



Implications of Norsok M-650 Standard in the Offshore Industry

A User's Perspective

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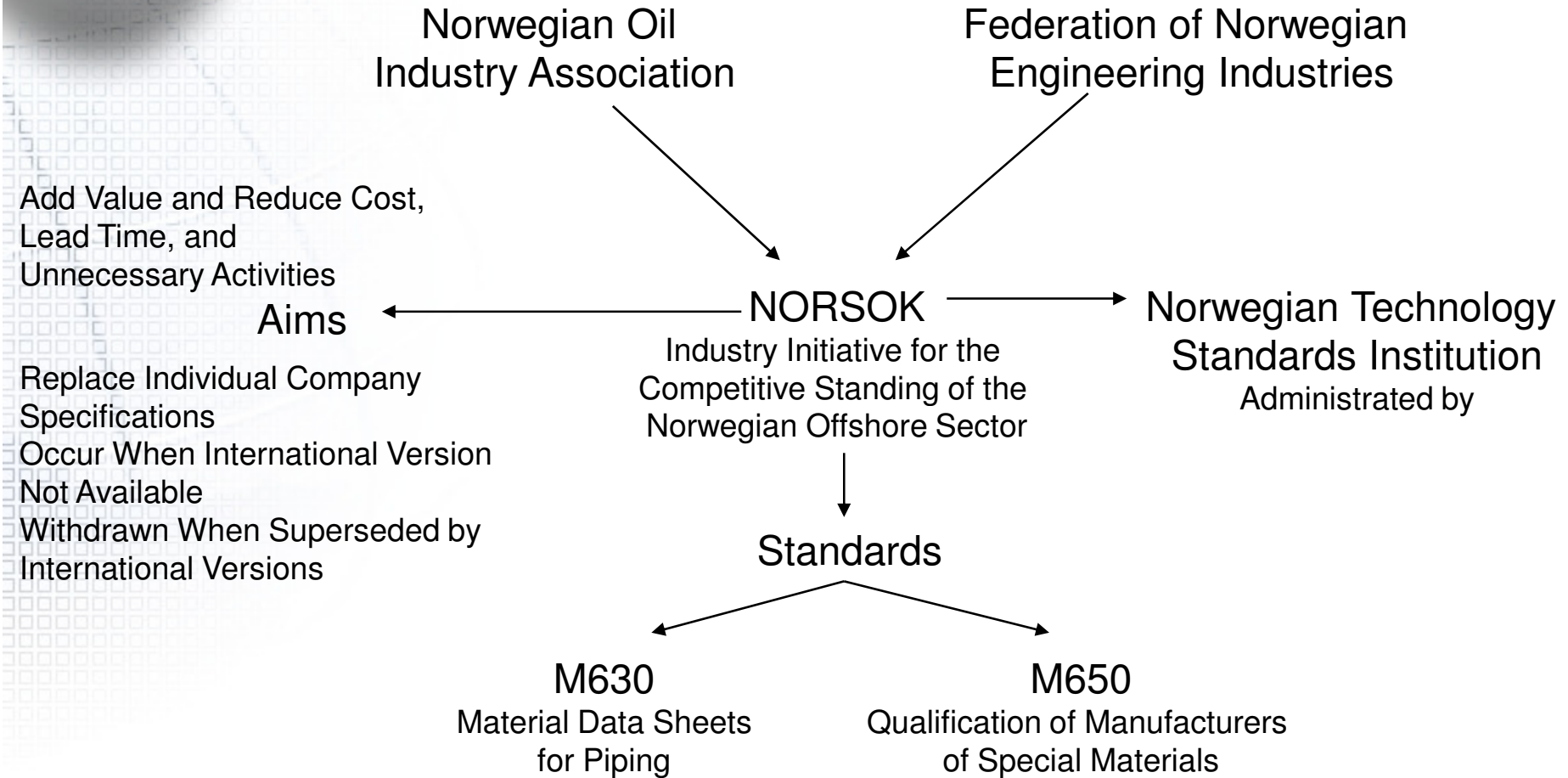
Programme

- What is Norsok and the M-650 standard?
- History and development of the M-650 Standard
- Overview of Norsok M-650 qualification process
- User Experiences
- Future: Implications for the Offshore Industry





What is NOROSOK?





What is the Norsok M-650 Standard?

- ‘Qualification of Manufacturers of Special Materials’
 - Qualification process to determine the competency of manufacturers of special material grades to supply products for use in the Norwegian oil & gas industry
- Main qualification requirements
 - Capability, skill, and understanding to handle the required material grade
 - Adequate facilities and equipment
 - Manufacture products with acceptable material properties
 - Implemented Quality Management System





When is the standard used?

- When required by the material data sheets in Norsok M630 – ‘Material Data Sheets for Piping’
- At discretion of the main contractor when material is ‘not special’ but the component is critical
- Special materials defined as:
 - Duplex Stainless Steels
 - All Grades, Product Forms and Dimensions
 - High Alloyed Austenitic Stainless Steels
 - All Product Forms and Dimensions
 - Nickel Base Alloys
 - Castings
 - Titanium and its Alloys
 - Castings





Where did the standard come from?

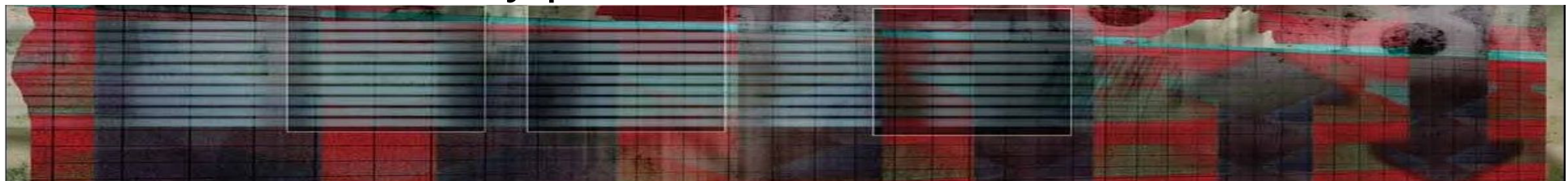
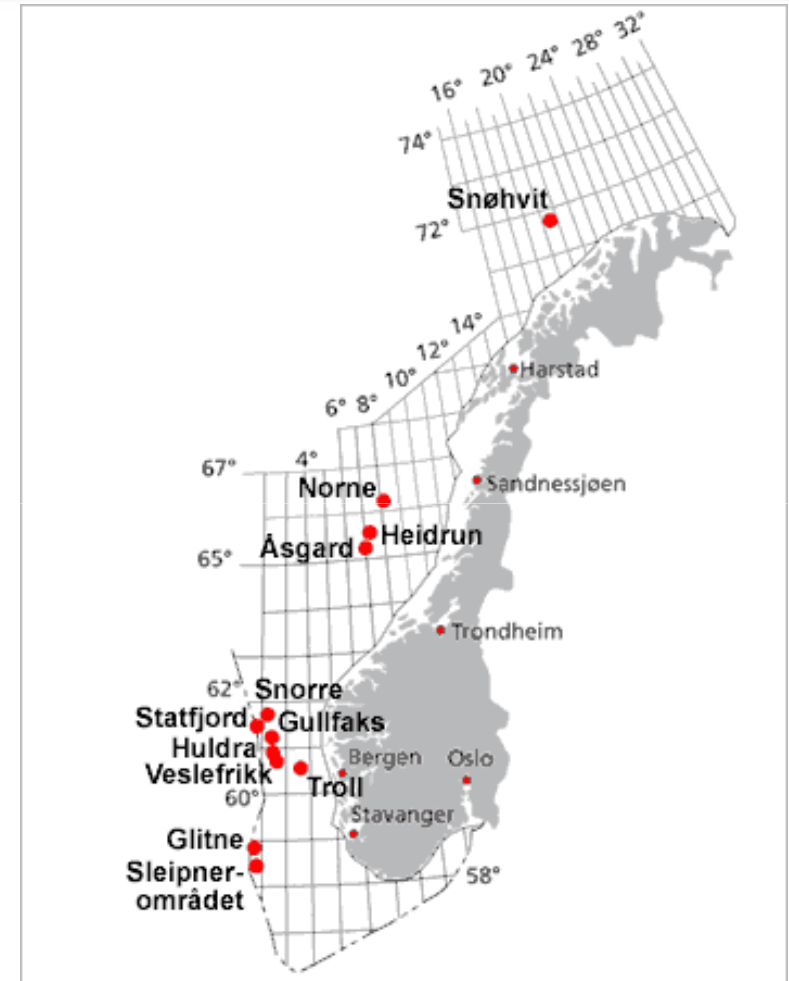
- 1980's saw increased use of 'special materials' in the Norwegian offshore sector
 - Superior properties at low design temperatures
 - Suppliers manufacturing products outside their area of expertise
 - Components with unacceptable properties
 - Project delays





Sleipner West Project 1

- Pre-approval of manufacturers at bidding stage
- Aims of process:
 - Authenticate competent and reliable manufacturers
 - Eliminate manufacturers unable to meet quality requirements.
 - Avoid delivery problems





Sleipner West Project 2

- Each manufacturer:
 - Submit step by step process description and manufacturing procedures
 - Testing
 - Charpy – Micrographic - Corrosion
 - Visited to establish
 - Sufficient competence and experience
 - Adequate facilities and equipment





NORSOK M-650 Rev 1

- Formalisation of Sleipner approval process
- Requirements:
 - Sufficient understanding and experience
 - Testing in accordance with the MDS
 - Documented evidence of successful manufacture of special materials
 - Qualification allowance (general)
 - Thickness + 25%
 - Weight + 50%





NORSOK M-650 Rev 2

- Complete revision of standard
- Additional Requirements
 - Additional testing requirements (informative only)
 - Heat treatment furnace survey (ISO 10423 API 6A)
 - Quality Management System required (ISO 9001)
 - Qualification Test Record to be produced
 - Qualification allowance (general)
 - Thickness + 25%
 - Weight G + 100% Max 250kg or if $G > 250\text{kg}$ all weights





NORSOK M-650 Rev 3

- Tightens up qualification process considerably
- Additional requirements
 - Increased testing requirements (informative only)
 - All testing 3rd party witnessed (EN 10204:1991 3.1C)
 - Qualification Test Record revised
 - All qualifications valid for 5 years
 - Heat treatment furnace temperature uniformity survey (ASTM A991)
 - Qualification allowance – new restrictions
 - Thickness $T + 10\%$ below defined levels and T above them
 - Weight $G + 100\%$ below defined levels and all above them





Overview of Norsok M-650 Process

- Manufacturing
- Visit & Inspection
- Testing
- Review & Resolution
- Certification





M-650 Process – Manufacturing

- Produced according to Manufacturing Summary
- Following company QMS and procedures



- Made by competent and trained personnel
- Evidence and document trail to back you up





M-650 Process – Visit & Inspection

- Standard requires visit by purchaser to assess:
 - Facilities and equipment
 - Quality Management System and the implementation of procedures
 - Competence, knowledge, and experience of personnel and management
- Question and answer session
- End of visit: Minutes
 - Detail facts of visit
 - Document actions required to ensure manufacturer meets qualification requirements





M-650 Process – Testing

- Split into two categories
 - Required by the MDS and must be passed in order to gain qualification
 - Required by the standard and is informative only
- Testing must be 3rd party witnessed
 - EN 10204:2004 3.1C





M-650 Process – Review and Resolution

- Resolution of outstanding problems:
 - Testing
 - Outstanding actions from visit
 - Quality Management System
 - Process procedures
- Compilation of Qualification Test Record
- Review of process and record by purchaser





M-650 Process – Certification

- Certificate:
 - Valid for 5 Years
 - States:
 - standard, material, product and process
 - Tested thickness and weight
 - Qualified thickness and weight
 - Carry forward qualification / approval for future work in this product and size range

MDS-D44 Boss Qualification Test Record

QTR		Qualification Test Record				QTR No.: MOF-QTR-D44-BOS
		NORSOK M-650				Rev. No.: 1
Manufacturer name/address/ Web page:						
Reference standard	NORSOK M650 Rev 2 – Qualification of Manufacturers of Special Materials NORSOK M630 Rev 4 – MDS-D44 Rev 3 ASTM API 6A Appendix H					
Material designation and MDS No.:	MDS-D44 Rev 3 – ASTM A 182 F51					
Manufacturing summary doc. No.:	MS03 Rev 1					Rev. No.: 1
Products and manufacturing process(es):	Boss Forging Open Die Hammer Forging					
Mandatory conditions and sub-contractors:						
Other information:						
Tested and Qualified Thickness and Weight						
Products and manufacturing process(es):	Test record No.	Tested thickness (mm)	Qualified thickness (mm)	Test piece weight (kg)	Qualified weight (kg)	
Boss Forging		117.50	120.00	30.85	61.70	
Qualification/Acceptance signatures						
Manufacturer:	Prepared by/Date: Richard Bolton M.Eng AMIChemE Area 42 Consulting – 06/09/04		Checked by/Date:			
<p>The manufacturer and this QTR are evaluated and found to be in compliance with the requirements of NORSOK M-650 for supply of the above listed products and materials. This acceptance does not exempt any purchaser from his responsibility to ensure that this qualification is valid for his products within the essential variables of NORSOK M-650.</p>						
Qualified/Accepted by (company name/address):				Signature/Date:		





Telling the world about your qualification

- NOROK do not approve or qualify manufacturers
- NOROK do not maintain a central registry of qualified manufacturers and do not intend to do so
- Increasing pressure to use qualified manufacturers
- Norwegian National Institute of Technology
 - Started and maintain an independent central registry
 - First QTR ~£800
 - Subsequent QTR's ~£500





National Institute of Technology NORSOK M-650 Website



Qualified manufacturers – Norsok M-650

Search in Norsok WEB

[Main Page / Search](#)
[Guidelines](#)
[Compensation](#)
[FAQ](#)

Welcome to Norsok M-650 Qualified Manufacturers Database

Using the Search key without defining any search criteria will give the complete list of qualified manufacturers.

Under “Manufacturer” the name of all qualified manufacturer will be found and search on one of them will show the complete list of qualification hold by the actual manufacturer.

Under “Type of Material” and “Type of products” you will find the materials and products as defined in M-650.

Search in database

Manufacturer

All manufacturers

Type of Material

All types

Type of Product

All types

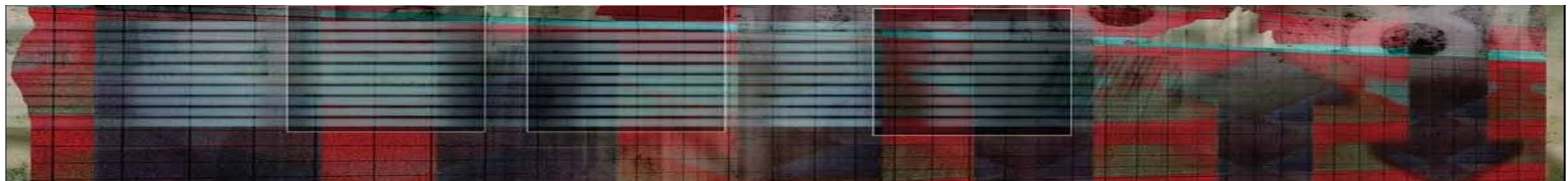
MDS

All type

Contact

[Links](#)

[The National Institute of Technology](#)
[NORSOK](#)





List of Qualified Manufacturers

Click [here](#) to download the complete datasource (excel must be installed)

Manufacturer	Country	Web Address	Type of Material	Type of Product	MDS	Tested Thickness	Qualified Thickness	Qualified Weight	Date of Qualification	Date of Expiry
Forging shop	Norway	N/A	25 Cr Duplex SS	Forgings	D54	50	62,5	N/A	Mar 2002	Mar 2007
Forging and Fittings	Sweden	N/A	25 Cr Duplex SS	Forgings	D54	100	125	N/A	Aug 2000	Aug 2005
Cast and Forge	Denmark	N/A	25 Cr Duplex SS	Forgings	D54	100	125	N/A	Sept 1998	Sept 2003
Steel Forge	Finland	N/A	25 Cr Duplex SS	Forgings	D54	50	62,5	200	Mar 2002	Mar 2007
Great Forge	Iceland	N/A	25 Cr Duplex SS	Bars	D57	100	125	200	May 1999	May 2004
Huge Forge	Germany	N/A	25 Cr Duplex SS	Bars	D57	100	125	200	Jul 1999	Jul 2004
Fittings	Netherland	N/A	25 Cr Duplex SS	Bars	D57	50	62,5	150	Oct 2003	Oct 2008
Stainless Forge	France	N/A	6 Mo SS	Forgings	R14	46	57	100	Aug 2000	Aug 2005
Flange Forging	Poland	N/A	22 Cr Duplex SS	Forgings	D44	199	248	N/A	July 1999	July 2004
Stainless Casting	Italy	N/A	6 Mo SS	Casting	R16	40	50	150	N/A	Nov 2006
Foundry Shop	Spain	N/A	6 Mo SS	Casting	R16	100	125	N/A	N/A	Aug 2005
Foundry and forging	Greece	N/A	22 Cr Duplex SS	Casting	D46	100	125	N/A	N/A	Sept 2003
Big Casting	Austrian	N/A	25 Cr Duplex SS	Casting	D56	40	50	100	N/A	Jan 2005
Plate and Pipe	Greenland	N/A	22 Cr Duplex SS	Plates	D45	10	12,5	N/A	N/A	Jun2006
Heavy Plate	Portugal	N/A	25 Cr Duplex SS	Plates	D55	20	25	N/A	N/A	Mars 2007

Click [here](#) to download the complete datasource (excel must be installed)





User Experiences

- Present
 - Interest increase in run up to adoption of 3rd revision
 - Lack of pre-qualified manufacturers
 - Qualification runs parallel with production
- Two camps
 - Manufacturers and sub suppliers
 - Oil companies and main contractors





Manufacturers and sub suppliers

- Experience
 - Improvement on per project approval process
 - Qualification process confusing, cumbersome and slow
 - Qualifications come from multiple bodies with different views
- Developments
 - Would like to see:
 - Streamlined process
 - Qualification process approval managed by independent body





Oil companies and main contractors - Experience

- Replaces several company standards with best industry practice
- Extended testing explores material property variations
- Standard not taken seriously by some suppliers
 - Subsequent use of unqualified sub suppliers
- Issues with manufacturers
 - Quality assurance systems too generalised
 - Procedures not often dedicated to specific material grade
 - Too willing to accept orders outside area of expertise
 - Metallurgical knowledge lacking or dependent on one person
 - Quality heat treatment systems and operations key to minimising material property variations





Oil companies and main contractors – Developments

- Possible adoption by other national or trans-national bodies of the standard
 - Aim of all NORSOK standards
- Increased requirements
 - More representative testing
 - Informative testing may become mandatory





Future: Implications for the Offshore Industry

- M-650 adoption
 - Norwegian companies operating in foreign waters are starting to use the standard
 - Rumoured non-Norwegian oil companies using the standard in other waters
- Increased demand for qualified manufacturers
 - Larger pool of qualified manufacturers
 - More certainty at bid stage of availability of competent manufacturers of special materials
 - Reduced delays at fabrication yards for contractors





Web Links

- Norwegian Standards
 - www.standard.no/petroleum
- National Institute of Technology - Norway
 - www.teknologisk.no/norsok-m650
- Geoff B Associates
 - www.geoffbassociates.com





Questions

