

eSign API Specifications

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1. Introduction

Information Technology Act, 2000 grants legal recognition to electronic records and electronic signatures. IT Act, 2000 provides that where any law requires that information or any other matter shall be authenticated by affixing signature then notwithstanding anything contained in the law, such requirement shall be deemed to be fulfilled if such information is authenticated by means of electronic signatures affixed in a manner prescribed by the Central Government. Under the IT Act, 2000, 'Electronic signatures' means authentication of an electronic record by a subscriber by means of electronic technique specified in second schedule and includes Digital signatures. Digital Signature means authentication of any electronic record by a subscriber by means of procedure specified in Section 3 of the IT Act, 2000.

The Controller exercises supervision over activities of Certifying Authorities and certifies public keys of certifying authorities. The Certifying Authorities are granted licence under the IT Act, 2000 by the Controller to issue Digital Signature Certificates. Any person can make an application to Certifying Authority for issue of an Electronic signature Certificate in such form as may be prescribed by the Central Government. For issuance of Digital Signature Certificates, the applicant's Personal identity, address and other details to be included in the DSC need to be verified by CAs against an identity document. For class III, physical presence of the individual is also required. Digital Signatures are widely used for authentication in the electronic environment. The cost of verification individual's identity and address and also the secure storage of private keys are the stumbling block in the widespread usage of Digital Signature in the electronic environment.

X.509 Certificate Policy for India PKI states that the certificates will confirm that the information in the application provided by the subscriber does not conflict with the information in well-recognized consumer databases. The database of individual's information maintained by e-KYC providers will be used for eSign . The accepted e-KYC providers are listed in the e-authentication guidelines.

Verification of the Proof of Identity (PoI) and Proof of Address (PoA) is a pre-requisite for issuance of Digital Signature Certificates by Certifying Authorities.

e-KYC Service providers can provide a paperless KYC experience by using e-KYC and avoid the cost of repeated KYC, the cost of paper handling and storage, and the risk of forged documents. The real-time e-KYC service makes it possible for service providers to provide instant service delivery to eSign Users which otherwise would have taken a few days for activation based on the verification of KYC documents, digitization, etc.

ESP and ASP have to make sure that mechanisms implemented for authentication of individuals adhere to the guidelines of e-KYC provider
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The Government has introduced ***Electronic Signature or Electronic Authentication Technique and Procedure Rules, 2015*** in which the technique known as "e-authentication technique using e-KYC services" has been introduced to eliminate stumbling block in the widespread usage of Digital Signature.

e-Sign facilitates digitally signing a document by an eSign user using an Online Service. While authentication of the signer is carried out using e-KYC, the signature on the document is carried out on a backend server, which is the e-Sign provider. The service shall be offered only by Certifying Authorities. The eSign is an integrated service that facilitates issuing a Signature Certificate and performing Signing of requested data on basis of authenticated e-KYC response. The eSign Service shall be implemented in line with e-authentication guidelines issued by Controller. The certificate issued through eSign service will have a limited validity period and is only for one-time signing of requested data.

1.1. Target Audience

This is a technical document and is targeted at Application Service Providers who require signing of digital document(s) in their application.

1.2. Objective of the document

This document provides eSign Service API specification. This includes API Data format, protocol and other related specifications. eSign is designed for applying Digital Signature based on the response received from e-KYC service.

1.3. Terminology

"eSign" or "eSign Service" is an online Electronic Signature Service in which the key pair generation, certification of the public key by the CA and digital signature creation for electronic document are facilitated by the eSign online Electronic Signature Service provider instantaneously within a single online service based on successful authentication of individual using e-KYC services

"eSign User" is an individual requesting for eSign online Electronic Signature Service of eSign Service provider. This individual shall be using the application of ASP and represents himself/herself for signing the document under the legal framework. For the purposes of DSC by the CA, the eSign user shall also be the 'applicant/subscriber for digital certificate', under the scope of IT Act.

"e-KYC" means the transfer of digitally signed demographic data such as Name, Address, photograph etc of an individual. collected and verified by e-KYC provider on successful authentication of same individual

"response code" is the identification number maintained by e-KYC provider to identify the authentication

Application Service Provider (ASP): An organization or an entity using eSign service as part of their application to digitally sign the content. Examples include Government Departments, Banks and other public or private organizations. Currently there is no process of registration of ASP. ASP may contact the ESP (eSign Service Provider) directly to avail the service within its framework.

eSign Service Provider (ESP): An organization or an entity providing eSign service. ESP is a "Trusted Third Party", as per the definitions of Second Schedule of Information Technology Act. ESP will facilitate subscriber's key pair-generation, storing of key pairs on hardware security module and creation of digital signature. ESP must be/ integration with a CA for the purpose of obtaining Signature Certificate for the generated Key-pair.

Certifying Authority (CA): An organization or an entity licensed under CCA for issuance of Digital Certificate and carrying out allied CA operations.

e-KYC Number’ shall mean the unique identification number maintained by e-KYC provider;

e-KYC provider shall mean any e-KYC provider listed in e-Authentication Guidelines

‘OTP’ shall mean one time password sent to the eSign User’s cell phone for the purpose of authentication;

UIDAI: An authority established by Government of India to provide unique identity to all Indian residents. It also runs the e-KYC authentication service for the registered KYC User Agency (KUA).

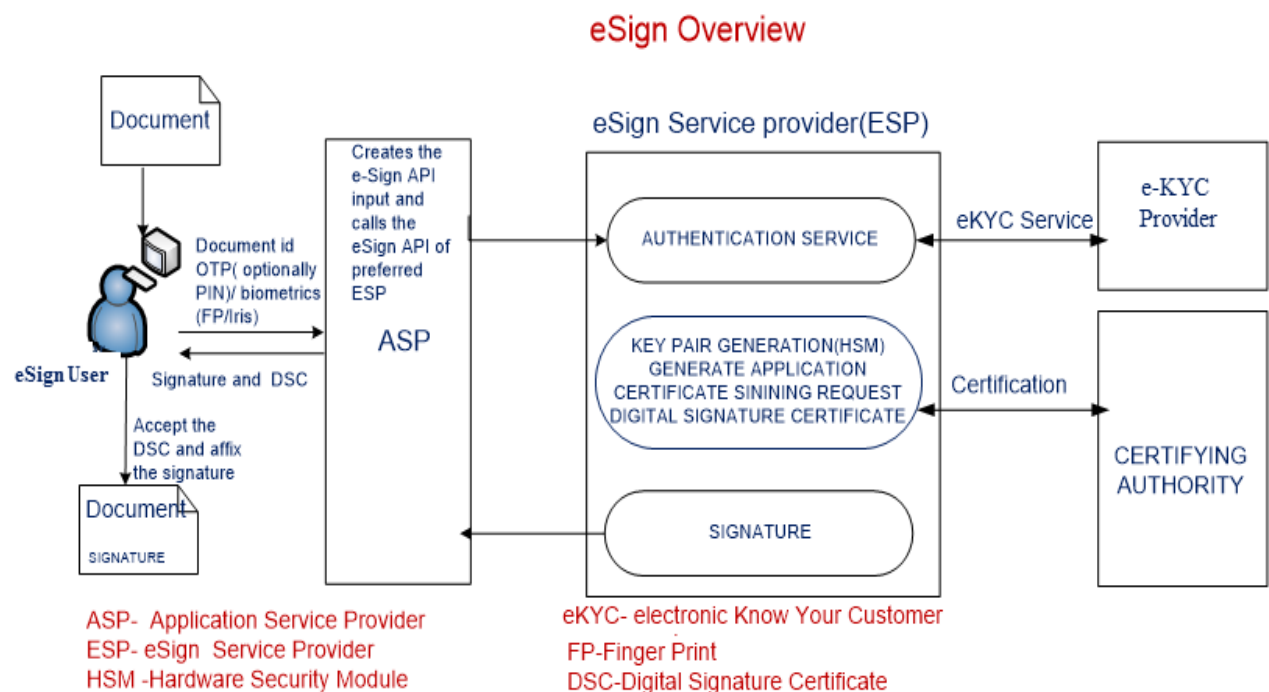
1.4. Legal Framework

eSign service will operate under the provisions of the Second Schedule of Information Technology Act, 2000 (e-authentication technique using Aadhaar e-KYC services) as notified vide (notification details)

2. Understanding eSign Service

This chapter describes eSign Service, some of the envisioned usage scenarios, and working details. Technical details follow in subsequent chapters.

2.1. eSign Service at a glance



3. eSign Service API

This chapter describes the API in detail including the service flow, communication protocol, and data formats.

This API expects that authentication of the individual will be carried out by ESP and the digitally signed e-KYC data is made available to ESP. The authentication needs to be carried out independent of this API

The suggested method for obtaining authenticated e-KYC response is

ESP facilitates authentication of eSign user by calling authentication URL or ESP's SDK. The e-KYC response will be received by ESP and performs eSign on the eSign request received from ASP within permissible time limit.

3.1. eSign - Usage scenarios

The API specifications remain common for all eSign Service provider. However, the parameters which will vary for each ESP are eSign Service URL and ASP ID (Unique User ID provided by the ESP).

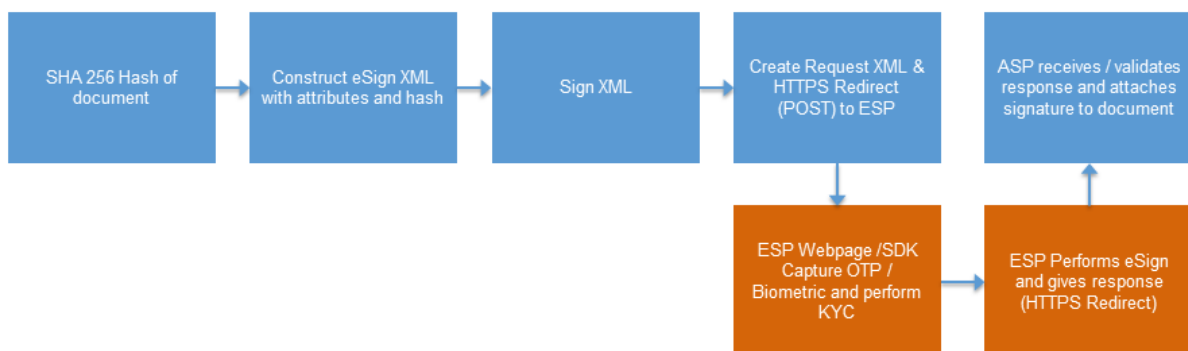
In case of multiple eSign provider, ASP shall have the parameters configurable for each request. The routing of requests to each APIs of ESP can be a round-robin, or a failure switchover, or an eSign user selection basis, or any other manner implemented by ASP.

The eSign service API can be used in the scenario where

ASP initiates eSign request and ESP authenticates user for eKYC before eSign

3.1.1. eSign using e-KYC made by ESP

Flow of eSign process using this option:

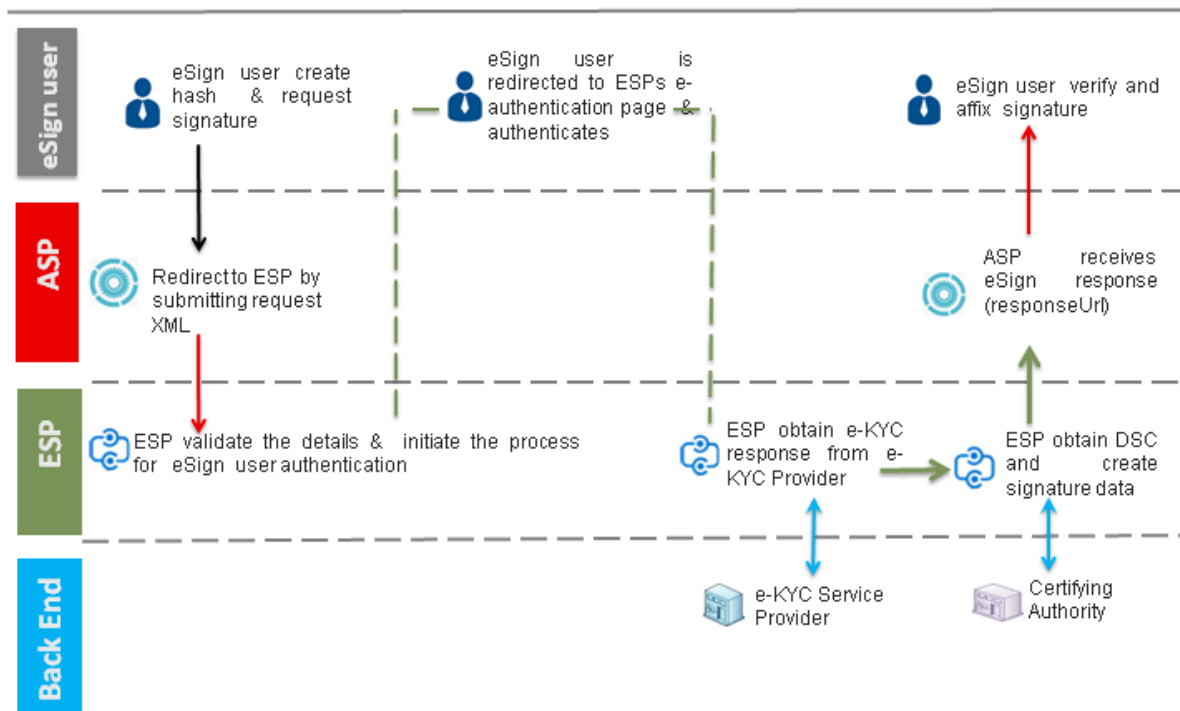


In this scenario:

1. ASP client application asks eSign user to sign the document
2. ASP client application creates the document hash (to be signed) on the client side
3. ASP client application asks the eSign user to provide consent for certificate generation and signature
4. ASP forms the input data for eSign API
5. ASP redirect to ESP's URL or uses ESP's SDK application and submit request XML
 - a. ESP validates the calling application and the input.
 - b. ESP verifies the Digital signature of ASP for eSign XML received
 - c. ESP logs the transaction

- d. ESP redirects eSign user to e- authentication page
 - e. ESP performs authentication and get e-KYC information from e-KYC provider
 - f. ESP show the document hash along with document information to eSign user.
 - g. ESP creates a new key pair and CSR for eSign user.
 - h. ESP calls the CA service and gets a Digital Signature Certificate for eSign user. The certificate will be a e-KYC class Digital Signature Certificate, which has e-KYC number, Name of the eSign user, e-KYC response code, Authentication Type, and Time Stamp embedded.
 - i. ESP signs the 'document hash' and provides response XML to the ASP by redirecting to ASP's response URL.
6. ASP receives the document signature and the eSign user's Digital Signature Certificate.
 7. ASP client application attaches the signature to the document.
 8. eSign user can accept or reject the signature and DSC

The web page flow for eSign using e-KYC made by ESP is as given below



3.2. API Protocol - eSign Service

eSign service is exposed as stateless service over HTTPS. Usage of open data format in XML and widely used protocol such as HTTPS allows easy adoption and deployment of this service. To support strong end to end security and avoid request tampering and man-in-the-middle attacks, it is essential that the requests and responses are digitally signed.

The usage of HTTPS shall ensure transport layer encryption, while digital signing of XML shall ensure integrity & authenticity of data.

Following is the URL format and the parameters for eSign service:

API URL	ESP shall expose URL as under: 1. URL2: HTTPS redirect URL for requests where ESP has to perform electronic KYC of eSign user.
Protocol	HTTPS
Method	POST
Content-Type	"application/xml"
Post data	A well-formed XML, as per the specifications provided in this document.

ASP is required to collect the necessary API URL from the respective ESP.

3.3. eSign API: Input Data Format - eSign Service

eSign Service uses XML as the data format for input and output.

3.3.1. eSign XML structure

Following is the XML data format for eSign XML.

```
<Esign ver="" sc="" ts="" txn="" ekycId="" ekycIdType="" aspId=""
AuthMode="" responseSigType="" responseUrl="">
  <Docs>
    <InputHash id="" hashAlgorithm="" docInfo="">Document
    Hash in Hex</InputHash>
  </Docs>
  <Signature>Digital signature of ASP</Signature>
</Esign>
```

3.3.1.1. Element Details

Element Name: Esign

- Description: Root element of the eSign xml
- Requirement of tag: Mandatory
- Value: Sub-elements
- Attributes: Table below

SI No	Attribute	Required?	Value
1.	ver	Mandatory	eSign version (mandatory). ESP may host multiple versions for supporting gradual migration. As of this specification, API Version is "2.1".
2.	sc	mandatory	sc – (mandatory) ASP should have taken a clear consent from 'eSign user' to carry on eSign from their front ending application. This attribute represents signatory's explicit consent is obtained by ASP for using the signatory's identity and address data received from e-KYC provider to, generate and submit the electronic DSC application form to CA, creation of key pairs by ESP for signatory, submission of certificate to CA for certification, one time creation of signature on the hash along with this request, deletion of key pairs from the after applying

			signature. Only valid value is “Y”. Check box[Y/N*] *No by default
3.	ts	Mandatory	Request timestamp in ISO format. The value should be in Indian Standard Time (IST), and should be within the range of maximum 30 minutes deviation to support out of sync server clocks.
4.	txn	Mandatory	Transaction ID of the ASP calling the API, this is logged and returned in the output for correlation
5.	e-KYCIDType	Mandatory	This represents the type of e-KYC ID being used. The value can be any one out of below: 1. Aadhaar = A
6.	ekycId	Optional	If present, the value must be UID TOKEN. ESP should process the request only if ekycId of input XML and e-KYC authentication response are same.
7.	aspId	Mandatory	Organization ID issued by ESP to the ASP
8.	AuthMode	Mandatory	Authentication Mode being used for e-KYC Authentication, either to be performed by ESP, or as already made by the ASP. Allowed values are: <ul style="list-style-type: none"> • OTP = 1 • Fingerprint = 2 • IRIS = 3 Class of eSign Certificate will be “OTP Class” for OTP based authentication. For Fingerprint and IRIS, the class will be “Biometric Class”. These will be as per definitions of “Class of Certificate” in India PKI-CP.
9.	responseSigType	Mandatory	This value represents the response signature type, where ASP can request for a specific type of signature from one of the following <ol style="list-style-type: none"> 1. rawrsa 2. PKCS7(with only the signer certificate in the certificate section and no revocation information) 3. PKCS7pdf(all issuer certificates up to and including root CA certificate and CRLs/OCSP responses of each issuer certificates should be included in the response. In case, the number CRL entries are more than 5, only OCSP responses are allowed. The signature should also be time stamped using the time stamping services of CA. The revocation information should be included as a signed attribute under pdfRevocationInfoArchival(1.2.840.113583.1.1.8) 4. PKCS7complete(All issuer certificates & its revocation information in unsigned info) 5. Rawecdsa

10.	responseUrl	Mandatory	This is mandatory. This should contain a valid HTTPS URL of the ASP, to which ESP has to redirect back to ASP with response XML.
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Element Name: Docs

- Description: Contains one sub-element with Document Hash
- Requirement of tag: Mandatory
- Value: Sub-elements
- Attributes: Not applicable

Element Name: InputHash

- Description: Contains the value of Document Hash, which has to be signed.
- Requirement of tag: Mandatory
- Value: SHA256 hash value of the document in Hex format
- Attributes: Table below

Sl No	Attribute	Required?	Value
1.	id	Mandatory	This should be 1. Only single document hash is allowed
2.	hashAlgorithm	Mandatory	Should be fixed to "SHA256"
3.	docInfo	Mandatory	Description for the respective document being signed, not more than 50 characters. docInfo should be strictly adhere to the content of document. Multiple documents of same type or different types should not be included in a single file.

Element Name: Signature

- Description: Contains the signature of ASP.
- Requirement of tag: Mandatory
- Value:
 - Signed value of Input XML, as per the W3C recommendation on XML Signature Syntax and Processing (Second Edition)
 - Refer <http://www.w3.org/TR/xmlsig-core/> for more information
- Attributes: Not applicable

If eSign user does not provide this explicit consent, application SHOULD NOT process data using this API. ASP front-end application must ensure it takes an "explicit informed signatory's consent" authorizing the ESP to retrieve the resident data, DSC application form generation and submission, key-pair generation, CSR request to CA, Digital Signature on the hash submitted and key pair deletion after Digital Signature creation.

IMPORTANT NOTE: Digital Signature at e-KYC XML level is mandatory .The eSign request XML should be digitally signed by ASP for authentication purposes.

3.4. eSign API: Response Data Format - eSign Service

Below is the response format of eSign Service API. Note that, the API does not give any identity related data of the eSign user.

```
<EsignResp status="" ts="" txn="" resCode="" errCode="" errMsg="">
  <UserX509Certificate>base64 value of eSign user certificate
  (.cer)</UserX509Certificate>
  <Signatures>
    <DocSignature id="" sigHashAlgorithm="SHA256" error="">
      Signature data in raw (PKCS#1) or raw( ECDSA ) or
      PKCS7 (CMS) signature as requested
    </DocSignature>
  </DocSignature>
</Signatures>
<Signature>Signature of ESP</Signature>
</EsignResp>
```

ASP should provide mechanism to verify and accept the contents of DSC.

3.4.1. Element Details

Element Name: EsignResp

- Description: This element is the root element of the response and contains the meta values.
- Value: Sub-elements
- Attributes: Table below

SI No	Attribute	Value
1.	status	In case of success, it will be "1" In case of failure, it will be "0"
2.	ts	Will contain the response timestamp in ISO format.
3.	txn	The Transaction ID provided by ASP in the request.
4.	resCode	A unique response code provided by ESP. This is a unique id for the transaction provided by ESP. It shall make the transaction traceable, and ASP is expected to store this code in their audit log.
5.	errCode	In case of failure, this will contain the failure error code. In case of success, it will be "NA"
6.	errMsg	In case of failure, this will contain a descriptive message against the error code. In case of success, it will be "NA"

Element Name: UserX509Certificate

- Description: This element will contain the Base 64 value of the Certificate. No private key information is shared. For manual verification, this value can be copied and saved as .cer file (With begin and end statements - PEM Format).

- Presence: Mandatory, if success.
- Value: Base 64 value of eSign user certificate (public).
- Attributes: Not Applicable

Element Name: Signatures

- Description: This element contains the sub-elements of signatures corresponding to InputHash.
- Presence: Mandatory, if success.
- Value: Sub-elements.
- Attributes: Not Applicable

Element Name: DocSignature

- Description: This element will contain the signed value which will be verifiable against original document.
- Presence: Mandatory
- Value: Signed value in raw (PKCS#1) or `raw(ECDSA)` or PKCS7 (CMS) signature format as per the request XML.
- Attributes: Table Below

SI No	Attribute	Value
1.	Id	Contains the corresponding ID to the Input Hash received
2.	sigHashAlgorithm	Should be fixed to "SHA256"
3.	error	In case of failure, this will contain the corresponding error

Element Name: Signature

- Description: This element will contain the signature of ESP, which can be used for verification by ASP and protect the response from any kind of tamper.
- Value:
 - Signed value of response XML, as per the W3C recommendation on XML Signature Syntax and Processing (Second Edition)
 - Refer <http://www.w3.org/TR/xmlsig-core/> for more information
- Attributes: Not Applicable

3.4.2. Error Codes

The List of error codes are available at annexure 1. ASP can automate their application based on prominent errors, in order to ease the flow for eSign user.

eSign Service -error codes

AADHAAR authentication errors relevant to ASP may be forwarded to ASP with respective error codes. Please refer the latest error codes of UIDAI in Authentication API document

Sl No	Error Code	Error message	Originator
1.	ESP-901	Invalid Authentication Mode	ESP
2.	ESP-902	Invalid ASP ID. It cannot be Empty	ESP
3.	ESP-903	Invalid ASP ID. It may not exist or may be inactive.	ESP
4.	ESP-905	Document Hash not received	ESP
5.	ESP-906	UID Token does not match	ESP
6.	ESP-907	Request Time Stamp cannot be Empty	ESP
7.	ESP-908	Request Time Stamp is not valid. Please check the server time.	ESP
8.	ESP-909	Transaction ID cannot be Empty	ESP
9.	ESP-910	Duplicate Transaction ID for the given ASP.	ESP
10.	ESP-911	Input XML Signature verification failed.	ESP
11.	ESP-922	Invalid Signature on Input XML. Please use the corresponding certificate mapped with ESP.	ESP
12.	ESP-944	User terminated eKYC process	ESP
13.	ESP-945	User terminated eKYC process after OTP Generation	ESP
14.	ESP-946	User interface page expired	ESP
15.	ESP-991	ESP Database Connectivity Error	ESP
16.	ESP-992	Input XML Parsing Error.	ESP
17.	ESP-993	Error Parsing CA Response XML	ESP
18.	ESP-999	Unknown Error	ESP

Change History

Change History			
Section	Ver	Date	Modification
3.3.1.1.	2.1	10.08.2020	In the value field of "responseSigType", added PKCS7pdf & PKCS7complete