

Material selection point of view

Thierry Cassagne, Michel Bonis
Total EP France

OGP International Standards – Materials Workshop
February 7& 8, 2007
London

OGP International Standards – Materials Workshop, February 7-8, London



Outline

► What do we do today?

- Material selection criteria
- Specifications and standards

► Need for a future ISO Standard

► What it should contain!

What do we do today?

The importance of material selection

Material selection is one of the factors contributing to the **integrity of installations** with objectives of HSE and cost effectiveness

For projects, material selection is made to ensure a technically fit for purpose solution to obtain the desired properties:

- **Structural integrity**
 - At design
 - For lifetime of the field (ageing, transient conditions)

- **Ensuring a function within a system** (process, transport ...)

Basis for material selection

This means that the following properties are considered:

- **Corrosion behaviour** (internal and external)
- Mechanical strength
- Welding and fabrication
- Availability (equipment or supplier)

with cost considerations for

- Material
- Fabrication
- Coating, cladding ...
- Life cycle

Basis for material selection

The selection is based on knowledge and experience



The selection is carried out for specific environments and by system because:

- ▶ It is easier to use "standard" sets of materials/solutions when they exist
- ▶ Experience has been built over the years and it is used to obtain the most reliable solution
- ▶ Material selection is often specific to a process/equipment
 - Compressors
 - Amine units
 - ...

Specifications used

At the moment there no single "material selection" specification in TOTAL

► There are several General Specifications based on various international standards:

- ISO specifications (H₂S, coatings, CP ...)
- API/ISO: specifications for wells and completions (6A/10423)
- NORSOK specifications (M-001)
- DNV Guidelines (CP, HISC ...)
- EEMUA Guideline document N°194 2004
- ASTM Standards (corrosion, materials ...)

Other additional requirements are from experience

Need for a future ISO Standard

Advantages of a Material Selection ISO Standard

► Easier for contractors and users

- Good basis for discussion
- More standard equipments
- Limited additional requirements
- Save time and money
- More reliable material selection for less trained users/contractors

► What is important?

- Widespread knowledge and availability of the ISO Standard document
- Trained people to make a proper use of it
- To be able to build on the ISO document
- The ISO Standard must allow us to make our own choice

What it should contain!

- ▶ **General methodologies for material selection and corrosion protection**
- ▶ **Degradation modes to be considered (corrosion, mechanical ...)**
- ▶ **Usual material selection(s) for specific systems**
 - Wells and completion
 - Subsea facilities
 - Pipelines and risers
 - Production process equipments
 - Utilities (water, gas, air, seawater ...)
 - Amine units
 - TEG units
 - De-aeration units
 - Rotating equipment
 - Flare system
 - Moorings
 - Flexibles
 - Umbilicals
 - ...

It is important to differentiate between:

▶ Common systems where environments are generic

In this case, material selection can be essentially standard and one or several generic solutions can be selected

Examples: amine units, utilities ...

▶ Variable environments and systems

In this case, the solution is limits oriented. The selected materials are a function of the actual conditions in each case.

Need: methodology of choice and the limits of use

Example: flowlines, pipelines ...

What it should contain!

▶ Material selection for specific components

- Bolting
- Structures
- Valves
- Anodes
- ...

▶ Guidelines for the use of materials in specific conditions

- H₂S
- Seawater
- Production environments
- Non metallics

▶ Guidelines on fabrication and welding (including specific problems)

- Cladding
- Welding
- Bending and forming

Material selection for corrosion control

