

DEP SPECIFICATION

DECANTER CENTRIFUGE SELECTION, DESIGN AND MANUFACTURE

DEP 31.27.00.31-Gen.

February 2013

ECCN EAR99

DESIGN AND ENGINEERING PRACTICE



© 2013 Shell Group of companies

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, published or transmitted, in any form or by any means, without the prior written permission of the copyright owner or Shell Global Solutions International BV.

This document contains information that is classified as EAR99 and, as a consequence, can neither be exported nor re-exported to any country which is under an embargo of the U.S. government pursuant to Part 746 of the Export Administration Regulations (15 C.F.R. Part 746) nor can be made available to any national of such country. In addition, the information in this document cannot be exported nor re-exported to an end-user or for an end-use that is prohibited by Part 744 of the Export Administration Regulations (15 C.F.R. Part 744).

PREFACE

DEP (Design and Engineering Practice) publications reflect the views, at the time of publication, of Shell Global Solutions International B.V. (Shell GSI) and, in some cases, of other Shell Companies.

These views are based on the experience acquired during involvement with the design, construction, operation and maintenance of processing units and facilities. Where deemed appropriate DEPs are based on, or reference international, regional, national and industry standards.

The objective is to set the standard for good design and engineering practice to be applied by Shell companies in oil and gas production, oil refining, gas handling, gasification, chemical processing, or any other such facility, and thereby to help achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

When Contractors or Manufacturers/Suppliers use DEPs, they shall be solely responsible for such use, including the quality of their work and the attainment of the required design and engineering standards. In particular, for those requirements not specifically covered, the Principal will typically expect them to follow those design and engineering practices that will achieve at least the same level of integrity as reflected in the DEPs. If in doubt, the Contractor or Manufacturer/Supplier shall, without detracting from his own responsibility, consult the Principal.

The right to obtain and to use DEPs is restricted, and is typically granted by Shell GSI (and in some cases by other Shell Companies) under a Service Agreement or a License Agreement. This right is granted primarily to Shell companies and other companies receiving technical advice and services from Shell GSI or another Shell Company. Consequently, three categories of users of DEPs can be distinguished:

- 1) Operating Units having a Service Agreement with Shell GSI or another Shell Company. The use of DEPs by these Operating Units is subject in all respects to the terms and conditions of the relevant Service Agreement.
- 2) Other parties who are authorised to use DEPs subject to appropriate contractual arrangements (whether as part of a Service Agreement or otherwise).
- 3) Contractors/subcontractors and Manufacturers/Suppliers under a contract with users referred to under 1) or 2) which requires that tenders for projects, materials supplied or - generally - work performed on behalf of the said users comply with the relevant standards.

Subject to any particular terms and conditions as may be set forth in specific agreements with users, Shell GSI disclaims any liability of whatsoever nature for any damage (including injury or death) suffered by any company or person whomsoever as a result of or in connection with the use, application or implementation of any DEP, combination of DEPs or any part thereof, even if it is wholly or partly caused by negligence on the part of Shell GSI or other Shell Company. The benefit of this disclaimer shall inure in all respects to Shell GSI and/or any Shell Company, or companies affiliated to these companies, that may issue DEPs or advise or require the use of DEPs.

Without prejudice to any specific terms in respect of confidentiality under relevant contractual arrangements, DEPs shall not, without the prior written consent of Shell GSI, be disclosed by users to any company or person whomsoever and the DEPs shall be used exclusively for the purpose for which they have been provided to the user. They shall be returned after use, including any copies which shall only be made by users with the express prior written consent of Shell GSI. The copyright of DEPs vests in Shell Group of companies. Users shall arrange for DEPs to be held in safe custody and Shell GSI may at any time require information satisfactory to them in order to ascertain how users implement this requirement.

All administrative queries should be directed to the DEP Administrator in Shell GSI.

TABLE OF CONTENTS

1.	INTRODUCTION	4
1.1	SCOPE.....	4
1.2	DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS	4
1.3	DEFINITIONS	5
1.4	CROSS-REFERENCES	5
1.5	SUMMARY OF MAIN CHANGES.....	5
1.6	COMMENTS ON THIS DEP	6
1.7	DUAL UNITS.....	6
2.	DECANTER CENTRIFUGE SELECTION – OVERVIEW	7
3.	DETERMINING AND GUARANTEEING THE LIMIT PARTICLE DIAMETER.....	8
4.	EQUIPMENT, MATERIALS AND SERVICES SUPPLIED BY THE CONTRACTOR	8
5	EQUIPMENT, MATERIALS AND SERVICES SUPPLIED BY THE MANUFACTURER/SUPPLIER	8
6	EQUIPMENT WARRANTY BY THE MANUFACTURER/SUPPLIER	9
7.	REQUIREMENTS	9
7.1	GENERAL REQUIREMENTS.....	9
7.2	PIPING	10
7.3	HOUSING	10
7.4	DRIVE AND GEAR BOX.....	11
7.5	LUBRICATION SYSTEMS.....	11
7.6	BASE FRAME	12
7.7	POLYMER FEED SYSTEM	12
7.8	SHOP TEST	12
8.	OTHER REQUIREMENTS	13
9.	REFERENCES	14

1. INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for design, selection, manufacture, shop assembly, shop testing, shop painting and delivery of horizontal solid bowl decanter centrifuges.

Data/requisition sheet DEP 31.27.00.93-Gen. is an integral part of this DEP.

Excluded from the scope of this DEP are pressure filters of the following types:

disposable cartridge filters; manually cleanable disposable cartridge filters; manually cleaned metal candle filters; filters packed with polypropylene wool blankets/mattresses; automatic backwash or backflush filters; deep bed filters; automatic self-cleaning filters (advanced version of automatic backwash filters with unique and more efficient backwash design)	covered in DEP 31.27.00.25-Gen.
vacuum belt filters	covered in DEP 31.27.00.29-Gen.
rotary drum vacuum filters	covered in DEP 31.27.00.30-Gen.
filters for removing particles from hydro processor feeds (type selection and design rules)	covered in DEP 31.27.21.10-Gen.

The equipment covered by this DEP includes recessed plate and membrane plate designs. Flush plate and frame designs are not included in this DEP.

This new DEP includes information derived from and supersedes 10 GS-44.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorized by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorized access to DEPs does not for that reason constitute an authorization to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil refining. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorized to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Term	Definition
Area Equivalent	Parameter that relates the separating ability of a solid-bowl decanter centrifuge to the area of an equivalent sedimentation tank. It is the product of the free surface area of liquid in the rotating bowl times the "g"-force.
Limit Particle Diameter	Smallest particle size that is retained at 99+ % of all particles of that size presented to the centrifuge. The limit particle size is defined as that size particle which enters the bowl from the most adverse position and is just barely separated at the centrate discharge weir. Particles smaller than the limit size may also be separated, depending on a favourable position at the inlet.
Scrolling Efficiency	Ratio of the axial movement of the settled solids per scroll revolution, to the scroll pitch. Settled solids may fail to scroll when the frictional forces at the scroll are greater than those at the bowl.
Slenderness Ratio	Inside length of the rotating bowl divided by the inside major diameter of the rotating bowl.
Stokes' Equivalent Diameter	Diameter of a spherical particle of the same density and settling rate as an irregularly shaped particle. The Stokes' Equivalent Diameter is always smaller than the largest dimension of an irregularly shaped particle. Where a particle size is specified in this DEP, the Stokes' Equivalent Diameter shall be understood.

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets (). Other documents referenced by this DEP are listed in (9).

1.5 SUMMARY OF MAIN CHANGES

This is a new DEP.