



Chevron Engineering Standards Overview

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Materials and Equipment Engineering

February 7, 2007



Why?

Post Merger → Overlapping, Non overlapping Standards, & Project Specs → Single Standards (CES)

Why Deploy Enterprise Wide across Chevron:

- Global Technology Improvement
- LL & BP implementation across multiple projects/facilities
- Reduce Project Risks
- Consistency of designs with large amount of hiring/onboarding
- New Employee shortened time to productivity

CES Benefits:

- Improved safety
- Reduced CAPEX, and OPEX
- Increased reliability and availability
- Improved cycle time
- Transfer of Intellectual Capital



Chevron Engineering Standards Programs

2006
Programs – 314 Active Projects

Onshore Consolidation - 162

Offshore Topsides - 97

Subsea - 44

LNG - 11

Safety in Design

2007 New Programs

Safety in Design – Human Factors

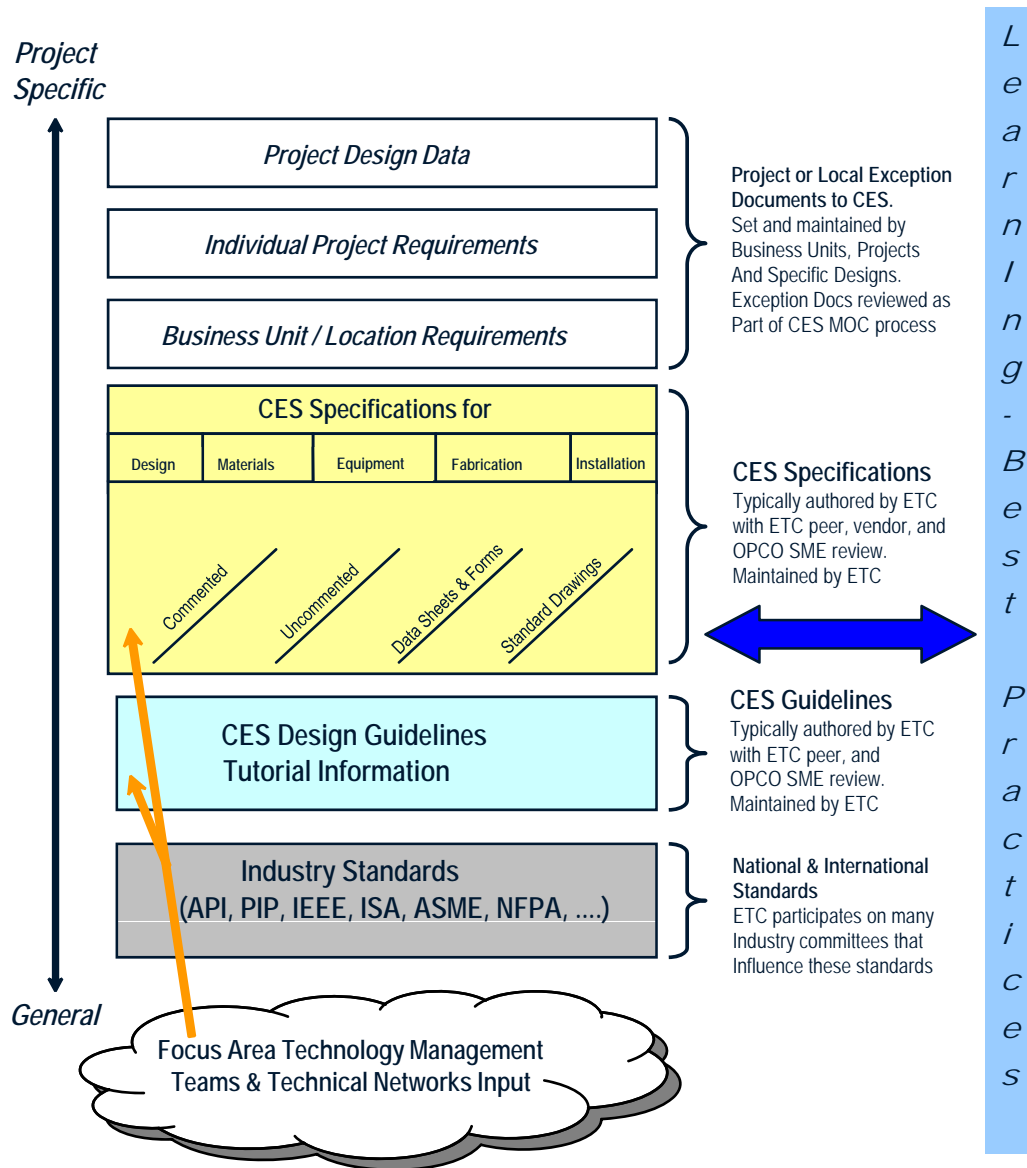
Fixed Platforms

Floating Systems

FPSO – Marine and Hull

- Onshore Consolidation – Mostly Refining
- Offshore Topsides – Upstream offshore facilities (warm climates)
- Subsea
- LNG Plants
- Safety in Design
- 3 New Programs starting in 2007

Chevron Engineering Standards Structure



Standards set needed for projects and facilities

- Industry Stds appended by exception specs to define CVX preferences
- CES Guidelines
- CES Specs
- Project Specs Package
- Project & Location data and exception specs append CES



CES Document Types

CES Document Types

Guidelines

- * **Material Specification Uncommented**
- Material Specification Commented**
- * **Design Specification Uncommented**
- Design Specification Commented**
- * **Procedure Specification Uncommented**
- Procedure Specification Commented**
- * **Data Sheet**
- * **Data Sheet Guide**
- * **Inspection and Testing Requirements**
- * **Documentation Requirements**
- * **Standard Drawings**

CES Document Designator	Legacy Chevron Designator
EN	EN
SU	EG
SC	MS
DU	
DC	
PU	
PC	
DS	DS
DG	DG
IT	
DR	
various	various

* Indicates documentation types that are typically part of the Project Specification Package



Commented Specifications

Shear area values for Charpy impact testing shall be in accordance with API 5L SR5A. Shear area requirements need not be met on the weld seam.

Comment: Shear requirements on the Charpy specimen for gas pipeline service are important to provide fracture initiation resistance. Meeting the shear requirement will mean that the test temperature is above the ductile-to brittle transition temperature.



CES Manual Organization

- Organized around major technologies, each having an assigned Subject Matter Expert Sponsor responsible for their technology area.
- Manual Sponsors are also leaders and contributors in their functional communities
- Sponsors are responsible for ensuring the information in their Manual is current and accurate.
- Sponsors are key in planning & prioritizing CES annual work scope
- Sponsors have final review & signoff of manual documents before they are published



CES Manuals & Sponsors

CIV - Civil and Structural
COM - Coatings
CMP - Compressors
CPM - Corrosion Prevention and Metallurgy
DRI - Drivers
ELC - Electrical
EXH - Heat Exchangers & Cooling Towers
FFM - Fluid Flow
FPM - Fire Protection
FRS - Flare & Relief Systems
HTR - Fired Heater & Waste Heat Recovery
ICM - Instrumentation & Control

IRM - Insulation & Refractory
MAC - Gen. Machinery
NCM - Noise Control
OPS - Subsea Operations
PPL - Pipelines
PIM - Piping
PVM - Pressure Vessels
PMP - Pumps
SID - Safety In Designs
TAM - Tanks
UTL - Utilities
WEM - Welding

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Chevron Engineering Standards

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ICM Home FE Home Other Tech Customer Service Archived Project Specs

Civil & Structural
Coatings
Compressor
Corrosion & Materials
Downstream | Upstream
Driver
Electrical
Fire Protection
Fired Heater
Flare/Relief Systems
Fluid Flow
General Machinery
Heat Exchanger
Insulation & Refractory
Instrumentation & Control
Miscellaneous Equipment
Noise Control
Operations
Packaged Equipment
Pipeline
Piping
Utilities
Welding

ICM

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Guidelines

Design guides, background information
[All Guidelines](#) except...
[Offshore Subsea Guidelines](#)

Specifications

[All Specifications](#) except...
[LNG](#)
[Offshore Subsea](#)
[Offshore Topsides](#)

Drawings

Complete Document Listings

[All Documents](#) except...
[Topsides](#) [LNG](#) [Subsea](#)

Legacy (Archived) Standards

[Texaco \(GEMS\)](#) [Caltex](#) [Unocal](#)
[Safety Instruction Sheets](#)

Monthly Reports

Consolidation Program Show Report

Document Updates

12/19/06	GB-J1143A-0	Pressure Gauge Installation -Horizontal Line, Vessel or
		Vertical Line, Vessel or
		02 / Combustibles Flue Gas
		Analyzer Calibration Station
12/01/06	ICM-EN-200	P&ID Development
12/01/06	ICM-EN-500	Flow Measurement
12/01/06	ICM-SU-11.01	High Integrity Pressure Protection Systems (HIPPS)
12/01/06	ICM-DU-11.02	Design of Flow Instrument Systems
12/01/06	ICM-SU-51.02	Umbilical Supply
11/01/06	ICM-PU-51.03	Loadout and Installation of Subsea Umbilicals
11/01/06	ICM-SU-11.28	Hydraulic Power Unit Specification - Application: Offshore Topsides

Search CES Database Full Text Search

Instrument Control Manual

Guidelines by Application

Specs by Manual Selected and Application

Complete listing of Specs by Application – across all Tech Manuals

Drawings

Local intranet

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Chevron Engineering Standards

FE Technologies

ICM Home FE Home Customer Service

Civil & Structural
Coatings
Fire Protection
Fired Heater
Insulation & Refractory
Instrumentation & Control
Miscellaneous Equipment
Noise Control
Operations
Packaged Equipment
Pipeline
Piping
Pressure Vessels

ICM

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CES

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[Safety Instruction Sheets](#)

Monthly Reports

Consolidation Program

News

02/03/06 [RE: restriction fittings at the root valves](#)
02/02/06 [restriction fittings at the root valves of n](#)

Document Updates

12/19/06	GB-J1143A-0	Pressure Gauge Installation Equipment
12/19/06	GB-J1143B-0	Pressure Gauge Installation -Vertical Line, Vessel or Equipment
12/07/06	GB-J-1399-0	Instrument Installation Detail 02 / Combustibles Flue Gas Analyzer Calibration Station
12/01/06	ICM-EN-200	P&ID Development
12/01/06	ICM-EN-500	Flow Measurement
12/01/06	ICM-DC-11.02	Design of Flow Instrument Systems
12/01/06	ICM-SC-11.31	High Integrity Pressure Protection Systems (HIPPS)
12/01/06	ICM-SU-5119	In Situ and Close Coupled Analyzers
12/01/06	ICM-SU-11.31	High Integrity Pressure Protection Systems (HIPPS)
12/01/06	ICM-DU-11.02	Design of Flow Instrument Systems
12/01/06	ICM-SU-51.02	Umbilical Supply
11/01/06	ICM-PU-51.03	Loadout and Installation of Subsea Umbilicals
11/01/06	ICM-SU-11.28	Hydraulic Power Unit Specification - Application: Offshore Topsides

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CVX Instrument Contacts

Two Search Engines

Legacy Company Standards

Mod's in progress to Ask a Question page

Instrument Supplier Contacts

Customer Service Page

View CES Monthly Reports (All Programs)

Recently published documents are automatically posted here

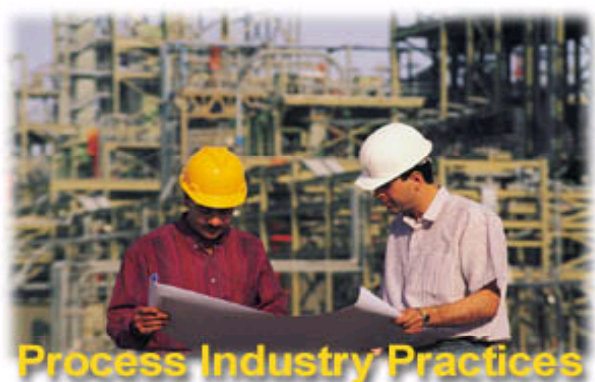
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- FAQ
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Process Industry Practices

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Process Industry Practices (PIP) is a consortium of process industry owners and engineering construction contractors who serve the industry. PIP was organized in 1993 and is a separately funded initiative of the [Construction Industry Institute](#) (CII), at [The University of Texas at Austin](#).

PIP publishes documents called Practices." These Practices reflect a harmonization of company engineering standards in many engineering disciplines. [Up to 6% savings on capital projects can be achieved](#) with the implementation of the Practices. Specific Practices include design, selection and specification, and installation information.

Practices are developed in the following disciplines:

-  [Civil/Structural/Architectural \(CSA\)](#)
[Civil Sample](#)* PDF (200 KB)
[Structural Sample](#)* PDF (599 KB)
-  [Coatings/Insulation/Refractory \(CIR\)](#)

January 18th, 2007

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[Click here](#) to view the agenda of our recent successful conference.

Jan 8
PIP is pleased to welcome Affiliated Engineers, Inc., located in Madison, Wisconsin, as its newest subscriber.

Dec 15
PIP is pleased to once again participate as a co-sponsor at the daratechPLANT2007 conference (<http://www.daratech.com/plant2007>) in Houston January 29 - 31, 2007 and will display our new and improved PIP booth. At this year's conference, you will discover innovative methods of work, successes and solutions to problems with established technologies, and how your peers are implementing and benefiting from today's best practices.

Dec 15
PIP is pleased to announce SNC-Lavalin GDS, Inc., located in Houston, Texas, as its newest contractor Member company.

Nov 30
PIP is pleased to welcome Rentech, Inc., located in Commerce City, Colorado, as its newest owner/operator Member Company.

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PIP 2006 Annual Conference NEW TOOLS NEW REALITIES

The PIP 2006 Annual Conference [Re-cap webpage](#) now available!



PIP Published Documents

PIP NEEDS YOU

Interested parties, after consultation with the Steering Team Member of their respective Member Company, should contact the Function Team Leader shown below.

Current Team and Committee Volunteer Opportunities

Vessel Function Team and Task Team Participants

[Bernie Shelley](#)

Members are needed for the Exchanger Task Team and Tank Task Team.

Machinery Team Participants

[Ron Carlson](#)

The Machinery Team could use someone to lead: RETC001 Factor Testing of Centrifugal Compressors

Refractory Team Participants

[Syed Rahman](#)

Need 2 or 3 additional members

January 18th, 2007

Members Area Search
Indexing now includes Practices in PDF, including CAD.

go!

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What's New?

Dec 1
Click here for a preview of the '07 Annual Conference and how you can contribute to its success!

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Nov 30
PIP is pleased to welcome Rentech, Inc., located in Commerce City, Colorado, as its newest owner/operator Member Company! Mark Hall will serve as the Steering Team representative. He is

PIP Search Feature, locates applicable documents



Materials Selection Standards

- Subsea Materials are mostly standardized
- Topsides and Onshore Production Facilities are generally not
 - Materials selection often based on engineering judgment and experience
 - Some guidelines exist and are being better developed



Materials Selection Guidelines



Upstream Materials & Corrosion

Materials & Equipment Engineering Unit
Chevron Energy Technology Company
1500 Louisiana St. - 16016B
Houston, TX 77002-7308
Tel 832-854-5241
AdebayoAkinpelu@chevron.com

APPENDIX A: MATERIALS SELECTION TABLE FOR SURFACE PRODUCTION FACILITIES

SYSTEM	EQUIPMENT	MATERIALS OF CONSTRUCTION	NOTES
Oil / Gas Gathering	Flowlines / Pipelines	<p>1) Typically carbon steel with chemical inhibition</p> <p>2) Carbon steel with corrosion resistant alloy (CRA) cladding e.g. austenitic stainless steels (316L), high nickel alloys (Type 825 or 625)</p> <p>3) Corrosion resistant alloy (CRA) pipe (2205 duplex stainless steel (22%Cr), super austenitic stainless steels such as 6% molybdenum stainless steels)</p> <p>4) Cement lined pipe (onshore only)</p>	<p>1) For high pressure (> 1400 psi), high temperature (> 300 F), high CO₂ partial pressure (1,000 psi) consider using one of the CRA options (solid CRA pipe or cladding).</p> <p>2) Corrosion inhibition becomes difficult under any of the following conditions: Temperature > 300 to 450 F (max); Pressure > 1400 psi; Gas velocity > 100 ft/s; Mixture velocity < 3 ft/s; Dissolved oxygen > 50 ppb; Partial Pressure CO₂ > 1000 psi ; Slug flow with Froude numbers > 10; Wall shear stress > 300-400 Pa (Gas) & 30 Pa (Liquid); Sand rate > 10 ppmw (Liquid) & 0.1 lb/MMSCFD (Gas).</p> <p>Beyond any of the above limits, consider a CRA option.</p>
	Headers / Manifolds	Same as above	<p>3) Temp limit for standard coatings is ~250 F.</p> <p>Consult with ETC Upstream & Materials Team before selecting CRAs or Composite pipe materials</p>