

ISO 20140-5:2024-09 (E)

Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment - Part 5: Environmental performance evaluation data

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative references	1
3	Terms, definitions, abbreviated terms and conventions	2
3.1	Terms and definitions	2
3.2	Abbreviated terms	4
3.3	Conventions for defining class definitions and properties	4
3.4	Value types	7
3.5	UML notation	7
4	Outline of EPE data	9
4.1	Overview	9
4.2	EPE data, EPE data class and EPE data class definition	9
4.2.1	EPE_data	9
4.2.2	EPE data class	11
4.2.3	Descriptions of EPE data class definition	12
4.2.4	Hierarchy of EPE data class definitions	13
4.3	EPE_process	13
4.3.1	Overview	13
4.3.2	Elementary_process	14
4.3.3	Compound_process	14
4.3.4	EPE_process_transition	16
4.3.5	EPE_IO_connection	17
4.3.6	Flow_control_process	17
4.4	EPE_input	17
4.5	EPE_output	18
4.6	EPE_mechanism	19
4.6.1	General	19
4.6.2	EPE_equipment	20
4.6.3	EPE_space	21
4.7	EPE_control	22
5	EPE data class definitions	22
5.1	Overview	22
5.2	Class definition of EPE_data	22
5.3	Class definition of Elementary_EPE_data	23
5.3.1	General	23
5.3.2	Class definition of Defined_EPE_data	24
5.3.3	Class definition of Measured_EPE_data	24
5.3.4	Class definition of Calculated_EPE_data	24
5.3.5	Class definition of EPE_IO_connection	25
5.3.6	Class definition of Environmental_condition_data	25
5.4	Class definition of Grouped_EPE_data	25
5.4.1	General	25

5.4.2	Class definition of EPE_process	26
5.4.3	Class definition of EPE_input	30
5.4.4	Class definition of EPE_output	36
5.4.5	Class definition of EPE_mechanism	38
5.4.6	Class definition of EPE_control	43
5.4.7	Class definition of EPE_process_transition	43
6	Properties of EPE data class definitions	44
6.1	General	44
6.2	Definitions of property	44
6.2.1	Air_conditioning	44
6.2.2	Capacity_of_buffering	44
6.2.3	Description_of_operation_mode	44
6.2.4	Dimension	44
6.2.5	Distribution_ratio	45
6.2.6	Downstream_endpoint	45
6.2.7	Economic_value_of_a_product	45
6.2.8	End_time	45
6.2.9	EPE_data_granularity	46
6.2.10	EPE_data_resolution	46
6.2.11	EPE_process_identifier	46
6.2.12	Formula_for_calculation	46
6.2.13	Functional_Hierarchy_Level	47
6.2.14	ID_of_EPE_data_class	47
6.2.15	Identifier_of_operation_mode	47
6.2.16	Identifier_of_part	48
6.2.17	Indoor_or_outdoor	48
6.2.18	Lighting_condition	48
6.2.19	Location_EPE_data_value_generated	48
6.2.20	Mass_of_part	49
6.2.21	Measuring_equipment_used	49
6.2.22	Mechanism_identifier	49
6.2.23	Name_of_operation_mode	49
6.2.24	Number_of_branches	50
6.2.25	Number_of_class_definitions	50
6.2.26	Number_of_EPE_process_transition	50
6.2.27	Number_of_operation_modes	50
6.2.28	Number_of_properties	51
6.2.29	Number_of_EPE_processes	51
6.2.30	Operation_mode_used	51
6.2.31	Organization_defining_EPE_data_value	51
6.2.32	Personnel_role	52
6.2.33	Power_for_lighting	52
6.2.34	Power_for_air_conditioning	52
6.2.35	Phase_of_material	52
6.2.36	Quantity_identifier	53
6.2.37	Recommended_replacement_cycle	53
6.2.38	Reference_to_following_processes	53
6.2.39	Reference_to_leading_processes	53
6.2.40	Regulatory_requirement	54
6.2.41	Start_time	54
6.2.42	Structure_of_EPE_data	54
6.2.43	Structure_of_process	55
6.2.44	Timing_EPE_data_value_generated	55
6.2.45	Type_of_assembly	55
6.2.46	Type_of_consumable	56
6.2.47	Type_of_electric_or_electronic_component	56
6.2.48	Type_of_energy	57
6.2.49	Type_of_environmental_condition	57
6.2.50	Type_of_equipment	57
6.2.51	Type_of_flow_control	58

6.2.52	Type_of_grouped_EPE_data	58
6.2.53	Type_of_input	59
6.2.54	Type_of_Harmful_substance	59
6.2.55	Type_of_GHG	60
6.2.56	Type_of_material	60
6.2.57	Type_of_mechanism	60
6.2.58	Type_of_output	61
6.2.59	Type_of_part	61
6.2.60	Type_of_person	62
6.2.61	Type_of_process	62
6.2.62	Type_of_product	62
6.2.63	Type_of_space	63
6.2.64	Type_of_transition	63
6.2.65	Type_of_unit_activity	64
6.2.66	Type_of_upstream_data	64
6.2.67	Upstream_endpoint	65
6.2.68	Way_for_generating	65
6.2.69	Way_of_measurement	65
Annex A (informative) Relationship with the other related International Standards		66
Annex B (informative) Use case for EPE data		68
Annex C (informative) Observation of EPE data in manufacturing systems		76
Bibliography		89