ISO/TS 10303-5001:2010-11 (E)

Industrial automation systems and integration - Product data representation and exchange - Part 5001: Guidance on the usage of ISO 10303-214 for gear units

Contents

Page

Foreword viii

Introduction ix

1 Scope 1

2 Normative references 3

3 Terms, definitions and abbreviated terms 3
3.1 Terms defined in ISO 10303-1 3
3.2 Abbreviated terms 3

4 Information requirements 4
4.1 Preliminary elements 4
4.2 Application objects 4
4.2.1 Application_context 4
4.2.2 Application_property 5
4.2.3 Assembly_definition 5
4.2.4 Assembly_relationship 5
4.2.5 Baseplate 6
4.2.6 Basic_material 6
4.2.7 Bearing 6
4.2.8 Bearing_bearing 7
4.2.9 Belt_or_chain 7
4.2.10 Bevel_or_hypoid_gear 7
4.2.11 Bevel_or_hypoid_gear_pair 7
4.2.12 Clutch_or_brake 7
4.2.13 Coordinate_definition 8
4.2.14 Coupling 8
4.2.15 Crossed_helical_gear 8
4.2.16 Crossed_helical_gear_pair 8
4.2.17 Cylindrical_gear 8
4.2.18 Cylindrical_gear_pair 9
4.2.19 Data_environment 9
4.2.20 Deformation_shift_bending 9
4.2.21 Direction_definition 9
4.2.22 Document_assignment 10
4.2.23 Dynamic 11
4.2.24 Efficiency_loss 11
4.2.25 Environment 11
4.2.26 External_geometric_model 11
4.2.27 Fit_of_key_assembly 11
4.2.28 Fitting_key 12
4.2.29 Functional_relationship 12
4.2.30 Gear 12
4.2.31 Gear_pair 12
4.2.32 Gear_unit 13
4.2.33 General_gear_pair 13
4.2.34 General_property 13
4.2.35 Geometric_model 14
4.2.36 Geometry_property 14

4.2.37 Hardness 15
4.2.38 Housing 15
4.2.39 Housing_baseplate 16
4.2.40 Housing_bearing 16
4.2.41 Housing_clutch_or_brake 16
4.2.42 Housing_coupling 16
4.2.43 Housing_sealing 17
4.2.44 Interference_fit_assembly 17
4.2.45 Life_time 17
4.2.46 Load_capacity 17
4.2.47 Lubricant 17
4.2.48 Lubricant_definition 18
4.2.49 Lubricant_part 18
4.2.50 Manufacturing 18
4.2.51 Material_definition 18
4.2.52 Material_part 19
4.2.53 Material_property 19
4.2.54 Material_property_association 19
4.2.55 Material_property_value_definition 19
4.2.56 Mesh 20
4.2.57 Numerical_value 20
4.2.58 Parameter_property 20
4.2.59 Part 21
4.2.60 Partial_document_assignment 21
4.2.61 Partial_part_shape_definition 22
4.2.62 Part_definition 24
4.2.63 Part_definition_relationship 24
4.2.64 Part_instance 25
4.2.65 Part_shape_definition 25
4.2.66 Part_version 26
4.2.67 Pinion_shaft 26
4.2.68 Placement_reference_relationship 26
4.2.69 Placement_relationship 27
4.2.70 Plain_bearing 27
4.2.71 Planetary_gear_train 27
4.2.72 Position_orientation_property 27
4.2.73 Position_orientation_property_value 28
4.2.74 Position_orientation_property_value_definition 28
4.2.75 Power_rotation_speed 29
4.2.76 Pressure_stress 29
4.2.77 Property 29
4.2.78 Property_value 30
4.2.79 Property_value_definition 30
4.2.80 Rolling_element_bearing 31
4.2.81 Safety 31
4.2.82 Sealing 31
4.2.83 Service_property 32
4.2.84 Shaft 32
4.2.85 Shaft_bearing 32
4.2.86 Shaft_clutch_or_brake 32
4.2.87 Shaft_collar 32
4.2.88 Shaft_sealing 33
4.2.89 Shaft_shaft 33
4.2.90 Shaft_wheel 33
4.2.91 Shape_description_association 33
4.2.92 Single_part_definition 34
4.2.93 Sliding_wear 34
4.2.94 Specification_property 34
4.2.95 Stiffness_suspension 34
4.2.96 String_value 34
4.2.97 Surface_condition 35
4.2.98 Surface_condition_association 35

4.2.99 Surface_texture 35
4.2.100 Surface_texture_parameter 36
4.2.101 Temperature 37
4.2.102 Tool 37
4.2.103 Tool_part_relationship 37
4.2.104 Torque_force 38
4.2.105 Unit 38
4.2.106 User_defined_part 38
4.2.107 User_defined_ relationship 39
4.2.108 Value_association 39
4.2.109 Value_limit 39
4.2.110 Value_list 40
4.2.111 Value_range 40
4.2.112 Value_with_unit 41
4.2.113 Wheel 41
4.2.114 Wheel_bearing 41
4.2.115 Wheel_belt_or_chain 42
4.2.116 Wheel_wheel 42
4.2.117 Worm 42
4.2.118 Worm_gear_pair 42
4.2.119 Worm_wheel 42
4.3 Application assertions 43
4.3.1 Assembly_relationship to Assembly_definition 43
4.3.2 Assembly_relationship to Part_instance 43
4.3.3 Coordinate_definition to Value_with_unit 43
4.3.4 Direction_definition to Value_with_unit 43
4.3.5 Document_assignment to Assembly_ relationship 43
4.3.6 Document_assignment to Partial_part_shape_definition 43
4.3.7 Document_assignment to Part_definition 43
4.3.8 Document_assignment to Part_definition_relationship 43
4.3.9 Document_assignment to Part_shape_definition 44
4.3.10 Document_assignment to Tool_part_relationship 44
4.3.11 Geometry_property to Partial_Part_shape_definition 44
4.3.12 Geometry_property to Part_shape_definition 44
4.3.13 Hardness to Value_with_unit 44
4.3.14 Material_definition to Part_definition 44
4.3.15 Material_property_association to Material_definition 44
4.3.16 Material_property_association to Material_property_value_definition 44
4.3.17 Material_property_value_definition to Material_property 45
4.3.18 Material_property_value_definition to Data_environment 45
4.3.19 Part_definition to Application_context 45
4.3.20 Part_definition to Part_version 45
4.3.21 Part_definition_relationship to Part_definition 45
4.3.22 Part_instance to Part_definition 45
4.3.23 Partial_part_shape_definition to Part_shape_definition 45
4.3.24 Part_shape_definition to Part_definition 45
4.3.25 Part_shape_definition to Part_instance 46
4.3.26 Part_version to Part 46
4.3.27 Placement_reference_relationship to Position_orientation_property_value_definition 46
4.3.28 Placement_relationship to Position_orientation_property_value_definition 46
4.3.29 Placement_relationship to Property_value_definition 46
4.3.30 Position_orientation_property_value to Coordinate_definition 46
4.3.31 Position_orientation_ property_value to Direction_definition 46
4.3.32 Position_orientation _property_value_definition to Position_orientation_property 46
4.3.33 Position_orientation _property_value_definition to Position_orientation_property_value 46
4.3.34 Property to Unit 47
4.3.35 Property_value_definition to Property 47
4.3.36 Property_value_definition to Property_value 47
4.3.37 Shape_description_association to External_geometric_model 47
4.3.38 Shape_description_association to Geometric_model 47
4.3.39 Shape_description_association to Partial_part_shape_definition 47
4.3.40 Shape_description_association to Part_shape_definition 47

4.3.41 Surface_condition_association to Part_shape_definition 47
4.3.42 Surface_condition_association to Partial_part_shape_definition 48
4.3.43 Surface_condition_association to Surface_condition 48
4.3.44 Surface_texture_parameter to Surface_texture 48
4.3.45 Surface_texture_parameter to Value_with_unit 48
4.3.46 Tool_part_relationship to Part_definition 48
4.3.47 Value_association to Assembly_relationship 48
4.3.48 Value_association to Partial_part_shape_definition 48
4.3.49 Value_association to Part_definition 49
4.3.50 Value_association to Part_definition_relationship 49
4.3.51 Value_association to Part_shape_definition 49
4.3.52 Value_association to Property_value_definition 49
4.3.53 Value_association to Tool_part_relationship 49
4.3.54 Value_list to Property_value 49

5 Mapping to ISO 10303-214 49

6 Conformance requirements 71

Annex A (informative) Product model for gear units 72

Annex B (informative) Property tables for gear units 84

Annex C (informative) Mapping mechanism 148

Annex D (informative) Mapping to relevant explicit ARM constructs of ISO 10303-224 149

Bibliography 150

Index 152

Figures Figure A.1 -- Product model for gear units EXPRESS-G diagram: 1 of 11 73

Figure A.2 -- Product model for gear units EXPRESS-G diagram: 2 of 11 74

Figure A.3 -- Product model for gear units EXPRESS-G diagram: 3 of 11 75

Figure A.4 -- Product model for gear units EXPRESS-G diagram: 4 of 11 76

Figure A.5 -- Product model for gear units EXPRESS-G diagram: 5 of 11 77

Figure A.6 -- Product model for gear units EXPRESS-G diagram: 6 of 11 78

Figure A.7 -- Product model for gear units EXPRESS-G diagram: 7 of 11 79

Figure A.8 -- Product model for gear units EXPRESS-G diagram: 8 of 11 80

Figure A.9 -- Product model for gear units EXPRESS-G diagram: 9 of 11 81

Figure A.10 -- Product model for gear units EXPRESS-G diagram: 10 of 11 82

Figure A.11 -- Product model for gear units EXPRESS-G diagram: 11 of 11 83

Figure C.1 -- Connection between product model for gear units and ISO 10303-214 148

Tables Table 1 -- Mapping table for ARM level of ISO 10303-214 51

Table B.1 -- Deformation shift bending 88

Table B.2 -- Dynamic 89

Table B.3 -- Efficiency loss 90

Table B.4 -- Environment **92**

Table B.5 -- Geometry property **93**

Table B.6 -- Hardness **102**

Table B.7 -- Life time **103**

Table B.8 -- Load capacity - factors **104**

Table B.9 -- Load capacity - strength **113**

Table B.10 -- Manufacturing **116**

Table B.11 -- Mesh **118**

Table B.12 -- Parameter property **122**

Table B.13 -- Power rotation speed **129**

Table B.14 -- Pressure stress **131**

Table B.15 -- Safety **133**

Table B.16 -- Service property **134**

Table B.17 -- Sliding wear **136**

Table B.18 -- Specification property **137**

Table B.19 -- Stiffness suspension **140**

Table B.20 -- Surface texture **141**

Table B.21 -- Temperature **142**

Table B.22 -- Torque force **145**

Table D.1 -- Mapping table for ARM level of ISO 10303-224 ..... **149**