شماره مجوز: ------

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

آگهی فراخوان مناقصه عمومی دو مرحله ای‌شماره RND-0318036-MH تحت عنوان

خرید کاتالیست R.C.D

شرکت پالایش نفت امام خمینی(ره) شازند در نظر دارد تامین کالای 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	مقدار	مبلغ برآورد(ریال)	مبلغ تضمین شرکت در مناقصه(ریال)
01	RND-0318036-MH	کاتالیستR.C.D	۳۰۰۰ متر مکعب	۱۷،۲۸۸،۵۰۰،۰۰۰،۰۰۰	۱۷۳،۲۶۳،۰۰۰،۰۰۰

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

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

د) مناقصه مذکور دو مرحله ای بدون لحاظ نمودن امتیاز فنی و قیمت تراز شده انجام می گردد.

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 یکشنبه مورخ ۱۴۰۳/۱۱/۲۱

۳-۲- مهلت ارسال پاسخ استعلام ارزیابی کیفی: روز سه شنبه مورخ ۱۴۰۳/۱۱/۳۰

۴) نام و نشانی دستگاه مناقصه گزار:اراک، کیلومتر ۲۰جاده بروجرد- دو راهی شازند- شرکت پالایش نفت امام خمینی (ره)شازند- اداره تدارکات کالا- اتاق ۱۱۳

تلفن تماس:۳۳۴۹۲۸۴۲-۰۸۶(عظیمی) و یا ۳۳۴۹۲۸۴۰-۰۸۶

فکس: ۳۴۱۶۶۲۴۳-۰۸۶ یا ۳۴۱۶۶۰۱۳-۰۸۶

روابط عمومی شرکت پالایش نفت امام خمینی (ره)شازند

*آخرین مهلت اعلام آمادگی :۱۴۰۳/۱۱/۲۱ (از طریق فکس یا ایمیل)

*آخرین مهلت تحویل CD مدارک ارزیابی کیفی ،پایان وقت اداری روز سه شنبه مورخ ۱۴۰۳/۱۱/۳۰ اعلام می گردد.(از طریق پست)

آدرس پست الکترونیکی: PROCUREMENT@IKORC.IR شماره تلفن تائیده فاکس و ایمیل: ۳۳۴۹۲۸۳۰-۰۸۶

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

شرکت /فروشگاه محترم ..... مناقصه عمومی دو مرحله‌ای شماره : RND-0318036-MH

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
RI≤۱/۲×ES	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 اززیابی 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)
فرم ارزیابی تامین کنندگان [illegible] کالا

تاریخ :

مناقصه عمومی دو مرحله‌ای شماره : RND-0318036-MH نام شرکت:

تحت عنوان: خرید کاتالیست واحد R.C.D

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 امتیاز لازم : ۲۰

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

پارامترهای ارزیابی	عالی امتیاز۵	بسیارخوب امتیاز۴	خوب امتیاز۳	مورد تایی 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 تاسیس :

	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
تامین 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	۲
B	۱
C	۲

فرمول امتیاز کل : ٪۳۰ (A+C)+ ٪۴۰ B

امتیازتامین کننده کالا : ۶+۲۷+۱۸ =۵۱

مشخصات فنی و اطلاعات مربوطه:

خرید کاتالیست R.C.D

ردیف	شرح :	واحد	مقدار
۱	کاتالیست R.C.D	مترمکعب	۳۰۰۰

زمان تحویل:یکساله

دوره تضمین یا گارانتی ۱۲ ماه پس از بارگیری کاتالیست یا ۱۸ ماه پس از تحویل آخرین محموله کاتالیست به پالایشگاه هر کدام زودتر اتفاق بیفتد، میباشد

هرگاه فروشنده در انجام تعهدات قراردادی موضوع قرارداد, با توجه به مفاد ماده ۴ (مدت اجرای قرارداد) تأخیر غیرمجاز به تشخیص خریدارداشته باشد خسارت تأخیر به ازای هر روز معادل(بیست تقسیم بر تعداد روز مدت اولیه قرارداد) درصد مبلغ اولیه قرارداد از مطالبات فروشنده به عنوان جبران خسارت تأخیر برداشت خواهد شد.

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.

الف)تأکید می‌گردد پیشنهادات فنی فاقد هریک از موارد مندرج در ذیل مورد بررسی قرار نخواهد گرفت:

- **ارائه گواهی از شرکت سازنده به منظور معرفی شرکت تامین کننده کاتالیست با سربرگ شرکت سازنده، درج ایمیل، آدرس و شماره تماس کارخانه، Official web Site، Business License و امکان ارتباط با شرکت صادر کننده گواهی (شماره تماس دفتر کارخانه و ایمیل شرکتی آن) به منظور راستی آزمایی الزامی است.**
- **مجموع حداقل فلزات فعال در حالت خالص (غیر اکسیدی) در کاتالیست های پیشنهادی (مجموع فلزات اکتیو سایت کبالت، نیکل، مولیبدن و ...) نباید از ۱۳۰ تن کمتر باشد (برای هر train حداقل مقدار فلزات فعال ۶۵ تن باشد.).**
- **ارائه آنالیزهای HRTEM و BET-BJH و FESEM برای هریک از کاتالیست های پیشنهادی ضروری می باشد.**
- **حداقل مقدار مجاز مقاومت مکانیکی در هر یک از انواع کاتالیست های ارائه شده ۱۲ N/mm می باشد.**
- **حداقل سطح فعال مجاز برای کاتالیست های گارد m^2/g ۲۱۰ و برای کاتالیست فلز زدا m^2/g ۱۸۰ و برای کاتالیست‌های گوگرد زدا m^2/g ۱۶۰ می‌باشد.**
- **حداقل PV (H_2O) مجاز برای کاتالیست های فلز زدا ۰/۹۲ml/g و برای کاتالیست های گوگرد زدا ۰/۸۵ml/g می باشد.**
- **حداقل دوره عمر کارکرد کاتالیست برای خوراک طراحی (۴۲٪ خوراک V.B و ۵۸٪ خوراک A. R) ۳۳۰ روز و برای خوراک با ۱۰۰٪ A. R، ۵۴۰ روز می باشد.**
- **محدوده دمای مجاز و فشار مجاز عملیاتی در راکتورهای واحد RCD(Train A/B): راکتور اول: ۳۹۶□C و ۲۰/۳۵ MPa (g)، راکتور دوم: ۴۰۸□C و ۲۰/۱ MPa (g)، راکتور سوم: ۴۲۱□C و ۱۹/۹ MPa (g)، راکتور چهارم: ۴۲۱□C و ۱۹/۶ MPa (g)، راکتور پنجم: ۴۲۰□C و ۱۹/۴ MPa(g) می باشد.**

- حداکثر مقدار مجاز افت فشار کل در طول بستر راکتورها در SOR کاتالیست ها ۲۲ barg و در EOR کاتالیست ها ۲۷ barg می باشد.
- حداقلTotal Yield مجاز برای محصول ته ماند تصفیه شده در شرایط SOR مقدار ٪۹۳ حجمی و در شرایط EOR ٪۸۸ حجمی برای کارکرد با خوراک طراحی می‌باشد.
- مقدار مجاز محتوای گوگرد و نیتروژن محصول باقیمانده تصفیه شده در شرایط / SOR EOR با خوراک طراحی به ترتیب حداکثر ppm ۴۰۰۰ و ppm ۲۱۰۰ می باشد.
- مقدار مجاز محتوای فلزات سنگین (مجموع نیکل و وانادیم) در محصول باقیمانده تصفیه شده در شرایط (SOR (EOR با خوراک طراحی حداکثرppm ۲۰ می باشد.
- مقدار مجاز Con Carbon Res در محصول باقیمانده تصفیه شده در شرایط (SOR (EOR با خوراک طراحی حداکثر ٪۶.۲ وزنی می باشد.
- محتوای گوگرد محصول دیزل تولیدی همواره می بایست از مقدار ppm ۵۰۰ کمتر باشد.

ب) بسته بندی کاتالیست در بشکه های فلزی بر روی پالت به همراه پوشش نایلونی در داخل بشکه برای جلوگیری از نفوذ رطوبت به داخل کاتالیست صورت پذیرد. در صورتیکه بسته بندی به صورت Big Bag یک تنی باشد می بایست ابتدا محموله داخل کارتن و سپس داخلBig Bagقرارگرفته و پوشش پلاستیکی مناسب و مقاوم بر روی آن قرار گیرد.بسته بندی ها بایستی مقاوم در برابر نور مستقیم آفتاب و نفوذ باران باشد. همچنین با توجه به تنوع کاتالیست ها و به منظور جلوگیری از بروز اشتباه در عملیات بارگیری کاتالیست، بایستی برای هر نوع کاتالیست و یا گارد کاتالیست یک مشخصه بارز مانند رنگ متفاوت بشکه یا Bag با قابلیت تمایز از فاصله دور فراهم گردد.

ج) با توجه به اینکه سازندگان کاتالیست،در پیشنهاد فنی خود از چندین نوع کاتالیست با دانسیته متفاوت استفاده می‌نمایند؛ لذا وزن مجموع کاتالیست‌ها متغیر بوده که این امر تأثیر زیادی در قیمت پیشنهادی ایجاد خواهد نمود. بنابراین جدول پیشنهاد مالی پس از بررسی و ارزیابی فنی پیشنهادها توسط مناقصه گذار برای هر یک ازمناقصه گران ارسال خواهد شد.مناقصه گران می بایست پیشنهاد مالی خود را بر اساس جدول مذکور ارائه نمایند. ملاک برنده شدن در مناقصه، قیمت نهایی اعلام شده در جدول مذکور خواهد بود.

د) بررسی و انجام تست های آنالیز هر یک از انواع کاتالیست و در نهایت تأیید فنی آنها، زمانی انجام می‌پذیرد که کل محموله از آن نوع کاتالیست تحویل شده باشد. در صورت مغایرت آنالیزهای انجام شده بر روی محموله ارسال شده با اطلاعات فنی کاتالیست از قبیل دانسیته، میزان LOI کاتالیست و ... ارائه شده در پیشنهاد فنی اسناد مناقصه که منجر به تحمیل هر گونه هزینه اضافی به شرکت پالایش نفت امام خمینی (ره) شازند گردد؛ کلیه هزینه های مازاد تحمیل شده می بایست توسط فروشنده بدون هیچ گونه قید و شرطی جبران گردد.

ه) پیشنهاد دهندگان می بایستی در پیشنهاد فنی خود، میزان انرژی مورد نیاز کاتالیست به منظور تأمین دمای انجام واکنش ها (سوخت مصرفی در کوره قبل از راکتور) در طول دوره کارکرد کاتالیست (از زمان SOR تا EOR) را اعلام نمایند.

و) فروشنده موظف به برگزاری دوره های آموزشی در خصوص راهبری مطلوب کاتالیست می باشد.

ز) فروشنده می بایست برنامه زمان بندی تولید کاتالیست را پس از عقد قرارداد به خریدار ارسال نماید. پس از مشخص شدن برنده مناقصه و پس از ابلاغ شروع قرارداد، کارشناسان خریدار در صورت لزوم، از خط تولید صنعتی شرکت تولید کننده کاتالیست، بازدید به عمل آورده و نمونه گیری از کاتالیست جهت انجام تست های لازم به عمل می آید وامکان و ملزومات این بازدید می بایست توسط فروشنده فراهم گردد. بنا به تشخیص شرکت خریدار ممکن است نمونه کاتالیست تولیدی شرکت تولیدکننده کاتالیست در حضور کارشناسان پالایشگاه،تولید و با توجه به شرایط عملیاتی مورد درخواست، تست پایلوت انجام گیرد.

س) جهت بازرسی و تأیید فنی کاتالیست به شیوه زیر عمل می گردد:

- پس از تولید کامل محموله کاتالیست (حداکثر در سه محموله از هر Train به طوری که در هر نوبت، تمامی مقدار یک نوع کاتالیست تولید و آماده شده باشد) در محل انبار شرکت تولید کننده و درحضور نمایندگان خریدار و فروشنده و با روش استاندارد تعریف شده(استاندارد ASTM E-725)، نمونه گیری از کاتالیست انجام و توسط نماینده خریدار پلمپ لازم انجام گیرد.(کلیه هزینه های مربوط به حضور خریدار در محل کارخانه تولید و انجام نمونه گیری به عهده فروشنده می باشد).
- نمونه تهیه شده توسط فروشنده به داخل کشور انتقال یافته و پس از فک پلمپ توسط خریدار جهت انجام آنالیزهای لازم به آزمایشگاه معتمد ارسال می گردد. (هزینه انجام تست به عهده خریدار خواهد بود).
- پس از مشخص شدن نتایج آنالیز و بررسی فنی توسط کارشناسان خریداردر صورت تأیید فنی و اعلام کتبی آن به فروشنده ، کالا به مقصد ایران حمل و پرداختها بر اساس اسناد مثبته و مطابق قرارداد انجام خواهد شد.

ش) برگه اطلاعات ایمنی مواد (MSDS) برای کاتالیست ها بایستی توسط فروشنده/سازنده به خریدار تحویل گردد.

ف) مشخصات کالا بایستی به طور کامل بر روی بسته بندی درج گردد.

ک) ضمن رعایت الزامات HSE، ریسک ها و مخاطرات بهداشتی ماده فوق باید توسط فروشنده ارائه گردد.

م) مناقصه گران مجاز می باشند یک مرتبه پیشنهاد فنی خود را ارسال نمایند. لذا ضروری است که در ارسال پیشنهاد فنی خود، دقت و توجه کافی را مبذول دارند. جداول و اطلاعات مورد نیاز خریدار که در بخش پیشنهاد فنی آورده شده است؛ بایستی به طور کامل برای هر نوع از کاتالیست و دقیقا مطابق با فرمت ارائه شده تکمیل و ارسال گردد. به منظور ارزیابی فنی کاتالیست، لازم است که اطلاعات جداول به طور کامل و دقیق ارائه گردد. در ارائه اطلاعات مورد نیاز تا حد امکان از ذکر دامنه اعداد و استفاده از علائم کوچک‌تر یا بزرگ‌تر بخصوص در مورد دانسیته، مشخصات فیزیکی و درصد وزنی فلزات به کار رفته در کاتالیست پرهیز گردد. تأکید می گردد پیشنهادات فنی که مطابق با فرمت ارائه شده ارسال نگردند؛ مورد بررسی قرار نخواهد گرفت.

ی) فروشنده می بایست به همراه پیشنهاد فنی یک کیلوگرم از هر نوع کاتالیست پیشنهادی ،مطابق با مشخصات اعلام شده در پیشنهاد به پالایشگاه تحویل نماید بدیهی است پیشنهاد شرکتهایی که فاقد نمونه کاتالیست باشند ،بررسی نخواهد شد.

شرح فنی کاتالیست و الزامات مربوطه (۲۵ برگ):

TECHNICAL SPECIFICATIONS & PROCUREMENT CRITERIA

FOR RCD CATALYSTS

Section 1: Definition

- **Buyer:** shall mean Imam Khomeini Oil Refining Company (hereafter referred to as IKORC), incorporated and existing under Islamic Republic of Iran law which is located at 20th km of Arak-Borujerd Road, Markazi province, Iran.
- **Supplier:** shall mean any supplier/vendor who shall be responsible for supplying the catalyst.
- **RCD:** ReducedCrude Desulfurization Unit which has originally designed and licensed by UOPincludes10 reactors to process 69180BPSD of high sulfur blend of Atmospheric residue &Vacuumbottom having 4.03 wt.%feed sulfur with guaranteed outlet specification of 4000 ppm.
- **Purchase order (P.O):** means the binding agreement between buyer and catalyst supplier for the supply of RCD catalyst and additional services as described in the "Purchase Order Documents".

Section 2: Introduction

- The unit is operating with two reactor trains including a total catalyst volume of approximately 2940 m^3. The unit capacity is 69180 BPSD of Atmospheric Residue & Vacuum Bottom.
- Consider the following limited tender for purchasing the required catalyst including technical services and training as clarified in the following specifications.
- The feed basis, termsand conditions of reference, product yields & qualities, general description, constraints definition, scope of supply & services, scope of work, performance guarantees and penalties etc. follow in the subsequent sections of the document.

- The product quality and yield pattern and hydrogen consumption to be submitted with the technical bid.
- It is required to deliver 1 kg sample of each type of catalyst (main & guards) toIKORC by every bidder. The bidders must deliver samples to IKORC before the due date of tender. Offer without the samples is liable to be rejected.
- Bidders must submit the catalyst production schedule to IKORC before the due date of the tender. Offer without a production schedule will be rejected.
- According to the production schedule provided by the tender winner, the resident representatives of the refinery will be present at the production site of the catalyst producing company and will supervise the production process and the schedule provided and will take samples from the production line.
- All costs of accommodation, food, transportation, etc. for the resident representatives of the refinery at the catalyst production site are the responsibility of the supplier and to be included in the catalyst price.

Section 3: Pre-Qualification Criteria (PQC)

3.1 Technical Criteria

- Supplier shall be a catalyst manufacturer and should have supplied catalyst(s) for similar RCD unit of any each refining plant refinery unit in the immediately preceding last 10 years from the date of this tender. Reference details including the copy of the purchase order to be attached. The list of references should be included in the technical proposal.

  Not: 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.

- Providing a certificate from the manufacturing company in order to introduce the catalyst supplier company with the manufacture's letterhead, including the e-mail, address and contact number of the factory, Business license, official web site link, is required for verification purposes.

3.2 General Points

- IKORC reserves the right to extend due date of tender, accept or reject any tender in part or full, without assigning any reason whatsoever.
- Each package shall be labeled indicating the Hazardous Nature, Brief Handling Procedure and Precautions to be followed.

- Certificate of Analysis for physical and chemical properties and Standard Test Methods are required with each batch of supply and Standard Test Methods should be determined by IKORC.
- Bidder shall submit detailed information along with the offer regarding the direct/indirect impact of their products on people, equipment, environment, material. Material Safety Data Sheets to be submitted with the technical bid.
- The material shall be packed in accordance with the rule in weatherproof, shipment worthy eco-friendly packing, labeled and indicating clearly the description of item, hazardous nature if any precautions/care to be taken.
- Offers and all correspondence must be in English language only.
- The commercial terms offered by the bidder should be firm, clear and specific as the tenders shall normally be finalized without seeking further clarification.
- Selected bidder has to confirm free replacement will be done if the supplied material rejected.
- Vendor should note that catalyst will be loaded at that time determined by IKORC. Guarantees will hold valid from the time whenever feedstock is introduced for the first time.
- Generated spent catalyst after EOR should be safe for disposal as per international safety standards. Catalyst Vendor shall specify the standard and detailed procedures for unloading and disposal of spent catalysts, and also MSDSs for this material.Prior to delivery of each batch of catalyst, third party inspection or inspection of refinery technical experts (IKORC) should be done. Only after accepting third party inspection report by IKORC or inspection of refinery technical experts (IKORC), delivery would be possible. refinery technical experts reports (IKORC) must include, but not limited, catalyst physical and chemical properties, packaging condition, appearance and labeling.
- Catalyst supplier should accept not duplicate or disclose IKORC operating data and reports to any third party.
- The supplier is required to receive process information related to the Catalyst performance from the refinery and submit analytical reports and required corrective changes to the refinery on a monthly basis.
- In case of any technical problems in the operation of the catalyst during the service period of the catalyst, the supplier is required to provide solutions and technical assistance to solve the problems.
- The catalyst supplier is required to hold training courses and visit the companies that use the catalyst of that company for 20 persons of employees introduced by the IKORC during the execution of the contract.

Section 4: Process Description

The RCD unit with capacity of 69,180 BPSD is designed to process the feedstock of RFCC. The main contribution of RCD unit is to remove sulfur and metal in residue oil to process by RFCC.The unit is designed to process the following quantity of feedstock with the following major properties. The unit shall be operable at 50% of its design capacity.

AR1 from CDU1: 4,654 BPSD (6.7 vol% Blended Feed)

VR from VDU: 29,350 BPSD (42.4 vol% Blended Feed)

AR2 from CDU 2: 35,176 BPSD (50.8 vol% Blended Feed)

Total Capacity: 69,180 BPSD

Sulfur, wt%: 4.03, Ni + V, wppm: 167, CCR, wt. %: 15.5

Make-up H_2: (95% purity and CO+CO_2max.15 mol ppm) for RCD shall be supplied from the HPU2.

The major specifications of treated residue product are as follows:

- Sulfur: max 0.4 wt%
- Nickel + Vanadium: max20 wppm
- CCR: max 6.2wt%

Fresh Feed System

Feed is filtered to remove solids that would otherwise deposit on top of the guard reactor catalyst bed. After filtration, the feed splits into two parallel flows through the feed control valves. Due to the two trains are identical, take train A for description. The reactor charge pumps take their suction from the feed surge drums.

Feed Heat Exchange

The reactor charge is preheated by the reactor effluent in a series of feed-effluent exchangers before entering to the combined feed heater. This attempts to recover as much heat as possible from the heat of reaction. Liquid feed first is preheated separately with hot separator vapor, before combining with the recycle gas; in this case, the recycle gas is preheated with hot separator vapor prior to joining with the liquid. Then the liquid feed is joined by the recycle gas and pass through the shell side of the combined feed exchangers, where they pick up heat from the reactor effluent. After the combined feed exchangers the feed proceeds to the combined feed heater, where it is further heated to the desired reactor inlet temperature. The heater is designed with two parallel and horizontally draining tube passes.

Reactors

Once the feed and recycle gas have been heated to the desired reactor inlet temperature in the combined feed heater, the reactants enter into top of the reactor R-1421 to R-1425 in series. As the reactants flow downward through the catalyst bed, various exothermic chemical reactions occur and the temperature increases. Each bed containsthermocouples which are assembled for temperature measurement at the top and at periodic levels down through the bed dependent upon bed length. The thermowells are designed for vertical installation. Single catalyst bed is designed depending upon the heat of reaction. Reactor skin thermocouples are provided at the bottom of each bed and on the bottom reactor head, for monitoring the reactor wall temperature.

The first reactor R-1421 is a guard reactor that can be bypassed without shutting down the unit. Unit that processes feeds with high particulates, gums, or metals, operate at high severity, or have operational upsets may be more susceptible to high pressure drop. If the guard reactor reaches to the differential pressure limit, bypassing this reactor allows the unit to remain in operation and extend the run length. Following the guard reactor, there are four additional reactors from R-1422 to R-1425. Each reactor has a single bed. Cold quench gas is injected to inlet lineof each reactor to control bed temperatures.

Pressure taps are located on the feed and effluent lines of each reactor to monitor pressure drop trends. Pressure drops can vary significantly with changes in feed rate, oil viscosity, gas rate, and reactor temperatures. Care must be taken when operating changes are made so that design limits are not exceeded. Note that sudden changes in the operating variables listed above that change pressure drop can also initiate flow maldistribution.

Reactor Effluent Cooling

As the reactants leave the last reactor R-1425, they flow through the tube side of the combined feed exchangers where heat is given up to the combined feed as described earlier. Then enter the hot separator, and the heat contained in the flashed hot vapor is recovered in a series of heat exchangers.

Vapor/Liquid Separation

A 4 vessels method of separating vapor and liquid is used in this unit. The flow scheme uses 4 vessels to disengage and individually remove vapor, water and hydrocarbon liquid. A hot separator is installed after the combined feed exchangers to collect the heavier hydrocarbon material from the reactor effluent and send it to fractionation

section via the hot flash drum. The overhead vapor from the hot separator continues through an air cooler into a cold separator.

Hot flash drum is used downstream of the hot separator, and cold flash drum is used downstream of the cold separator, where both drums further remove dissolved gases from the liquid prior to entering the fractionation section. Dissolved hydrogen, H_2S and light hydrocarbons will flash due to the pressure reduction.

Liquid hydrocarbon from the hot separator leaves on level control to the hot flash drum. The flashed vapor is cooled and sent to the cold flash drum. The liquid streams from the hot and cold flash drums are sent to the fractionation section on level control.

Recycle Gas Scrubbing

After separation of the gas and liquid phases in the cold separator, the gas leaves from the top of the cold separator and used as recycle gas. The recycle gas stream contains H_2S which reduces the hydrogen partial pressure and suppresses catalyst activity. The amine flow rate in recycle gas scrubber is adjusted to reduce the concentration of H_2S in the recycle gas below 100 ppm on a molar basis.

Hydrogen Purification

Increasing the recycle gas hydrogen purity will decrease catalyst deactivation. The measure to increase the hydrogen purity is by bleeding off part of recycle gas to PSA unit from the point downstream of recycle gas scrubber through flow control valve. The bleed is essential to maintain high hydrogen purity in the recycle gas and a high hydrogen partial pressure in the reactors. The bleed rate to the PSA unit is increased throughout the run to keep the recycle gas hydrogen purity above 85 mole% at EOR.

Recycle Hydrogen System

After H_2S removal, the gas leaves from the top of the recycle gas scrubber and flows to the suction of the recycle gas compressor. The recycle gas compressor is a centrifugal machine that supplies enough pressure to recycle the hydrogen-rich gas to the required pressure at the gas injection point close to the feed pump discharge. After the recycle compressor discharge, recycle gas splits off the main stream for use as quench gas between each reactor. The bulk of the recycle gas is joined by the makeup gas. After preheated in the shell side of hot separator vapor-recycle gas exchanger, the combined makeup and recycle gas is divided into two passes which are flow controlled into the combined feed passes going to the combined feed exchangers.

Make-Up Hydrogen System

RCD requires a supply of high pressure hydrogen. Hydrogen reactions with oil molecules account for a "chemical" hydrogen consumption in the high pressure system. In addition to the chemical consumption, the HP loop losses hydrogen by: unrecovered bleed hydrogen sent to thePSA Unit, dissolved hydrogen leaving the HP system in oil streams, and system leaks.Make-up H_2 is obtained from a hydrogen manufacturing plant. Reciprocating compressors are used to raise the pressure of the gas, with the number of compression 4 stages. Normally, only two of the three compressors are on-line. From the discharge of the last stage of compression, the makeup gas joins the recycle gas after the recycle gas compressor as described above. Each compressor has maximum capacity 60 kNm^3/h at EOR.

Fractionation Section

The function of the common fractionationsection is to receive the reactor effluent from two individual trains and handle it to produce desired products such as light gases, light wild naphtha, heavy naphtha, gas oil and RFCC feed. This can be accomplished with a 2-column fractionation scheme. The fractionation section consists of the following sections:

(1) Stripper(2) Naphtha Splitter(3) Product Fractionator Feed Heater

(4) Product Fractionator with Side Cut Gas Oil Stripper

Multiple Train Units

The unit because of relative size and operating is designed as two trains.

This would involve two parallel reactor trains i.e. high pressure sections with a common fractionation section i.e. low pressure section. The trains are interconnected at the lowest possible pressure point so as to minimize high pressure isolation. The trains are separated after feed filter and combined upstream of stripper.

The unit consists of the following sections:

(1) Feed Pretreating (Filter) Section(2) Two Trains of Reactor Section

(3) Make-up Hydrogen Compressor Section(4) Product Fractionator Section

The catalyst should be designed to have at least one year operation. Therefore, each trains should be shut down every year for catalyst replacement.

Besides treated residue the unit also produces hydrocracked lighter material, i.e., wild light naphtha, heavy naphtha and Gas Oil, which will be further processed by CDU, KHT and RCD Units, respectively.

Section 5: Feed Specification

5.1 Design case:

RCD feed is blend of following sources (**Table 1**):

- Vacuum Residue from CDU#1
- Atmospheric Residue from CDU#1
- Atmospheric Residue from CDU#2

5.1.1 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.

5.1.2 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.

5.1.3 IKORC must be to work by only AR feed for some operation duration, therefore vendor must consider two cases of the feed data in technical offer. (A.R with or without V.R in feed)

Table 1: Properties of RCD Feed

Properties	Test Method	Feed			
		VR	AR1	AR2	Blend
Total Feed Rate, BPSD		29350	4654	35176	69180
Feed Rate (per train), m^3/hr		97.8	15.5	117.2	230.6
Feed Rate (per train), ton/hr		100.4	15.5	114.8	230.1
Blend Ratio, vol%		42.426	6.727	50.847	100.0
TBP Cut Range, °C		535+	320+	373+	
TBP Cuts, vol.%					
205°C-		0.0	0.5	0.2	0.0
205-320°C		0.0	5.7	3.6	2.4
320°C+		100.0	93.8	96.2	97.6
540°C+		89.3	42.4	49.1	65.7
Distillation	ASTM-D1160				
IBP		479	225	240	
10 vol%		550	355	403	
30 vol%		593	439	470	
50 vol %		644	505	537	
70 vol%		714	592	615	
90 vol%		797	739	715	
95 vol%		832	786	798	
FBP		875	856	859	
Specific Gravity(60°F/60°F)	ASTM-D1298	1.026	0.967	0.979	0.998
Total Sulfur, wt%	ASTM-D1552	4.6	3.5	3.6	4.03
Total Nitrogen, ppmw	ASTM-D4629	4250	2850	3150	3610
Total Sodium, ppmw	UOP-389	-	-	-	1
Total Iron, ppmw	UOP-389	-	-	-	10
CCR, wt%	ASTM-D189	21.0	9.9	11.4	15.5
Nickel, ppmw	UOP-391	55.0	25.0	30.0	40.6
Vanadium, ppmw	UOP-391	175.0	80.0	90.0	126.4

Asphaltene, wt%	UOP-614	8.9	4.0	4.7	6.5

5.2 Design and operating conditions of RCD

The unit is operating with two trains, 10 reactors total having a total catalyst volume ofapproximately 3000 m^3.

The design and present operating conditions of the unit aregiven below.

5.3 Unit Capacity

Feed Rate: 69180bbl/day&Turndown Ratio: 50% of design capacity.

5.4 Operating conditions

Table 2: Operating Conditions

Process Parameter	Unit	Value
Total Hydrogen Makeup Rate (for two train)	KNm^3/hr	120 (max.)
Makeup Hydrogen Purity	mol%	99
$CO+CO_2$ in Makeup Hydrogen	mole ppm	15 (max.)
First Reactor Inlet Pressure	barg	180
Reactors Furnace Duty (for each train)	MW	20.97
Max. Rate of Recycle Gas Compressor (include quench gas flow for each train)	$\|KNm^3/hr$	276.5
H_2 Purity in Recycle Gas	%	90 (min.)
Catalyst Loading (10 Reactors)	m^3	2940
Fresh Feed Rate	BPSD m^3/hr	69180 460

5.5 Reactors

Table 3: Reactors* Size

Reactor	Reactor ID	Reactor T/T	Cat. Volume
R-1421	4800 mm	7000 mm	150 m^3
R-1422	4800 mm	17000 mm	330 m^3
R-1423	4800 mm	17000 mm	330 m^3
R-1424	4800 mm	17000 mm	330 m^3
R-1425	4800 mm	17000 mm	330 m^3
R-1441	4800 mm	7000 mm	150 m^3
R-1442	4800 mm	17000 mm	330 m^3
R-1443	4800 mm	17000 mm	330 m^3
R-1444	4800 mm	17000 mm	330 m^3
R-1445	4800 mm	17000 mm	330 m^3

*** Two trains, 10 reactors total**

The range of allowance operating temperature and pressure in the RCD reactors (Train A/B reactors) should be considered as below:

- First reactors (R-1421/41): Max Operating is temperature 396 □C/ operating pressure is 20.35 MPa (g)
- Second reactors (R-1422/42): Max Operating is temperature 408 □C/ operating pressure is 20.1 MPa (g)
- third reactors (R-1423/43): Max Operating is temperature 421 □C/ operating pressure is 19.9 MPa (g)
- fourth reactors (R-1424/44): Max Operating is temperature 421 □C/ operating pressure is 19.6 MPa (g)
- Fifth reactors (R-1424/44): Max Operating is temperature 421 □C/ operating pressure is 19.6 MPa (g)

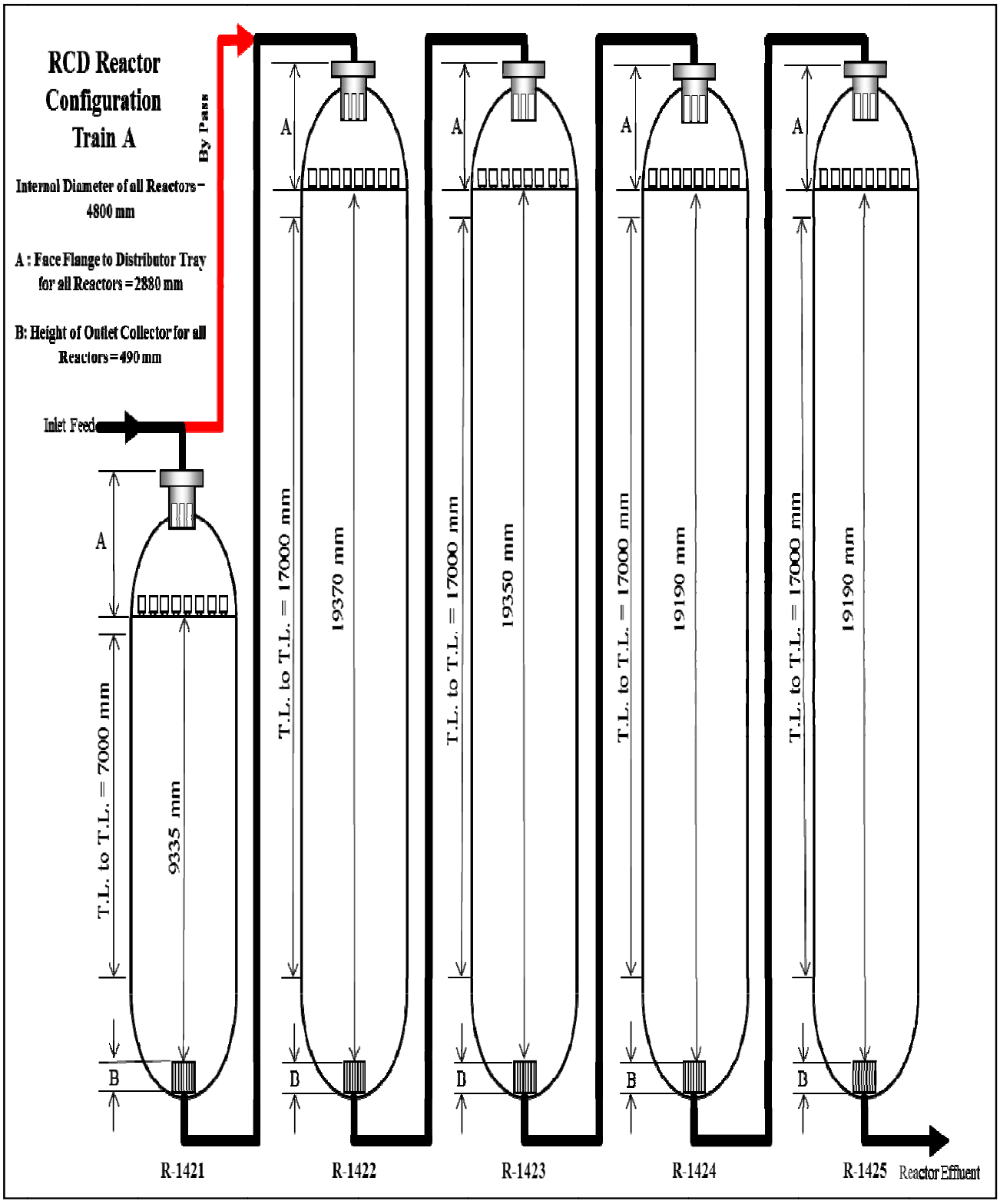
5.6 Makeup Gas quality

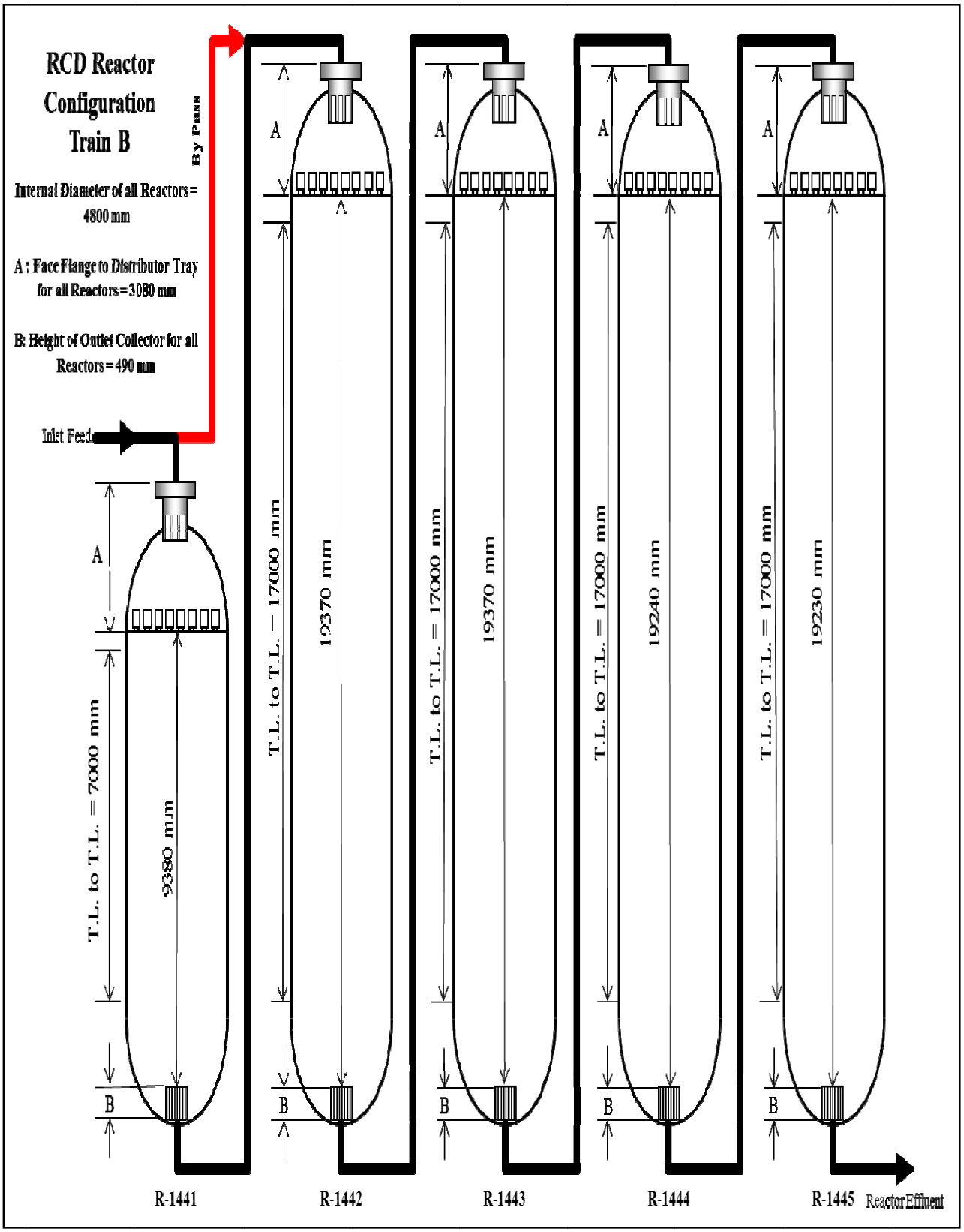
Makeup Hydrogen supplied from PSA. Quality of makeup Hydrogen as per thefollowing table.

Composition	mol %
Hydrogen	99.9 (min : 94)
$CO+CO_2$	Max 15 mol ppm

5.7 Reactors 'Details

RCD unit consists of 10 Reactors,namely R-1421~5 & R-1441~5. Thedetail is as follows.


RCD Reactor Configuration Train A
Internal Diameter of all Reactors – 4800 mm
A : Face Flange to Distributor Tray for all Reactors = 2880 mm
B: Height of Outlet Collector for all Reactors = 490 mm
By Pass
Inlet Feed
A
B
T.L. to T.L. = 7000 mm
9335 mm
T.L. to T.L. = 17000 mm
19370 mm
19350 mm
19190 mm
R-1421
R-1422
R-1423
R-1424
R-1425
Reactor Effluent



Section 6: Catalyst Performances

6.1 Required Information and Documentation

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

1- Reactors temperature profile in cycle life
2- Total H_2Consumption
3- H_2/HC Ratio
4- Life of the catalyst (guarantee)
5- Maximum sulfur content of products (guarantee)
6- Maximum nitrogen content of products (guarantee)
7- Maximum metals content of product (guarantee)
8- Surface area of catalyst
9- Apparent Bulk density of catalyst (ABD) (UOP 294)
10- Mechanically Tapped Packing Density (MTD), (ASTM D-4164)
11- VibratoryTapped Packing Density (VTD), (ASTM D-4180)
12- Vibratory Tapped Packing Density (VTD), (ASTM D-4699)
13- Pore Volume by H_2O (guarantee)
14- Side Crush strengthof catalyst (N/mm) (guarantee)
15- Particle Crush strength of catalyst (N/Particle)
16- Catalyst length size distribution& Average length of the catalyst
17- Abrasion resistance
18- Catalyst fine content
19- Cumulative metal poison limit of catalyst (metal trap capacity)
20- Active metals content of catalyst
21- LOI of catalyst (UOP-954-11)
22- Application of each type catalyst
23- Performance and cycle length guarantee
24- Technical service (including training and technical support)
25- User reference list; reference units must have these criteria: Min 42% VB, Min cycle length 330 days for design feed and 540 days for A.R case.
26- Catalyst supplier must stand guarantee for yield, product specification, reactor pressure drops(in design feed case, for SOR maximum pressure drop across reactors should be less than 22 barg and, for EOR maximum pressure drop across reactors should be less than 27 barg) and catalyst life
27- Certificate of analysis
28- QCP, QA and QC certificates
29- Filling the following tables 6 to 9 as per your catalyst design
30- Catalyst production schedule

Supplier must submit the catalyst production schedule to IKORC according to the proposal.

According to the production schedule provided by the supplier, the resident representative of the refinery will be present at the production site of the catalyst producing company and will supervise the production process and the schedule provided. All costs of accommodation, food, transportation, etc. for the resident representatives of the refinery at the catalyst production site are the responsibility of the seller and to be included in the catalyst price.

31- Catalyst to handle fresh feed rate as mentioned in Section 5.

32- Catalyst offered should have proven commercial performance of minimum one year in operation.

33- The catalyst's vendor shall provide 1~7 the above-mentioned items the information For two feed case 5.1.3

6.2 Catalyst Requirement

Vendorto ensure that the available Emergency depressurizing system in RCDunit is capable to handle any runaway reaction.

1. Catalyst to handle fresh feed rate of 69180 BPSD of Atmospheric and Vacuum Residue with specification of Table 1 which maximum Vacuum Residue is 42vol%.
2. Catalyst offered should have proven commercial performance of minimum one years in operation in similar unit with similar feed (42% Vacuum Residue).
3. Vendor to ensure that the proposed catalyst is capable to operate well in this unit and can handle any runaway reaction and R.GCompressor trip scenarios.
4. The detailed Particle Size Distribution (PDS) for all type of catalysts shall be provided and guarantee by catalyst manufacturer.
5. Catalyst fine which is catalyst particle with smaller length than 1.6mm should be lower than 0.5wt% and guarantee by catalyst manufacturer.
6. Catalyst Side Crush Strength should be minimum 12 N/mm and guarantee by catalyst manufacturer.
7. The total amount of minimum active metals (including cobalt, nickel, molybdenum, etc.) in the pure state (non-oxidized), in the proposed catalyst should not be less than 130 tons (for each train 65 tons).
8. It is necessary to provide HRTEM, BET-BJH and FE-SEM analysis reports for each of the supplied catalysts.
9. The minimum allowance surface area limit for guards, HDM and HDS catalysts are 210, 180 and 160 m^2/g, respectively.
10. The minimum allowance pore volume (H_2O) limit for HDM and HDS catalysts are 0.92 and 0.85 wt.%, respectively.
11. Catalyst LOI (at 500 □C 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.

6.3 Product Quality (must guarantee)

Vendors shall submit the product qualities as per the following format in the technical bid for design case.

Table 4: Properties of Treated Residue (Design)

Properties	SOR/EOR	Test Method
TBP Nominal Cut	320°C+	
Specific Gravity	0.960/0.948	ASTM D-1298
Total Sulfur, wt% - Design	0.4	ASTM D-1552
Metal (Ni + V) Contents - Design	19.8 /20.6 wt ppm	UOP-391 or equivalent
Conradson Carbon Residue - Design	6.0/ 6.2 wt%	ASTM D-189
Nitrogen - Design	2100/2260 wt ppm	ASTM D-4629

Table 5: Light Products Limitation (for two trains)

Product	TBP Nominal Cut	Maximum Flow, EOR
Diesel	205-320°C	65.1 m^3/h
Heavy Naphtha	85-205°C	11.4 m^3/h
Light Wild Naphtha	85°C-	9.3 m^3/h

Table 6: Properties of Product

Process Conditions	SOR			MOR			EOR		
	vol%/Feed		wt%/Feed	vol%/Feed		wt%/Feed	vol%/Feed		wt%/Feed
C5-205°C									
205-320°C									
320°C+									
Yield									
	C5-205°C	205-320°C	320°C+	C5-205°C	205-320°C	320°C+	C5-205°C	205-320°C	320°C+
Density (g/cm^3)									
Total Sulfur (wt%)									
Flash Point (°C)									
Viscosity@100°C(cSt)									
Pour point (°C)									
CCR (wt%)									
Cetane index									
Nitrogen (wppm)									
Ni (wppm)									
V (wppm)									

6.4 Life Cycle of Catalyst Guarantee

6.4.1 The catalyst should be designed to meet the guaranteed quality, product yield andspecifications as per section 8.

6.4.2 Vendor has to specify the cycle length in case RCD unit shall be operated at 4000ppm of product.

6.5 Performance Guarantee Test Run

6.5.1 For establishing the above performance guarantees, test runs will be conductedeitherwith design feed stock or feedstock having similar characteristics as those ofdesign feed stocks. The Performance Guarantee Test Run (PGTR) for catalyst will beconducted within 1 month from the date of injection of fresh feed after catalystloading.

6.5.2 The catalyst will be accepted by IKORC only if the guarantees specified by thevendor &IKORC have been met in the PGTR.

6.5.3 Catalyst supplier shall provide details, any procedures, special conditions required forconducting PGTR. The analysis obtained from IKORClaboratory shall be considered as final. These methods shall be in accordance withnormal practice.

6.5.4 The test run commence when the units are operating under stable conditionsand shall be conducted for a period of 72 to 120 consecutive hours based on feedavailability. Based on mutually agreed and jointly collected measurements during thetest run, catalyst supplier and IKORC shall evaluate the results of the test run toconfirm conformity with the performance guarantees.

Section 7: Scope of Services

Vendor shall provide the following services.

7.1 Scope of Supply & Services

I. Supply of necessary catalysts & graded bed asrequired. Vendor to mention each type of catalysts requirement separately.

II. If active catalyst to be loaded with dense loading machine, supply and service of dense loading machine and dense loading technician is with catalyst vendor's scope. These services shall be part of catalyst supply proposal.

III. In performance test of catalyst, if it is needed special device for testing of feed/product of unit, catalyst vendor shall be provide the required laboratory device and test methods (like SARA test). These services shall be part of catalyst supply proposal.

IV. Vendor should assist by deputing expert engineers during catalyst loading, start-upassistance and Performance Guarantee Test Run activities.

Vendor shall submit detailed catalystloading, start-up/catalyst activation and PGTR reports immediate after eachactivities. Time spent during transit will not be considered by IKORC.

V. Vendor has to indicate stabilization period required to attain SOR condition after feed is taken.

VI. Vendor has to 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 first start up with the catalyst).

VIII. Vendor should provide operating parameters for other modes of operations (design& check cases like unit operation with the feed stock having 100% AR).

7.2 Data/Documents to be submitted with the offer

Following information shall be submitted as a part of the technical offer (as per the following table format, Table7):

a. Minimum Information to be furnished in the Technical Proposal is defined in this section. Metric system of units shall be followed for all information. We insist, the catalyst vendor should avoid providing a range or a limit on all required data and it shall be specified the exact values clearly.

b. Catalyst-wise: Name, Type, Size, Density, Average Bulk Density, Bed Height,wt% metal of content,(Particle & Side) Crushing Strength, Surface Area, Pore Volume, Catalyst Pore Size Distribution,Catalyst Particle Size Distribution, Attrition Loss, Fine Content, Abrasion.The standard test method for measuring the all properties of eachtype of catalyst must be provided.

c. Catalyst supplier shall submit all the details and technical information including datawith respect to Process Guarantees, duly signed and complete in all respects, alongwith the offer.

d. Catalyst supplier to provide both the estimated values and guaranteed values at SORand EOR.

e. Catalyst supplier shall provide necessary procedure and loading diagram for theloading of catalyst in IKORC's reactor.

f. Catalyst supplier to provide information on the following key operating parameters atSOR/EOR, as a minimum, in the proposal for all cases.

- Overall mass balance including hydrogen consumption
- ReactionYield
- Temperature/Pressure at inlet and outlet of each Reactor
- Pressure Drop across the each Reactor
- Weighted Average Bed Temperatures (WABT) for each Reactors
- Hydrogen partial pressure
- LHSV
- WHSV
- Recycle Gas to Oil Ratio
- Recycle Gas & Quench Gases in each Reactors expressed as Nm^3/hr.

- Energy Consumption to achieve highest activity performance of catalyst as Kcal/hr.

g. As the vendor will specify SOR / EOR inlet & WABT temperature, they will specify catalyst deactivation rate at the design charge for the design feed.

h. Composition of each proposed catalyst active metal content in catalyst etc. Vendor also to indicate the requirement of support balls, their specifications &quantities for each Reactors. Vendor to provide the reactor loading diagram indicating catalyst grading & support balls.

i. Vendor must quote catalyst quantity as packed basis in kg unit and mention volume in m^3 unit.

j. Vendor must quote catalyst loading services separately.

k. Vendor to specify method of Hydro treating catalyst loading.

l. Catalyst should be able to handle turndown with fresh feed at 50% of design throughput without impact on radial spread temperature.

m. Precautions, emergency procedures to be followed during start-up/normal operation/upsets/turnarounds.

n. Information regarding catalyst poisons.

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

p. Detailed catalyst performance monitoring calculations/procedures.

q. Catalyst reaction chemistry.

r. Detailed Pre-wetting procedure.

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

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

u. Signed Statement of Deviations as per the Tender documents.

v. Vendor to note that catalyst will be loaded at a time determined by IKORC.

w. Vendor to provide catalyst technical details/Material Safety Data Sheet &manufacturer's specification with the bid documents/Manufacturers certificate of analyses incorporating all properties given in the specifications for each batch supplied.

x. Catalyst/Catalyst support material to be packed suitably bags in good condition

y. Spent catalyst generated after EOR should be safe for disposal as per international Safety standards. Vendor shall specify the standard and provide MSDS for spent catalysts.

z. Vendor to indicate the total H_2 requirement for the feed composition and also indicate Chemical Hydrogen consumption & Dissolved Hydrogen consumption separately.

aa. Vendor to indicate the estimated variation in inlettemperature of Reactors, WABT/H_2 consumption/Product qualities with respect to change in design case feed properties for100%A.R feed.

bb. Vendor to provide their catalyst deactivation details/WABT curve with respect to time for design case & for 100% A.R feed.

cc. Vendor to mention the list of required documents from IKORC at various stages.

dd. The good (catalysts) which consume lower energy to reach the highest performance over Operating Period will be received higher technical score in this section

ee. 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.

ff. 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.

Table 7-1: Catalyst Property Data Information

MAIN & GUARD CATALYST PROPERTIES (FOR EACH TYPE SEPARATELY)				
CATALYST NAME				
FACTORY ADDRESS & E-MAIL				
		Units		
CATALYST QUANTITIES	CATALYST HEIGHT IN REACTOR	mm		
	CATALYST VOLUME	m^3		
FORM				
COLOR				
AVE. DIAMETER		mm		
AVE.LENGTH		mm		
PSD (Particle Size Distribution) (ASTM-)	<1.6 mm	Wt%		
	1.6~3 mm	Wt%		
	3~6 mm	Wt%		
	>6 mm	Wt%		
SURFACE AREA (UOP 964-11 / ISO9277)		m^2/g		
TOTAL PORE VOLUME OF CATALYST (UOP964-ISO/15901)		cm^3/g		
PORE VOLUME by H_2O), (ASTM D-8393)		cm^3/g		
MEAN PORE DIAMETER (UOP-954/ISO15901)		nm		
FINE CONTENT,(UOP 333)		wt%		
Reactor Loading Density	Sock	g/ml		
	Dense	g/ml		
Apparent Bulk density UOP 294		g/ml		
Mechanically Tapped Packing Density (MTD), (ASTM D-4164)		g/ml		
Vibratory Packing Density (VPD), (ASTM D-4180)		g/ml		
Vibratory Packing Density (VPD), (ASTM D-4699)		g/ml		
CRUSH STRENGTH (RADIAL/SIDE) (ASTM D-6175)		N/mm		
BULK CRUSH STRENGTH (ASTM D-7084)		N/mm		
RADIAL CRUSH STRENGTH PARTICLE (ASTM D-4179)		N(N/particle)		
AXIAL CRUSH STRENGTH PARTICLE (ASTM D-4179)		N(N/particle)		
LOI (at 550±10°) (UOP 954)		(wt.%)		
Particle With Length < 1.6 (UOP 947-15)		(wt.%)		
Cumulative metal poison limit of catalyst (metal trap capacity)		Kg		
MAIN & GUARD CATALYST CHEMICAL PROPERTIES				
ACTIVE METAL CONTENT	Ni	wt%		
	Mo	wt%		
	Co	wt%		
	OTHER METALS	wt%		
CATALYST POISON RESTRICTIONS		PPBwt		
		PPBwt		
		PPBwt		
		PPBwt		
TYPE OF LOADING (Dense/Sock)				
Sulfur Requirement		wt%		
Catalyst Application				

Table 7-2: Catalyst Operating Data Information For Case 1 Feed(42% V.B)

Opration data Information		UNIT	SOR 30	MOR 180	EOR 335
TEMP. RX 1	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 1	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 2	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 2	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 3	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 3	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 4	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 4	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 5	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 5	INLET	bar			
	MAX ALLOWABLE ΔP				
H_2 TO HC VOL. RATIO Inlet (MIN)		Nm^3/m^3			
H_2 TO HC VOL. RATIO Total (MIN)		Nm^3/m^3			
CHEMICAL H_2 CONSUMPTION (MIN PURITY 99		Nm^3/m^3			
LHSV		1/hr			
WHSV		1/hr			
CYCLE LIFE, GUARANTEED		Day			

Table 7-3: Catalyst Operating Data Information For Case 2 Feed (Without V. B)

Opration data Information		UNIT	SOR 30	MOR 180	EOR 335
TEMP. RX 1	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 1	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 2	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 2	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 3	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 3	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 4	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 4	INLET	bar			
	MAX ALLOWABLE ΔP				
TEMP. RX 5	INLET	°C			
	ΔT				
	WABT				
PRESS. RX 5	INLET	bar			
	MAX ALLOWABLE ΔP				
H_2 TO HC VOL. RATIO Inlet (MIN)		Nm^3/m^3			
H_2 TO HC VOL. RATIO Total (MIN)		Nm^3/m^3			
CHEMICAL H_2 CONSUMPTION (MIN PURITY 99		Nm^3/m^3			
LHSV		1/hr			
WHSV		1/hr			
CYCLE LIFE, GUARANTEED		Day			

Table 7-4: Catalyst Activation Data For Case 1 Feed(42% V.B)

Catalyst Activation Rate		UNIT	SOR 30	MOR 180	EOR 335
Activation Rate	HDS	%			
	HDN	%			
	HD CCR	%			
	HD NI	%			
	HD V	%			
	HDM	%			
METAL ON CATALYST	NI+V Adsorbed	Kg			
	MOC	w of c%			

Table 7-5: Catalyst Activation Data For Case 2 Feed (Without V. B)

Catalyst Activation Rate		UNIT	SOR 30	MOR 180	EOR 540 (min)
Activation Rate	HDS	%			
	HDN	%			
	HD CCR	%			
	HD NI	%			
	HD V	%			
	HDM	%			
METAL ON CATALYST	NI+V Adsorbed	Kg			
	MOC	w of c%			

Productivity*		Unit	SOR 30 days	MOR 180 days	EOR 335 days
WILD NAPHTHA (4-85°C)	TOTAL SULFUR	PPMwt			
	FLOW RATE	m^3/h			
	YIELD	wt%			
HEAVY NAPHTHA (85-205°C)	TOTAL SULFUR	PPMwt			
	FLOW RATE	m^3/h			
	YIELD	wt%			
GAS OIL (205-320°C)	TOTAL SULFUR	PPMwt			
	TOTAL NITROGEN	PPMwt			
	FLOW RATE	m^3/h			
	Pour Point	°C			
	Cloud Point	°C			
	YIELD	wt%			
	AROMATICS	vol%			
TREATED RESIDUE (320+)	TOTAL SULFUR	PPMwt			
	TOTAL NITROGEN	PPMwt			
	Specific Gravity	g/ml			
	CCR Report	wt%			
	Ni	PPMwt			
	V	PPMwt			
	Cu	PPMwt			
	Na	PPMwt			
	C7 INSOLUBLE	wt%			
	YIELD	wt%			
Removal Rate	HDS	%			
	HDN	%			
	HDNi	%			
	HDV	%			
	HDM	%			
Metal on Catalyst	Ni + V Removed	Kg			
	MOC	W of C %			
***All databe filled for two feed case 5.1.3 separately.**					

Section 8: Guarantees and Penalties

Catalyst supplied by the vendor shall be subjected to the following guarantee conditions. IKORC expects following guarantees to be met by the catalyst vendor for fresh feed rate, propertiesfor two feed case 5.1.3 separately, operating condition and limitations mentioned in this document. Also, catalyst supplier must guarantee the performance of presulfided catalyst in SOR condition.

8.1 Minimum Yield Guarantees:

Treated Residue 320+°C yield must be ≥ 93 vol% at SOR and ≥ 88vol% at EOR condition..

8.2Minimum Product Quality Guarantees:

Treated Residue 320+°C must meet following minimum requirement quality:

1. Sulfur < 4000 ppm.
2. Metals Content (Ni+V) < 20 ppm.
3. CCR < 6.2 wt%.
4. Nitrogen < 2200 ppm.
5. Diesel Product (205-320°C) Sulfur < 500 ppm

8.3Catalyst life/Cycle length Guarantees liability:

Cycle length shall be minimum 330 days at design feed and 540 days at A. R case.