

Title: Inspection and Test Plan: Wind turbine (2.5MW) High Strength Steel Bolt & Nut test plan(Grade 10.9)			Document No. 950PW856		Rev. 1	Page 1	Of 3
					Confidential Class		
Doc. Type PTP	Issued by ERD Deputy	Language English	Derived from W0102-Q06-003-SPEC-304-W2E-001-4-GE			Rev. 1	
Rev.	Kind of Revision						
0	First Issue						
1	<ul style="list-style-type: none"> <li>1- Rows of 11, 12 and 13 are combined to row of 12.</li> <li>2- Note 6 is added</li> <li>3- Proof load is added</li> </ul>						
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Rev.	Prepared	Checked	Checked	Checked	Approved	Date	

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No.	Inspection or Test	Reference Document	Performed By	Verified by			Quality Docs (EN 10204-2005)	Remarks
				Supplier	Pars	3		
1	Material Certificate And Chemical Analysis	DIN EN 898-1/Chemical Analysis Per Grade 12.9	Supplier	Hold	Witness	-	3.1	(NOTE 1)
2	Dimensional Requirement	En 14399/ ISO 4014/ ISO 4017/ ISO 4032	Supplier	Hold	Witness	-	3.1	
		Special size/ DWG	Supplier	Hold	Witness		3.1	
3	Material purity	DIN 50602 FOR K3<20	Supplier	Hold	Witness		3.1	
4	Surface Defects Of Steel Bar	DIN EN 10221, Class E	Supplier	Hold	Review	-	3.1	(NOTES 2)
5	Impact Test	ISO 83, U NOTCH 27J@-40°C	Supplier	Hold	Review	-	3.1	
6	Tensile Test	DIN EN ISO 898-1, MAX. UTS 1170 MPa,	Supplier	Hold	Witness	-	3.1	
7	Proof load	DIN EN ISO 898-2	Supplier	Hold	Witness	-	3.1	
8	Hardness & Surface Carbon Change Test	MAX. SURFACE HARDNESS 375 HV 0.3	Supplier	Hold	Witness	-	3.1	(NOTE 3)
9	Thread Tolerance (Pre Coating)	ISO 965	Supplier	Hold	Witness		3.1	
10	Eddy Current/ Magnetic Crack Testing	DIN EN 26157-3/ ISO 6157-2	Supplier	Hold	Witness		3.1	(NOTE 4)
11	Coating	<b>tZn:</b> DIN EN ISO 1461, DSV / GAV policy for producing hot-dip galvanized screws	Supplier	Hold	Witness		3.1	(NOTE 5)
		<b>zinc-flake (Dacromet/ Geomet):</b> DIN EN ISO 10683						

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No.	Inspection or Test	Reference Document	Performed By	Verified by			Quality Docs (EN 10204-2005)	Remarks
				Supplier	Pars	3		
12	Corrosion Resistance/ adhesive and Visual Inspection of tzn and zinc-flake coating	DIN EN ISO 10163/ DIN EN ISO 10164/ DIN EN ISO 9227 MIN. 1000 hr	Supplier	Hold	Review	-	-	(NOTE 6)
13	Thread Tolerance (after coating)	DIN ISO 965	Supplier	Hold	Witness		3.1	
14	PRE-SHIPMENT INSPECTION (PACKING & MARKING CHECK)	PRE-SHIPMENT INSPECTION	Supplier	Hold	Witness	-	-	(NOTE 7&8)

Hold point: a hold shall be put to the production schedule and the inspection or authorization of test shall be carried out with the participant or his representative in attendance. Manufacturing can only proceed with a written authorization of customer or his representative. The notification is to be issued by vendor at least one week before starting the action.

Review point: the supplier has either to submit to purchaser for comments the documents required prior to the performance of the dedicated activity or to transmit or make available for the review of purchaser by the result of the controls and tests conducted, as the case may be.

Witness point: random inspection of purchaser without prior notification.

Note 1: phosphorus and sulfur must be below 0.02% and total below 0.03%. the chemical composition of the base material must initially conform with the requirements of DIN EN ISO 898-1 for property class 12.9. Notes f, h & i (in DIN EN ISO 898-1 table 2) are mandatory.

Note 2: any type of surface coatings containing phosphorus, phosphate coating, acid pickling and embrittling process is extremely prohibited.

Note 3: no edge carbonization is allowed (DIN EN ISO 898-1). only 20 hv 0.3 depth-wise hardness change (except threads) due to carbon change in metallographic studies is allowed.

Note 4: prior to coating, all parts must undergo magnetic crack testing (magnetic flux leakage, eddy current inspections).

note 5: Electro galvanized coating must not be used for bolts of property class 10.9

Note 6: Friction coefficient of threads and bolt heads shall be test and set limited to " $\mu_{ges} = 0.09 - 0.11$ ". To adjust the friction coefficients, the use of MoS2 lubricants (eg. Molykote 1000) is allowed

Note 7: sets should be delivered as fully fitted units complete with nuts. Washers and nuts should be aligned in accordance with standards (champfer, marking).

Note 8: zinc-flake (geomet) coated bolts are to be covered with plastic mesh.