نوبت« »

شرکت پالایش نفت امام خمینی(ره)شازند(سهامی خاص)

آگهی فراخوان مناقصه عمومی دو مرحله ای‌شماره RND-0318035-ME

تحت عنوان خرید کاتالیست CGH جهت رکتورهای 3201,3202,3203

شرکت پالایش نفت امام خمینی(ره) شازند در نظر دارد تامین موضوع صدرالاشاره را از طریق مناقصه عمومی طبق اسناد مناقصه به تامین کننده واجد شرایط واگذار نماید. شرکتهای متقاضی می توانند جهت دریافت اطلاعات بیشتر و شرایط شرکت در مناقصه به سایت WWW.IKORC.IR مراجعه نمایند.

۱– موضوع مناقصه :

الف) شرح مختصر:

ردیف	شماره مناقصه	موضوع مناقصه	تعداد	مبلغ برآورد(ریال)	مبلغ تضمین شرکت در فرآیند ارجاع کار(ریال)
۱	RND-0318035-ME	کاتالیست CGH جهت رکتورهای 3201,3202,3203	۳۰۰ متر مکعب	۲،۹۰۰،۰۰۰،۰۰۰،۰۰۰	۲۹،۳۷۸،۰۰۰،۰۰۰

ب) تضمین مورد قبول شامل : ضمانتنامه بانکی / واریز وجه نقد / چک بین بانکی / چک تضمینی

ج) مناقصه گزار در رد یا قبول هر یک یا تمام پیشنهادها بدون آنکه محتاج به ذکر دلیل باشد مختار است.

۲) کلیه اشخاص حقوقی واجد شرایط میتوانند مطابق تاریخ های ذیل جهت دریافت اسناد استعلام ارزیابی به آدرس اینترنتی فوق الذکرمراجعه نمایند و پس از دریافت اسناد و مطالعه آن ، مستندات ارزیابی کیفی را در قالب لوح فشرده در مهلت مقرر به آدرس ذیل ارسال نمایند .بدیهی است پیشنهاد هایی که با شرایط مندرج در فراخوان اختلاف داشته وارسال مدارک مناقصه از سوی متقاضیان بعد از مهلت مقرر قابل پذیرش نمی باشد. پس از ارزیابی کیفی از متقاضیان تائید شده جهت ادامه فرآیند مناقصه دعوت بعمل خواهد آمد.

۳) مهلت دریافت اسناد :

۳-۱- مهلت دریافت اسناد استعلام ارزیابی کیفی: روز شنبه مورخ ۱۴۰۳/۱۱/۱۳

۳-۲- مهلت ارسال پاسخ استعلام ارزیابی کیفی: روز پنج شنبه مورخ ۱۴۰۳/۱۱/۱۸

۴) نام و نشانی دستگاه مناقصه گزار:اراک، کیلومتر۲۰جاده بروجرد-دو راهی شازند- شرکت پالایش نفت امام خمینی (ره)شازند- اداره تدارکات کالا- واحد مناقصات-اتاق ۱۱۸

تلفن تماس:۳۳۴۹۲۹۱۶و۳۳۴۹۲۸۴۰-۰۸۶

فکس: ۳۴۱۶۶۲۴۳-۰۸۶ یا ۳۴۱۶۶۰۱۳-۰۸۶

روابط عمومی شرکت پالایش نفت امام خمینی (ره)شازند

آخرین مهلت اعلام آمادگی ۱۴۰۳/۱۱/۱۳ (از طریق فاکس یا ایمیل)

***آخرین مهلت تحویل CD مدارک ارزیابی کیفی پایان وقت اداری روز پنج شنبه ۱۴۰۳/۱۱/۱۸ اعلام می گردد (از طریق پست)**

آدرس پست الکترونیکی PROCUREMENT@IKORC.IR شماره تائیدیه فاکس و ایمیل ۳۳۴۹۲۸۳۰-۰۸۶

شرکت پالایش نفت امام خمینی (ره) شازند (سهامی عام)

شرکت /فروشگاه محترم ..... مناقصه عمومی دو مرحله‌ای شماره : RND-0318035-ME

لطفاً به منظور انجام ارزیابی کیفی آن شرکت / فروشگاه ، طبق جداول ومحاسبات پیوست مدارک ومستندات ذیل را ارائه فرمایید:

۱– جهت ارزیابی توان مالی

الف : مدارک مورد نیاز جهت ارزیابی حداقل یکی از موارد ذیل:

۱-الف : مالیات متوسط سالانه پرداخت شده (برگ تشخیص/ قطعی مالیات عملکرد ۱۰ سال اخیر).

۲-الف : فروش یکسال گذشته (لیست خریداران شامل نام خریدار ،شرح کالا،مبلغ کالا)مستند به قراردادها و اسناد فروش با صورت های مالی تأیید شده.

۳-الف :مالیات متوسط سالانه مستند به اسناد مالیات های قطعی و علی الحساب پرداخت شده .

۴-الف : حداکثر تائیدیه کتبی اعتبار از طرف بانکها.

۵-الف :دارائیهای ثابت.

۶-الف متوسط بیمه سالانه(برای قراردادهای پیمانکاری).

فرمول	امتیاز
۱/۲ × ES≤ RI	۱۰۰
ES≤ RI <۱/۲ × ES	۹۰
./۸ × ES≤ RI <ES	۸۰
./۶× ES≤ RI <./۸ × ES	۷۰
RI <./۶ ×ES	۶۰

۲– جهت ارزیابی حسن سابقه / مشتریان قبلی / تضمین کیفیت و تضمین خدمات محصولات مدارک ذیل مورد نیاز است :

الف :کیفیت کالای مورد نظر (ارائه مدارکی مبنی بر فروش کالای مورد نظر به خریداران/ ارائه مدارکی مبنی بر تطابق مشخصات فنی ارائه شده از سوی فروشنده با کالای مورد نظر)

ب : ارائه استانداردها وگواهی تضمین کیفیت ساخت کالای مورد نظر فروخته شده (در صورت موجود بودن)

ج : ارائه مدارک مربوطه در خصوص دارا بودن نمایندگی

د : ارائه تائیدیه کالای فروخته شده

۳– جهت ارزیابی تجربی مدارک ذیل مورد نیاز است :

الف: ارائه اساسنامه شرکت یا پروانه کسب

ب : ارائه شماره اقتصادی / کد ملی

شرکت پالایش نفت امام خمینی (ره) شازند (سهامی عام)

تاریخ :

فرم ارزیابی تأمین کنندگان ~~استاندارد ارزیابی تأمین کنندگان~~ کالا

مناقصه عمومی دو مرحله‌ای شماره : RND-0318035-ME **نام شرکت:**

تحت عنوان: خرید کاتالیست CGH **جهت رأکتور های ۳۲۰۳،۳۲۰۲،۳۲۰۱**

A : توان مالی

ارزیابی بر اساس یکی از پارامترهای ذیل انجام می شود :

☐ درآمد /فروش سالانه	☐ اظهار نامه مالیاتی	☐ متوسط مالیات سالانه
☐ دارائی های ثابت	☐ تائید کتبی اعتبار بانکی	☐ متوسط بیمه سالانه

☐ صورتهای مالی حسابرسی شده : دارد ☐ ندارد — میزان توان مالی : میلیارد ریال

امتیاز کسب شده : ☒ ۲۰ ☐ ۳۰ ☐ ۴۰ ☐ ۵۰ ☐ ۶۰ ☐ ۷۰ ☐ ۸۰ ☐ ۹۰ ☐ ۱۰۰

حداقل امتیازلازم : ۲۰

B : ارزیابی مشتریان قبلی ، حسن سابقه وتضمین کیفیت وخدمات محصولات

پارامترهای ارزیابی	عالی امتیاز۵	بسیارخوب امتیاز۴	خوب امتیاز۳	مورد تأیی نیست
کیفیت کالای مورد نظر مندرج در اسناد فنی ارائه شده		✱		
خدمات وپشتیبانی			✱	
انجام تعهدات(کارانتی)			✱	

امتیاز:۶۷ **٪۶۷=۱۰۰*(۱۰÷۱۵)**

C : ارزیابی تجربی

سال تأسیس :

	سابقه	امتیاز
تولید کننده/سازنده کالا	با بیش از ۱۰ سال سابقه	۱۰۰
	۵ سال تا ۱۰ سال سابقه	۹۰
	با کمتر از ۵ سال سابقه	۸۰
تأمین کننده کالا	با بیش از ۱۰ سال سابقه	۸۰
	۵ سال تا ۱۰ سال سابقه	۷۰
	با کمتر از ۵ سال سابقه	۶۰ *

امتیازتامین کننده کالا : ۶۰

بر اساس ارزیابی مدارک فوق شرکت مذکور مورد تائید می باشد ☐

به دلیل عدم ارائه مدارک ذیل ، شرکت مذکور مورد تائید نمی باشد ☐

۱- عدم ارائه مدارک مالی ☐

۲- عدم ارائه مدارک حسن سابقه و .. ☐

۳- عدم ارائه مدارک تجربه و سوابق مربوط ☐

اولویت معیارها :

A	
B	
C	

فرمول امتیازتامین کننده کالا : B ٪۴۰ +(A+C) ٪۳۰ **امتیاز کل** ۶+۲۷+۱۸ =۵۱

بررسی کننده :

۴ – قیمت تراز شده به نحوه زیر محاسبه میگردد و تعیین برنده پس از بررسی قیمت تراز شده انجام خواهد شد:

$$L = \frac{100 \times C}{100 - [i \times (100 - t)]}$$

L= قیمت تراز شده

C= قیمت پیشنهادی (درج شده در پاکت قیمت)

i = ضریب تاثیر (بین ۰.۱ تا ۰.۴) ۰٫٤

t = امتیازکل فنی بازرگانی (بین حداقل امتیاز فنی بازرگانی قابل قبول تا صد)

مشخصات فنی و اطلاعات مربوط به خریدار: RND-0318035-ME

ردیف	شرح کالا	واحد	مقدار
۱	**کاتالیست** CGH **جهت رکتورهای** 3201,3202,3203	**متر مکعب**	**۳۰۰**

الزامات انرژی:

حداکثر دماهای ورودی راکتور به شرح جدول زیر باشد:

	حداکثر دمای SOR	حداکثر دمای EOR
راکتور ۳۲۰۱	160 °C	200 °C
راکتور ۳۲۰۲	265 °C	295 °C
راکتور ۳۲۰۳	340 °C	370 °C

ضریب تاثیر جهت قیمت تراز شده: ۰.۴

حداقل امتیاز پیشنهادات فنی قابل قبول: ۷۰

مناقصه عمومی دو مرحله‌ای شماره : مناقصه عمومی دو مرحله‌ای شماره : RND-0318035-ME

۴ – قیمت تراز شده به نحوه زیر محاسبه میگردد و تعیین برنده پس از بررسی قیمت تراز شده انجام خواهد شد:

$$L = \frac{100 \times C}{100 - [i \times (100 - t)]}$$

L= قیمت تراز شده

C= قیمت پیشنهادی (درج شده در پاکت قیمت)

i = ضریب تاثیر (بین ۰.۱ تا ۰.۴) ۰٫٤

t = امتیازکل فنی بازرگانی (بین حداقل امتیاز فنی بازرگانی قابل قبول تا صد)

***آخرین پیشنهاد فنی تائید شده برنده مناقصه ضمیمه برگ مشخصات فنی جدول فوق الذکر میگردد و فروشنده موظف است نسبت به تحویل کالا مطابق آن اقدام نماید/**

RND-0318035-ME

TECHNICAL SPECIFICATIONS & PROCUREMENT CRITERIA FOR CGH CATALYSTS

TECHNICAL SPECIFICATIONS & PROCUREMENT CRITERIA FOR PRIME G CATALYSTS

Section 1: Definition

- **Buyer**: shall mean Imam Khomeini Oil Refining Co. (hereinafter referred as IKORC), incorporated and existing under the laws at Islamic Republic of Iran is located at 20Km.Broojerd Road-Arak-Iran.
- **Supplier**: shall mean any supplier/vendor who shall be the responsible for the supply of catalyst.
- **CGH:** Cracked Gasoline Hydrotreating unit was originally designed and licensed by Axens with two sections and 3 reactors to process 50500 BBL/day of high sulphur gasoline containing 1.2%wt feed sulfur with the guaranteed outlet specification of 10 ppm.
- **Purchase order, P.O** means the binding agreement between Buyer and catalyst Supplier for the supply of CGH catalyst and additional services as described in the "Purchase Order Documents".

Section 2: Introduction

- The technical specification is being released for procurement of suitable catalysts for Cracked Gasoline Hydrotreating Unit for Imam Khomeini Oil Refinery.
- The feed basis, terms of reference, product yields & qualities, general description, constraints definition, scope of supply & services, scope of work, performance guarantees and penalties etc. are outlined in the subsequent sections of the document.
- The Product quality and yield pattern and Hydrogen consumption should be submitted with the technical bid.
- Consider the following limited tender for purchasing the required catalyst including technical services and training as clarified in the following specifications.
- The feed basis, terms and conditions of reference, product yields & qualities, general description, constraints definition, scope of supply & services, scope of work, performance guarantees and penalties etc. are outlined in the subsequent sections of the document.
- The product quality and yield pattern and hydrogen consumption to be submitted with the technical bid.

Section 3: Pre-Qualification Criteria (PQC)

3.1 Technical Criteria

3.1.1 The Supplier shall be a catalyst manufacturer and must have supplied catalyst(s) for similar Cracked Gasoline Hydrotreating (CGH) units to any refinery in Iran or in a country other than the location of their manufacturing plant in the immediate preceding 10 months from the date of this tender. Reference details including the copies of the purchase order must be attached.

3.1.2 The catalyst supplier shall provide a references list regarding successful and satisfactory performance of the offered catalyst(s) for the desired hydrotreatment process in units operating under similar conditions with equivalent or higher guaranteed performance in Iran or outside the country where the manufacturing plant is located. IKORC may at its discretion seek the performance details of the Supplier's catalyst(s) from end users with similar plants who are using the same catalyst(s), which is offered to IKORC. In the event that non-satisfactory performance feedback is received, the catalyst(s) offered shall be deemed technically disqualified, and the offer shall not be considered for further evaluation. The references of catalyst must have completed successful operation. Reference details including the feed/products quality specifications, operating conditions, catalyst performance reports, and a copy of the purchase order must be attached.

3.1.3 IKORC may at its discretion seek the performance details of the supplier's catalyst(s) from end users with similar plants using the same catalyst(s) offered to IKORC. In the event that non-satisfactory performance feedback is received, the catalyst(s) offered shall be deemed technically disqualified, and the offer shall not be considered for further evaluation.

3.2 General Points

3.2.1 IKORC reserves the right to extend the due date of tender, accept or reject any tender in part or in full, without assigning any reason whatsoever.

3.2.2 Each package shall be labeled to indicate the hazardous nature, brief handling procedure and precautions to be followed.

3.2.3 A certificate of analysis for physical and chemical properties and standard Test methods must be provided with each batch of supply.

3.2.4 On receipt of the product, samples will be drawn for testing at IKORC's laboratory and if found to be in accordance with our specifications, the same shall be accepted.

3.2.5 The bidder shall submit detailed information along with the offer regarding the direct and/or indirect impact of their products on people, equipment, environment, and material. Material Safety Data Sheets (MSDS) must be submitted with the technical bid.

3.2.6 The material shall be packed in compliance with the regulations, in weatherproof, shipment-worthy eco-friendly packaging, labeled to clearly indicate the item description, hazardous nature (if applicable), and precautions/care to be taken.

3.2.7 Offers and all correspondence must be in English language only.

3.2.8 The commercial terms offered by the bidder should be firm, clear and specific as the tenders will typically be finalized without seeking further clarification.

3.2.9 Selected bidder has to confirm free replacement will be done if the supplied material rejected.

3.2.10 After documents evaluation, visiting catalyst production plant and at least three similar reference units would be necessary for final technical approval.

3.2.11 The vendor must acknowledge that the catalyst will be loaded at a time determined by IKORC. Guarantees will remain valid from the first introduction of feedstock.

3.2.12 Spent catalysts generated after the end of their run (EOR) should be safe for disposal as per international safety standards. The catalyst vendor must provide detailed procedures for the unloading and disposal of spent catalysts, including MSDS documentation.

3.2.13 The inspection and technical approval of the catalyst must follow these steps:

• After completing the production of the catalyst shipment (in a maximum of three shipments, each shipment for each reactor), the entire quantity of one type of catalyst must be prepared and stored in the warehouse of the manufacturing company. In the presence of representatives from the buyer and supplier, and following the defined standard sampling method, the catalyst shall be sampled and

sealed by the buyer's representative. All costs related to the buyer's presence at the production plant and sampling shall be the responsibility of the supplier.

• The sample prepared by the supplier shall be transported to the destination country, and after the seal verification by the buyer, it is sent to a trusted laboratory for necessary analysis. The buyer will bear the cost of testing.

• After the technical analysis results and review are determined by IKORC's experts, and in the event of technical approval and written notification to the supplier, the goods will be shipped to Iran, and payments will be made upon receipt of required documentation in accordance with the contract.

• The inspection may also be conducted by a third-party inspector at the buyer's discretion and at the supplier's expense.

• The analysis tests for each type of catalyst and their final technical approval will inly be conducted once the entire shipment of that specific type of catalyst has been delivered in buyer's warehouse. If discrepancies are found between analysis results of the delivered shipment and the technical specifications of the catalysts_ such as density, LOI or other parameters provided in the technical proposal of the tender documents_ that result in any additional costs being incurred by buyer company, compensation will be made in accordance with the regulations outlined in the contract.

Section 4: Process Description

This process unit is licensed by Axens, This Cracked Gasoline Hydrotreating process is designed to process 50,500 BPSD of gasoline from Fluidized Catalytic Cracking (FCC) unit.

The design objective of the Cracked Gasoline Hydrotreating unit is to reduce the combined gasoline sulfur level while minimizing octane loss through olefin hydrogenation. The sulfur content of Light Cracked Gasoline (LFRCG) and

Desulfurized Heavy Cracked Gasoline (HFRCG) is reduced to minimal levels, and octane loss (RONC) is limited to a maximum of 2.0.

Cracked Gasoline Hydrotreating unit utilizes AXENs' Prime G+ process. Prime G+ is a process for hydrodesulfurization of cracked gasoline which includes the following major sections:

- Selective Hydrogenation Unit (SHU) section where diolefins are selectively hydrogenated and light sulfur compounds are converted into heavier sulfur compounds. The hydrogenation reactions take place in a fixed- beds reactor at elevated pressure 27 barg in the presence of a catalyst consisting of alumina with nickel and molybdenum oxides.
- Splitter section where the combined gasolines including light cut and heavy cut gasolines are separated into light low sulfur cut and a heavy cut that needs further desulfurization.
- Hydrodesulfurization section (HDS) where the heavy cut is selectively hydrodesulfurized before being stabilize. The hydrodesulfurization reactions take place in two fixed-bed reactors in series at a pressure 22.9 barg in the presence of two types of catalysts: one based alumina with cobalt and molybdenum oxides and other based alumina with nickel oxide.

This unit is also designed for in-situ catalyst regeneration and the activity of catalyst is recovered by burning the coke using mixture of steam and air in SHU reactor and mixture of nitrogen and air in HDS reactors.

The aim of this "OPERATING MANUAL" is to provide the operation staff with the necessary background and information to understand how the process works, how to prepare the unit for start-up, how to operate it and shut it down. It also explains how to prevent or correct operation upsets. Special procedures for catalyst handling and treatment prior to start-up as well as the relevant list of analyses and specific safety recommendations are also included.

Section 5: Feed Specification:

5.1 Design case:

The catalyst supplied shall be capable of processing and guaranteeing the high-sulfur gasoline having the following range of feed Specification

Table – 1 Feed Specification

	Unit	Design Feed	Test Method
Capacity	BPSD	**50500**	
Flow rate	m^3 /h	**334.6**	
Density @ 15°C	kg/m3	**756.7**	ASTM D-1298
Sulphur total	ppm wt	**1000 (Max 1200)**	ASTM-D 2622
Mercaptans	ppm wt	**200**	UOP 163
Br Number	gBr/100 gr	**-**	ASTM-D 1159
Diene Value	mg/g	**2**	UOP 326
RON		**91.7**	ASTM-D 2699
MON		**79.9**	ASTM-D 2699
P	%vol	**20.6~29.5**	ASTM-D 6839
O	%vol	**34.1 (Max 43)**	ASTM-D 6839
N	%vol	**9.3**	ASTM-D 6839
A	%wt	**27.1 (Max 32)**	ASTM-D 6839
RVP	kpa	**55**	ASTM-D 323
Nitrogen	wtppm	**40 (60 Max)**	ASTM D-4629
Benzene	vol %	**<1.0**	ASTM D-6839 or 6277
Existing gums	mg/100 ml	**3**	ASTM D381
Distillation			ASTM-D86
IBP	°C	**37**	
5%vol	°C	**47**	
10%vol	°C	**54**	
30%vol	°C	**74**	
50%vol	°C	**102**	
70%vol	°C	**138**	
90%vol	°C	**185**	
95%vol	°C	**207**	
FBP	°C	**221**	

✓ *Catalyst supplier to provide the impact on the guarantee on change in feed parameter in the form of correlations and/or graph.*

✓ *Feed properties which are not provided in this tender and estimated by*

vendor and may be critical otherwise to indicate the same in the offer.

5.2 Design and operating conditions of CGH

The unit operates with three reactors with a total catalyst volume of approximately 300 m3.

The design and present operating conditions of the unit are provided below.

It should be noted that temperatures mentioned for the inlet of reactors at SOR and EOR represent maximum temperature.

5.3 Unit Capacity:

Feed Rate: 50500 bbl/day

Turn Down Ratio: 50 % of design throughout

5.4 Operating conditions:

Fresh Feed Rate, M3/Hr	343.6
R-3201 LSHV, 1/Hr	4
R-3202 LSHV, 1/Hr	4
R-3203 LSHV, 1/Hr	3
SHU Section H_2/HC Ratio, N M3/ S M3	10.3
HDS Section H_2/HC Ratio, N M3/ S M3	350
SHU Section Make-up Gas, NM3/Hr	3456.4(SOR)/4032.3(EOR)
HDS Section Make-up Gas, NM3/Hr	5986.7(SOR)/6970.6(EOR)
SHU & HDS sections Make-up Gas H_2 Purity, Mol%	93.74
Recycle Gas H_2 Purity, Mol%	90.45
Feed Surge Drum (V- 3201)	
Pressure, Barg	3.5
Temperature, °C	40
Reactor (R-3201)	
Reactor Feed Oil, M3/Hr	343.6
Make Up Gas, N M3/Hr	3456.4(SOR)/4032.3(EOR)
Inlet Pressure, Barg	27
Inlet Temperature, °C	160(SOR)/200(EOR)

Max. Catalyst Temperature, °C	217
Max. Reactor Delta T, °C	22
Max Reactor Delta P, Bar	2
Outlet Temperature, °C	182(SOR)/217(EOR)

Reactor (R-3202)

Reactor Feed Oil, M3/Hr	293.9(SOR)/292.2(EOR)
Make Up Gas, N M3/Hr	5986.7(SOR)/6970.6(EOR)
Recycle Gas , N M3/Hr	91246(SOR)/89865.7(EOR)
Inlet Pressure, Barg	22.9
Inlet Temperature, °C	265(SOR)/295(EOR)
Max. Catalyst Temperature, °C	315
Max. Reactor Delta T, °C	20
Max Reactor Delta P, Bar	1.5
Outlet Temperature, °C	284(SOR)/315(EOR)

Reactor (R-3203)

Reactor Feed Oil, M3/Hr	293.9(SOR)/292.2(EOR)
Inlet Pressure, Barg	19.6
Inlet Temperature, °C	340(SOR)/370(EOR)
Max. Catalyst Temperature, °C	373
Max. Reactor Delta T, °C	3
Max Reactor Delta P, Bar	1
Outlet Temperature, °C	343(SOR)/373(EOR)

Separator Drum (V-3204)

Pressure, Barg	15
Temperature, °C	50

Amine Absorber(V-3206)

Inlet Pressure, Barg	15
Inlet Temperature, °C	50
OVHD Pressure, Barg	14.4
OVHD Temperature, °C	53
Bottom Pressure, Barg	14.7
Bottom Temperature, °C	51

Rich Amine Degasing Drum (V-3210)

Pressure, Barg	6
Temperature, °C	51

Recycle Compressor K.O. Drum(V-3207)

Pressure, Barg	14.1
Temperature, °C	53
Recycle Gas Compressor (C-3201)	
Suction Pressure, Barg	14.1
Suction Temperature °C	53
Discharge Pressure, Barg	24.3
Dicharge Temperature °C	118
Splitter(V-3202)	
Inlet Pressure, Barg	5.1
Inlet Temperature, °C	153(SOR)/159(EOR)
OVHD Pressure, Barg	4.8
OVHD Temperature, °C	84(SOR)/86(EOR)
Bottom Pressure, Barg	5.3
Bottom Temperature, °C	201(SOR)/202(EOR)
Splitter Reflux Drum(V-3203)	
Pressure, Barg	4
Temperature, °C	40
Stabilizer (V-3208)	
Inlet Pressure, Barg	6.8
Inlet Temperature, °C	155(SOR)/156(EOR)
OVHD Pressure, Barg	6.8
OVHD Temperature, °C	131(SOR)/132(EOR)
Bottom Pressure, Barg	7
Bottom Temperature, °C	206(SOR)/207(EOR)
Stabilizer Reflux Drum(V-3209)	
Pressure, Barg	6
Temperature, °C	40

5.5 Make-up Gas quality:

SHU make-up hydrogen is supplied from a PSA unit. The quality of the make-up hydrogen is detailed in the following table.

Table – 2 Quality of SHU make-up Hydrogen

Composition	mol %
Hydrogen	99.9 (min: 94)
CO+CO2	Max 15 mol ppm

HDS make-up hydrogen is supplied from the OCT unit. The quality of the make-up hydrogen is detailed in the following table.

Table – 3 Quality of HDS make-up Hydrogen

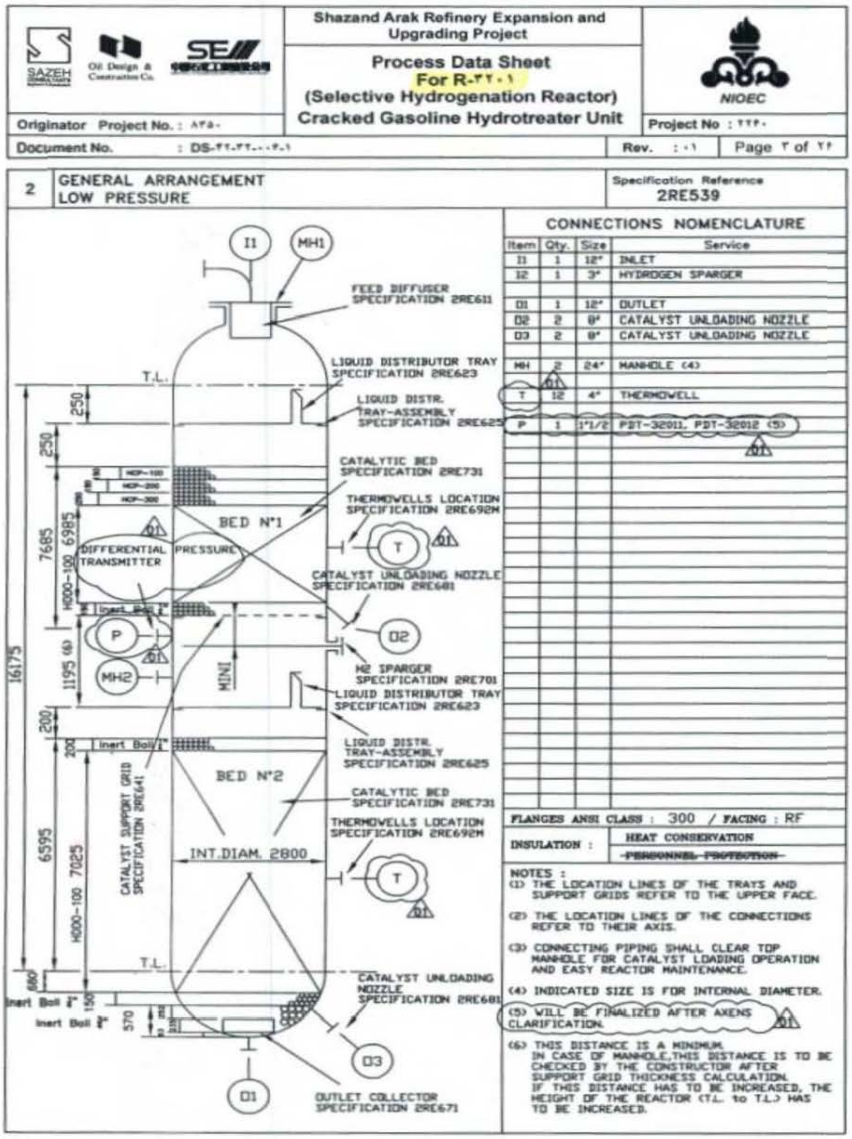
Composition	mol %
H2	93.74
C1	2.37
C2	2.22
C3	1.07
C4	0.43
C5+	0.17

Reactor Details

CGH unit consists of three Reactors namely R-3201&2&3. The details are as follows.

5.6 Reactor Mechanical and Process details:

R-3201



R-3202

Shazand Arak Refinery Expansion and Upgrading Project

Process Data Sheet
For R-۳۲۰۲
(First HDS Reactor)
Cracked Gasoline Hydrotreater Unit

NIOEC

Originator Project No. : ۸۳۵۰

Project No : ۲۲۴۰

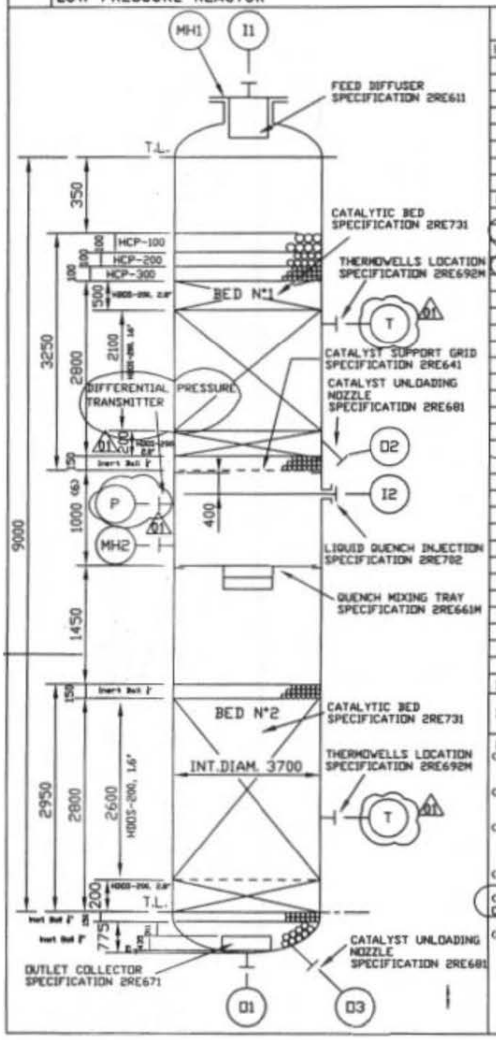
Document No. : DS-۲۲.۳۲...۷۰۱

Rev. : ۰۱

Page ۲ of ۲۷

2 GENERAL ARRANGEMENT
LOW PRESSURE REACTOR

Specification Reference
2RE531



CONNECTIONS NOMENCLATURE

Item	Qty.	Size	Service
I1	1	20"	INLET
I2	1	3"	QUENCH INLET NOZZLE
D1	1	20"	OUTLET
D2	3	8"	CATALYST UNLOADING NOZZLE
D3	3	8"	CATALYST UNLOADING NOZZLE
MH1	1	30"	MANHOLE (4)
MH2	1	24"	MANHOLE (4)
T	12	4"	THERMOWELL
P	1	1"1/2	PDT-32042, PDT-32043 (5)

FLANGES ANSI CLASS : 300 / FACING : RF

INSULATION : HEAT CONSERVATION
~~PERSONNEL PROTECTION~~

NOTES :
(1) THE LOCATION LINES OF THE TRAYS AND SUPPORT GRIDS REFER TO THE UPPER FACE.
(2) THE LOCATION LINES OF THE CONNECTIONS REFER TO THEIR AXIS.
(3) CONNECTING PIPING SHALL CLEAR TOP MANHOLE FOR CATALYST LOADING OPERATION AND EASY REACTOR MAINTENANCE.
(4) INDICATED SIZE IS FOR INTERNAL DIAMETER.
(5) WILL BE FINALIZED AFTER AXENS CLARIFICATION.
(6) THIS DISTANCE IS A MINIMUM. IN CASE OF MANHOLE, THIS DISTANCE IS TO BE CHECKED BY THE CONSTRUCTOR AFTER SUPPORT GRID THICKNESS CALCULATION. IF THIS DISTANCE HAS TO BE INCREASED, THE HEIGHT OF THE REACTOR (T.L. to T.L.) HAS TO BE INCREASED.

R-3203

Shazand Arak Refinery Expansion and Upgrading Project

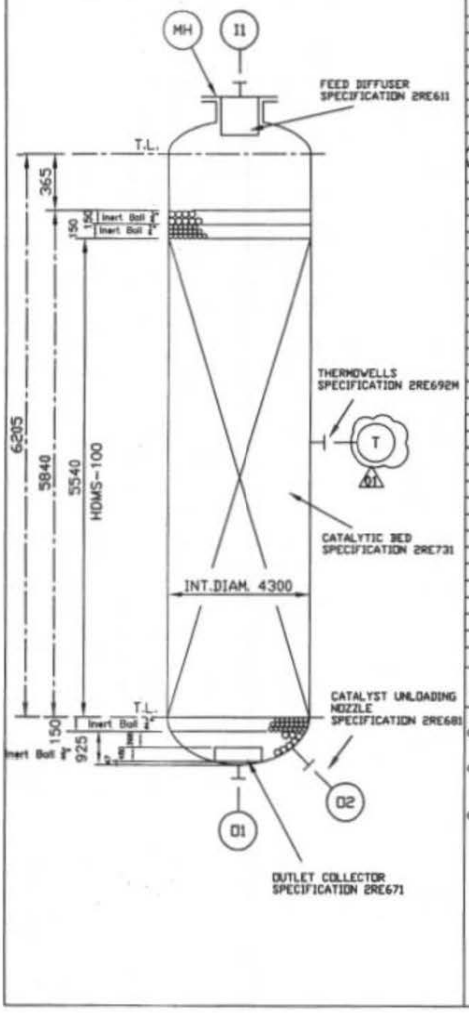
Process Data Sheet
For R-۳۲۰۳
(Second HDS Reactor)
Cracked Gasoline Hydrotreater Unit

NIOEC

Originator Project No. : ۸۳۵۰ | Project No : ۲۲۴۰
Document No. : DS-۴۲-۳۲۰۰-۸۰۱ | Rev. : ۰۱ | Page ۳ of ۱۹

2 GENERAL ARRANGEMENT

Specification Reference
2RE510



CONNECTIONS NOMENCLATURE

Item	Qty.	Size	Service
II	1	20"	INLET
01	1	20"	OUTLET
02	3	8"	CATALYST UNLOADING NOZZLE
MH	1	30"	MANHOLE (3)
T	3	4"	THERMOWELL

FLANGES ANSI CLASS : 600 / FACING : RF

INSULATION : HEAT CONSERVATION
~~PERSONNEL PROTECTION~~

NOTES :
(1) THE LOCATION LINES OF THE CONNECTIONS REFER TO THEIR AXIS .
(2) CONNECTING PIPING SHALL CLEAR TOP MANHOLE FOR CATALYST LOADING OPERATION AND EASY REACTOR MAINTENANCE .
(3) INDICATED SIZE IS FOR INTERNAL DIAMETER .

6 Catalyst Performance

6.1 Catalyst Requirement

Catalyst type and quantity must meet the following requirements:

1. The catalyst must handle fresh feed rate as mentioned in Section 5.
2. The offered catalyst must have a proven commercial performance record of at least 10 years in operation.
3. The vendor must ensure that the available emergency depressurizing system in the CGH unit is capable of handling any runaway reaction.
4. The Vendor must ensure that the proposed catalyst is capable to operate well in this unit and is capable of handling any runaway reaction and RGC trip scenarios.
5. A detailed Particle Size Distribution (PDS) for all type of catalysts must be provided and guaranteed by catalyst manufacturer.
6. Catalyst fine which is catalyst particle with smaller length than 1.6mm must be less than 0.5wt% and guaranteed by catalyst manufacturer.

6.2 Required Information and Documentation

Catalyst type and quantity must meet the following requirements. The catalyst's vendor must provide the following information:

1. Reactors' temperature profile in cycle life.
2. Total H2Consumption.
3. H2/HC Ratio.
4. Total & first cycle Life of the catalyst (guarantee).
5. Maximum sulfur content of products (guarantee).
6. Maximum nitrogen content of products (guarantee).
7. Maximum olefin of product (guarantee).
7. Maximum RON decrease of product (guarantee).
8. Surface area of catalyst.
9. Bulk density of catalyst.
10. Total pore volume of catalyst.
11. Bulk& Side Crush strength of catalyst.

12. Catalyst length size distribution& Average length of the catalyst.
13. Attrition Loss.
14. LOI of catalyst.
15. Abrasion resistance.
16. Catalyst fine content.
17. Cumulative metal poison limit of catalyst.
18. Active metals content of catalyst.
19. Performance and cycle length guarantees.
20. Technical service (including training and technical support).
21. User reference list; reference units must have similar feed & can be visited.
22. Catalyst supplier shall stand guarantee for yield, product specification, reactor pressure drop and catalyst life.
23. Certificate of analysis.
24. QCP, QA and QC certificates.
25. Filling the following tables as per your catalyst design.
26. The offered catalyst must have a proven commercial performance record of at least 4 years in operation.

6.3 Format for submission of yield pattern:

Vendors must submit the yield pattern figures strictly as per the following format in the technical bid for design case.

Table – 4 Product Yield pattern

FEED STREAMS	SOR	EOR	PRODUCT STREAMS	SOR	EOR
	Wt%	Wt%		Wt%	Wt%
Feed	100	100	H2S		
SHU H2 Consumption, Wt%			NH3		
HDS H2 Consumption, Wt%			Fuel gas		
			LCG		
			HCG		
Total			**Total**		
First Cycle Lenghth, m3 of feed/kg of Catalyst					

6.3 Product Quality

Vendors must submit product quality data in the technical bid for the design case, strictly following the format provided below.

6.3.1 products limitation:

Table – 5 Gasoline products limitation

Characteristics	Unit	specifications
Total Sulfur in recombined product	ppm	< 10
RON loss through Prime-G unit		< 2.0
MON loss through Prime-G unit		< 0.6
MAV of HDS feed	%	<2
RSH of LCG (C_5~80°c)	ppm	<1

Regarding two products of LCG (C_5-80°c) and HCG (80°c -221°c) are separated in the distillation column (V-3202) from R-3201 outlet based on std. D86.

6.3.2 products Specification:

Gasoline (HCG+LCG) yield must be ≥ 99 Wt% by wt.

i) Gasoline (HCG+LCG) Sulphur (including RSH) < 10 ppm

ii) Gasoline (HCG+LCG) Diolefine = Trace

iv) Gasoline (HCG+LCG) RON decrease <2

However, vendor must specify the estimated above qualities.

6.4 First Cycle Catalyst Guarantee

6.4.1 The catalyst must be designed to meet the guaranteed quality, product yield and specifications for a minimum period of 4 years as the first cycle of operation, while processing according to the feed specifications without regeneration and with a total catalyst life of minimum 10 years.

6.4.2 However, the vendor must specify and guarantee the estimated first cycle length.

6.4.3 The Vendor must specify the cycle length in case CGH unit operates at 10 ppm of product Gasoline.

6.5 Ultimate cycle life Guarantee

The catalyst vendor must provide an ultimate cycle life guarantee of at least 10 years with a minimum of one in-situ regeneration. However, the vendor must specify and guarantee the estimated ultimate cycle length.

6.6 Performance Guarantee Test Run

6.6.1 To establish the above performance guarantees, test runs will be conducted either with the design feedstock or with feedstock having similar characteristics to those of the design feedstock. The performance guarantee test run for the catalyst will be conducted within the first 3 months from the date of injection of fresh feed after catalyst loading.

6.6.2 The catalyst will be accepted by IKORC only if the guarantees specified by the vendor and IKORC are met in the PGTR.

6.6.3 Catalyst supplier shall provide details, any procedures, special conditions required for conducting performance guarantee run. The analysis obtained from IKORC KORC laboratory will be considered final. These methods must comply with normal practice.

6.6.4 The test run commences when the units are operating under stable conditions and should be conducted for a period of 72 to 120 consecutive hours based on feed availability. Based on mutually agreed and jointly collected measurements during the test run, Catalyst supplier and IKORC will evaluate the results of the test run to confirm conformity with the performance guarantees.

7 Operating Constraints

The following operating constraints of the CGH unit must be considered by the vendor while designing the catalyst and providing guarantees.

- Maximum Skin Temp. of Heater is 385 ° C
- Maximum reactor bed outlet temperature allowed in R-3201 is 325 °C
- Maximum reactor bed outlet temperature allowed in R-3202 is 350 °C
- Maximum reactor bed outlet temperature allowed in R-3203 is 373 °C
- Maximum recycle gas actual flow including quench and make up gas is 23018 KG/H.
- Maximum HDS H2 Make Up availability is 6.97 Knm3/hr.
- Maximum SHU H2 Make Up availability is 4.43 Knm3/hr.

8 Scope of Services :

Vendor must provide the following services:

8.1 Scope of Supply & Services

i) Supply of necessary catalysts & graded bed as required. Vendor must mention each type of catalyst requirement separately.

ii) If Active catalyst to be loaded with dense loading machine, supply and service of dense loading machine and dense loading technician are within catalyst vendor's scope. These services shall be part of catalyst supply proposal.

iii) Vendor should assist by deputing expert engineers during catalyst loading, start-up assistance and Performance Guarantee Test Run (PGTR) activities.

iv) In case IKORC requires more than 20 days vendor's service for this activity, the vendor must quote per-time rates in price bids for services needed at the site, these rates will not be considered for the evaluation of offers.

v) Vendor must indicate stabilization period required to attain SOR (Start of Run) condition after feed is taken and catalyst sulfiding is completed.

vi) Vendor must certify and sign various stage-wise documentary clearances during catalyst loading and reactor box up after inspection.

vii) Catalyst supplier shall also provide a certificate of worthiness after the successful completion of the catalyst loading, prior to the first start-up with the catalyst.

viii) Vendor must specify the recommended in-situ regeneration method/technique for each proposed catalyst.

ix) Vendor should provide operating parameters for other modes of operation (design & check cases).

x) Vendor must provide periodic evaluation of catalyst performance on quarterly basis for CGH unit and offer technical assistance for trouble shooting arising in the until the catalyst is in use, even after the guarantee period exceeds. Necessary data enabling the above will be furnished by IKORC.

xi) Vendor shall provide necessary technical support in analyzing spent catalyst and related subject as requested by IKORC within two months.

xii) Vendor must provide to visit of vendor's factory for minimum four refinery expert at time of catalyst production.

8.2 Data / Documents to be submitted with the offer

Following information must be submitted as a part of the technical offer (as per the following tables format):

a. Minimum Information to be furnished in the Technical Proposal is defined in this section. The metric system of units shall be followed for all information.

b. Catalyst-wise: name, type, size, density, average bulk density, bed height, active site metal content (oxide basis) (wt%), crushing strength, surface area, pore volume, catalyst pore size distribution, attrition loss, loss on ignition (ASTM UOP954), and the properties of each catalyst with their standard methods of measurement.

c. Vendor has to mention DMDS required for sulfiding in kilograms, including contingency quantity.

d. Catalyst supplier must submit all the details and technical information including data with respect to Process Guarantees, duly signed and complete in all respects, along with the offer.

e. Catalyst supplier must provide both the estimated values and guaranteed values at SOR and EOR.

f. Catalyst supplier must provide necessary procedure and loading diagram for the loading the catalyst in IKORC's reactors.

g. Catalyst supplier must provide information on the following key operating parameters at SOR/EOR, as a minimum, in the proposal for all cases.

- Overall mass balance including hydrogen consumption.
- Reactor yield.
- Temperature/pressure at inlet and outlet of each bed.
- Pressure drops across each bed.
- Weighted Average Bed Temperatures (WABT) for each bed.
- Hydrogen partial pressure.
- LHSV/WHSV.
- Recycle gas to oil ratio.
- Recycle gas & Quench gases in each bed expressed as Nm3/Hr.
- Energy Consumption to achieve highest activity performance of catalyst as Kcal/hr.

h. The vendor must specify SOR/EOR inlet & WABT temperatures and indicate the catalyst deactivation rate at the design charge for the design feed.

i. The composition of each proposed catalyst, including reactive metal content, must be provided. The reactor loading diagram, indicating catalyst grading and support balls, must also be provided.

j. The Vendor must quote catalyst quantity as packed basis in kilograms and mention volume in cubic meters(m3).

l. Vendor to specify method of hydro-treating catalyst loading.

m. Catalyst must handle turndown operations with fresh feed at 50% of design throughput without impacting radial spread temperature.

n. Precautions and emergency procedures to be followed during start-up, normal operation, upsets, and turnarounds must be specified.

o. Information regarding catalyst poisons.

p. Catalyst packing, handling, storage, loading & unloading procedure.

q. Detailed Catalyst Performance monitoring calculations/procedure.

r. Catalyst reaction chemistry.

s. Detailed pre-wetting and pre-sulfiding procedure.

t. Reference list of units where the catalyst has been in operation. Catalyst without proven one-year commercial experience is not acceptable.

u. All necessary technical information or the operating parameters that affect the catalyst performance i.e., SOR & EOR conditions with respect to temperature, temperature rise, reactor pressure drop, product yield, product quality, etc.

v. Signed Statement of Deviations as per the tender documents.

w. Vendor should note that catalyst will be loaded at a time determined by IKORC.

x. Vendor must provide catalyst technical details/ Material Safety Data Sheet and manufacturers specification with the bid documents / manufacturers certificate of analyses incorporating all properties given in the specifications for each batch supplied.

y. Catalyst / Catalyst support material must be packed suitably in air-tight polyethylene bags in good condition / steel drums / sacks and placed on heavy-duty pallets.

z. Spent catalyst generated after EOR should be safe for disposal as per international Safety standards. Vendor shall specify the standard.

aa. Vendor to indicate the total H2 requirement for the feed composition and also indicate Chemical Hydrogen consumption & Dissolved Hydrogen consumption separately.

bb. Vendor to indicate the estimated variation in inlet temperature of Beds, WAB, hydrogen consumption, and product qualities with respect to change in design case feed properties.

cc. Vendor to provide their catalyst deactivation details/WABT curve with respect to time for design case.

dd. Vendor to mention the list of documents required by vendor from IKORC at various stages.

ee. The catalysts that consume lower energy to achieve the highest performance during the operating period will receive a higher technical score in this section.

ff. Catalyst LOI (at 500° for 1 hour) wt% must be less than 4 wt.%. In the case of higher LOI from the mentioned range (4%), the makeup catalyst must be provided by supplier without any extra expenses.

hh. The supplier is obliged to hold training courses and arrange visits to production catalyst units in international companies for at least 20 experts introduced by the buyer during the contract implementation period.

ii. The supplier must send the catalyst production to the buyer after signing the contract. As per the buyer's decision, the production catalyst samples of the production companies may be tested in a pilot set-up in the presence of the production refinery experts and according to the operational condition requested.

jj. The supplier must give Catalyst Reference List for this catalyst in similar unit with a similar feed, which has been in operation. The list should include the refinery's feed flow rate, unit capacity, number of catalyst activity service years, feed specification, product performance, reactor condition, refinery address, and contact information.

kk. Bidders are required to submit 1 Kg sample of Main/Active Catalyst to IKORC. The sample is required to be submitted before the due date of tender. Offer, without the sample is liable to be rejected.

Table – 6 Data Information (R-3201/3202/3203)

(It must be filled for each reactor in a separate table)

MANUFACTURE		CATALYST NAME		
		COMPANY NAME		
		FACTORY ADDRESS & E-MAIL		
CATALYST CHARACTERICS *			UNIT	DATA
INLET TEMP.	SOR	INLET	°C	
		DT		
		WABT		
	EOR	INLET		
		DT		
		WABT		
INLET PRESS.	SOR	INLET	bar	
		MAX ALLOWABLE DP		
	EOR	INLET		
		MAX ALLOWABLE DP		
H2 TO HC VOL. RATIO (MIN)			Nm3/m3	
Chemical H2 CONSUMPTION		SOR	Nm3/M3	
(MIN PURITY 99VOL%)		EOR	Nm3/M3	
LHSV			1/h	
WHSV			1/h	

Table – 7 catalysts property

(It must be filled for each type of catalysts in a separate table)

CATALYST PHYSICAL PROPERTIES *			
CATALYST QUANTITIES	CATALYST HEIGHT IN REACTOR	mm	
	CATALYST VOLUME	m3	
FORM			
COLOR			
DIAMETER		mm	CALIPER
LENGTH		mm	CALIPER
Particle Size Distribution		mm	E 726
SURFACE AREA		m2/g	D3663
PORE VOLUME		cm3/g	D6761
BULK DENSITY		kg/m3	D4164
CRUSH STRENGTH		N/mm	D6175
LOI (at 500 for 1 hour)		wt.%	UOP 954
CATALYST CHEMICAL PROPERTIES *			
Active Metal Content (Oxide Basis)		wt%	E1621
		wt%	E1621
		wt%	E1621
CATALYST POISON RESTRICTIONS (max. limit values in feed)		ppb wt%	
		ppb wt%	
		ppb wt%	
		ppb wt%	
		ppb wt%	
TYPE OF LOADING			
TOTAL LIFE, GUARANTEED		year	
FIRST CYCLE LIFE, GUARANTEED		year	
NO. OF REGENERATION			
REGENERATION CONDITIONS	TIME NEED FOR EACH REGENERATION	hr	
	REGENERATION GAS		
	PRESSURE AT HIGH-SEPARATOR	bar	
	MAX REACTOR INLET TEMP.	°C	
	MAX BED TEMP.	°C	
	INLET REACTOR OXYGEN CONTENT	vol%	
	ANALYSIS INSTRUMENT REQUIREMENTS		

GUARD CATALYST PROPERTIES *			
GUARD CATALYST QUANTITIES	GUARD HEIGHT IN REACTOR	mm	
	GUARD VOLUME	m3	
FORM			
DIAMETER		mm	CALIPER
LENGTH		mm	CALIPER
SURFACE AREA		m2/g	D3663
PORE VOLUME		cm3/g	D6761
BULK DENSITY		kg/m3	D4164
CRUSH STRENGTH		N/particle	D4179
Active Metal Content		wt%	E1621
		wt%	E1621
* FOR EACH CATALYST & EACH REACTOR, FILLTHE ABOVE TABLES SEPARATELY.			

Table –8 Product Specification

PRODUCTIVITY	UNIT	Test Method	LCG	HCG
Density @ 15°C	kg/m^3	ASTM D-1298		
YIELD	Wt%			
IBP	°C	ASTM-D86		
5%vol	°C			
10%vol	°C			
30%vol	°C			
50%vol	°C			
70%vol	°C			
90%vol	°C			
95%vol	°C			
FBP	°C			
T. N	ppm wt	ASTM D4629		
T. S	ppm wt	ASTM-D 2622		
Mercaptans	ppm wt	UOP 163		
Br Number	gBr/100 gr	ASTM-D 1159		
Diene Value	mg/g	UOP 326		
RON		ASTM-D 2699		
MON		ASTM-D 2699		
Benzene	%vol	ASTM D-6839 or 6277		
P	%vol	ASTM-D 6839		
O	%vol	ASTM-D 6839		
N	%vol	ASTM-D 6839		
A	%wt	ASTM-D 6839		
MAV	%wt	IFP 9407		
RVP	kpa	ASTM-D 323		
Nitrogen	wtppm	ASTM D-4629		
Existing gums	mg/100 ml	ASTM D381		

9 Evaluation Criteria

9.1 The commercially offer must be equal with the following formula

$$L= (100*C)/(100-(i*(100-t)))$$

L = equal price

C = offer price

t = technical privilege Base on table 7 (for accepted must be t > 70)

i = coefficient effect (for catalyst i = 0.4)

9.2 offer not meeting guarantees mentioned in the section 10 is liable to be rejected.

Table – 9 Selection Criteria

Tender :CGH Catalyst		Tender NO.: RND-			
No.	Criterion of technical assessment	Weight percent coefficient	Special criteria	Description of details	Attached
1	OPERATING COST	30			
2	LIFE OF CATALYST	20	❋		
3	PRODUCTIVITY OF CATALYST	20	❋		
4	CATALYST PROPERTY	10			
5	TECHNICAL SUPPORT	10			
6	REFERENCE LIST	10	❋		

NO.	Description of details	Privilege
1	OPERATING COST	
	including :1) inlet of bed Temp. 2) H2/HC Ratio 3) Hydrogen consumption 4) energy consumption	Attached forme
2	LIFE OF CATALYST	
	Catalyst Life including: 1) first cycle Life 2) Total life	Attached forme
3	PRODUCTIVITY OF CATALYST	
	Quality & Productivity: 1) Total Sulfur 2) RSH 3) OLEFINE % 4) DIOLEFINE % 5) Yield%	Attached forme
4	CATALYST PROPERTY	
	CATALYST PROPERTY including: 1) Physical property 2)Chemical Property	Attached forme
5	TECHNICAL SUPPORT	
	Technical Consulting: 1) Technical Support 2) Guarantee Agreement	Attached forme
6	REFERENCEE LIST	
	provide references regarding successful and satisfactory performance	Attached forme

Obligations

No.	Description
1	Guarantee of Section 10
2	Visit of vendors Factory at time of production

Explanation

1- min technical privilege is 70 (t > 70)
2- coefficient effect for catalyst i = 0.4
3- Special criteria: the criteria that if not get fully privilege, offer not acceptable
4- The commercially offer must be equal with the following formula

$$L= (100*C)/(100-(i*(100-t)))$$

L = equal price C = offer price

t = technical privilege (for accepted must be t > 70)

i = coefficient effect (for catalyst i = 0.4)

Table -10 technical privilege forme

Attached form: technical privilege				
Objective	Effectiveness (%) on Objective	Sub-Objective		Effectiveness (%) on SUB-Objective
Operating Cost	30	Reactors Inlet Temperature &Energy Consumption (SOR/EOR)		40
		LHSV/WHSV		10
		Chemical H2 Consumption		20
		H2/HC ratio		30
Catalyst Life	20	Guaranteed Cycle Length (Total Life)		60
		First cycle life		40
Products	20	LCG	Total Sulfur	10
			RSH	5
			OLEFINE	10
			DIOLEFINE	10
			RON	5
			Yield	10
		HCG	Total Sulfur	10
			RSH	10
			OLEFINE	10
			DIOLEFINE	5
			RON	5
			Yield	10
Technical Support	20	Performance Guarantee		30
		Technical Service		20
		User Reference List		50
Catalyst Property	10	Physical Property	Surface Area	20
			Crushing Strength	15
			Bulk Density	15
			Total Pore Volume	15
		Chemical Property	Active Metal Content	25
			Catalyst Poison	10

10 Guarantees

Catalyst supplied by the vendor shall be subject to the following guarantee conditions.

IKORC expects following guarantees to be met by the catalyst vendor for a fresh feed rate of 334.6 M3/hr. Minimum guarantees to be met for any feed specification within range mentioned.

Materials must be guaranteed against manufacturing defects, materials, workmanship and design for the duration of first cycle life. Warranty for replacement of material / accessories should be provided free of charge at our premises. The above guarantee/warranty will be without prejudice to the certificate of inspection or material receipt note issued by us in relation of the materials.

10.1 Minimum Yield Guarantees:

Gasoline (HCG+LCG) yield must be ≥ 99 wt%. However, vendor must specify and guarantee the estimated yield.

10.2 Minimum Product Quality Guarantees:

Product Gasoline (HCG+LCG) must meet following minimum requirement quality:

i) Total Sulphur (including RSH) < 10 ppm

ii) Diolefine = Trace

iv) Gasoline (HCG+LCG) RON decrease <2

However, the vendor must specify the estimated values for above qualities.

10.3 Turndown Guarantees:

The targeted guaranteed turndown ratio is 50% of design feed for the unit. The turndown test run shall be for a period of 48 hours on continuous basis of operation, producing on-specification products with design feedstock. As per IKORC's

prerogative, a turndown capacity test run or minimum possible capacity test run shall be carried out. However, it will be carried out within 6 months of start-up.

10.4 Pressure drop Guarantee:

i. The catalyst supplier must provide the estimated pressure drop.

ii. The catalyst supplier must give maximum pressure drop guarantee in the beds of reactor. Guarantee includes reactor internals also.

10.5 Catalyst life/Cycle length Guarantees:

First cycle length shall be a minimum 4 years at design feed and a total catalyst life at least 10 years in operation. As the vendor will specify SOR / EOR inlet temperature, WABT temperature, and pressure drop across the reactor, they must specify catalyst deactivation rate/curve for the design case.