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User manual

a.sign premium seal qualified

(english translation)

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Table 1: document history

1 Overview

1.1 Summary

`a.sign premium seal qualified` is a qualified electronic seal in accordance with the eIDAS regulation [Cou14, Section 5, Article 38, Qualified certificates for electronic seals].

`a.sign premium seal qualified` is a remote signature, therefore the seal private key is stored in a hardware security module in the data center of A-Trust. For each signature the client software has to issue a request with the data to be signed to A-Trust. This request has to be signed with an authentication key.

To order an `a.sign premium seal qualified` you will need to generate a PKCS#10 request for an authentication certificate, that will later authenticate every signing request to the A-Trust servers.

This document describes the registration process and signature interface for the `a.sign premium seal qualified`.

2 a.sign premium seal qualified registration process

2.1 Preconditions

For a.sign premium seal qualified a PKCS#10 request for an authentication certificate is required.

This request can be generated using openssl using the following commands: a new private key file `private_key.pem` and a certificate request file `certificate_request.txt`.

```
openssl req -nodes
            -new
            -newkey rsa:2048
            -sha256
            -out certificate_request.txt
            -keyout private_key.pem
```

will be generated. Pay attention to the file `private_key.pem` file, it will be needed for every signature request and should be kept secret.

2.2 Order process

To order an a.sign premium seal qualified certificate visit the website <https://www.a-trust.at/Bestellungen/asignsealqualified/>, fill out the form and provide the necessary documents. An A-Trust Support employee will contact you regarding further action to complete the registration process.

After completing the registration process, A-Trust will provide you with an a.sign premium seal qualified certificate and an authentication certificate.

2.3 Optional step, combining private key and authentication certificate

If your client software needs a PKCS#12 file rather than a separate private key and certificate file, the following command creates the PKCS#12 file with the name `authentication_certificate.p12`

```
openssl x509 -inform der
            -in SealAuthenticationCertificate.cer
            -out SealAuthenticationCertificate.pem

openssl pkcs12 -export
            -out authentication_certificate.p12
            -inkey private_key.pem
            -in SealAuthenticationCertificate.pem
```

3 a.sign premium seal qualified signature interface

3.1 Overview

To communicate with the A-Trust server a REST interface (HTTP POST and HTTP GET) is used.

3.2 Get certificate information

This call downloads the seal certificate for the specified serial number.

URL schema

```
/SealQualified/v1/Certificate/[authcertserial]/[sessionid]
```

Listing 1: get certificate uri schema

The parameter **authcertserial** is the certificate serial number of the authentication certificate in decimal format. The parameter **sessionid** is assigned by the calling application and is used to connect the sessions between client and server.

Request

```
GET /SealQualified/v1/Certificate/1058733338/sessionid
Host: ...
```

Listing 2: get certificate request

Response

```
HTTP/1.1 200 OK
Cache-Control: no-store, no-cache
Content-Disposition: attachment; filename=assignSealQualified.cer
Content-Length: 1077
Content-Type: application/x-x509-ca-cert

[ binary data ]
```

Listing 3: get certificate response

3.3 Sign hash value

This call performs a signature with the seal private key.

The data to be signed has to be hashed by the client before transmission to the A-Trust server.

The signature created by the A-Trust server is an ECDSA signature in the following format:

$$\text{signature} = \text{Base64_url}(R + S)$$

where R = first coordinate of ECDSA point
 S = second coordinate of ECDSA point

URL schema

```
/SealQualified/v1/Sign/[sessionid]
```

Listing 4: get certificate uri schema

The parameter **sessionid** is assigned by the calling application and is used to connect the sessions between client and server.

Request

```
POST /SealQualified/v1/Sign/sessionid HTTP/1.1
Content-Type: application/json
Host: ...
Content-Length: 952

{
  "AuthSerial": "1058733338",
  "AuthCert": "MIIETCCA3GgAwIBAgI....",
  "Hash": "Dza/4+d+pQzueNkiecsIU+qXv...",
  "HashSignatureMechanism": "SHA256withRSA",
  "HashSignature": "wHP+yGEq8g9GT/IE..."
}
```

Listing 5: sign hash value request

The parameter **AuthSerial** contains the certificate serial number of the authentication certificate in decimal format. Instead of the **AuthSerial** you can also add the complete authentication certificate in base64 format as **AuthCert**. **Hash** contains the to-be-signed hash value and **HashSignature** contains the signature with the authentication certificate over the hash value. **HashSignatureMechanism** specifies the algorithm used to sign the hash value.

For `HashSignatureMechanism` the following values are supported:

- `SHA256withRSA`
- `SHA384withRSA`
- `SHA512withRSA`
- `SHA256withECDSA`
- `SHA384withECDSA`
- `SHA512withECDSA`

Response

```
HTTP/1.1 200 OK
Content-Length: 130
Content-Type: application/json; charset=utf-8

{
  "Signature": "BC4jJ\\fdAvBBln+y6h...egC7U="
}
```

Listing 6: sign hash value response

3.4 Test call

This call serves only as a connection test and always returns with HTTP state 200 - OK if the server is available.

Request

```
GET /SealQualified/v1/Test
Host: ...
```

Listing 7: test request

Response

```
HTTP/1.1 200 OK
```

Listing 8: test response

4 Live and test system

4.1 Live-System

The live system for a.sign premium seal qualified is available via the following link:

URL: <https://www.a-trust.at/SealQualified/v1>

4.2 Test-System

For testing purpose the following parameters can be used:

URL: <https://hs-abnahme.a-trust.at/SealQualified/v1>

The required authentication certificate is available on github <https://github.com/A-Trust/ASignSealQualified> including free sample code and test clients.

5 Errorcodes

The following error messages are returned by the A-Trust service

HTTP statuscode	description
200 - OK	success
400 - bad request	error parsing the request
404 - not found	no seal for the given serial number or authentication certificate found
422 - unprocessable entity	given <code>AuthSerial</code> and <code>AuthCert</code> do not match
500 - internal server error	internal error

Table 2: errorcodes

References

- [Cou14] Council of European Union: *Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC*, 2014. <https://eur-lex.europa.eu/eli/reg/2014/910/oj>.