p>The NRC (RG 1.152 R3) does not endorse IEEE Std. 7-4.3.2 (2003) Annex F, Computer reliability because the NRC does not endorse the concept of quantitative reliability goals as a sole means of meeting its regulations for the reliability of digital computers used in safety systems.</p>	None
Annex G	Bibliography	General description. No requirement.	None