Smart Energy Meter specification

Need for a Review

RAJESH BANSAL
Sr. Vice President, BRPL Delhi
What is a standard?

A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose.

Expectation from standard:

- To ensure that product and service are
  - Reliable and Safe
  - Optimum cost but Good quality
  - Understand user need and have Long useful life - interoperability
  - No adverse impact on society, environment.
  - In line with practices and technology

Compliance of standard give confidence in a product
Standard Vs Specifications

- Standard are different from specification.

- Standards are basically minimum requirement. Specification can have requirement beyond standard.

- Normally same standard is followed by mass, but specification can vary from user to user.

- Standard are more towards reliability and basic functionality, whereas specification covers additional - much more than that.

- Incase of energy meter – standard is more towards Active energy, whereas specifications talk about other features, need, objective and functionality.
Need a review of Meter Standard and specification with respect to New Role of Energy Meters.
Needs, Expectations, concerns and technology changes very fast. Thus it require continuous review of Specifications
Energy Meter specification – How we make

Refer old document

New tech, new capability.. Just add

Fear not to miss anything

Influenced by fancy features

Viability aspect never considered.

Many disclaimer to Safeguard buyer

One need far lower effort if logical and good specification are made.
Present Test – Relevance with new technology

- No Load Test are routine tests
- Technology upgraded: Still No Load Test is routine test.
- Advanced Technology: No modifications in standard.

- Used to be calibration point
- May be applicable for Analog chips
- New ASIC ensure no load No recording

Are manufacturer really testing 100% meters for No load test as per IS ??
Is it really required ?? Should we spend hrs for test ??
Any Recommended Faster Alternate Test ??
Present Test – Relevance with New Technology

- **No Load Test**
  - Latest ASIC ensures same in design
  - No load Test requires lot of time i.e. upto 200 Minutes.
  - As a practice
    - Manufacturers any how ensuring by alternate methods

One Recommendation – Make it as Type/ Acceptance test.

Additional Test need to be reviewed

- Repeatability Test
- Interpretation of Test Results
- Reverse Phase Sequence

Are these test/ limits still relevant?
Suggestion for new specification

| Need to redefine what is routine test/lot test. Technology has changed a lot. It impact productivity and thus cost |
| Technology and capability is changing – many specs are irrelevant. Do not carry luggage |
| Try to exploit new features and capabilities. May not be advisable to carry old, existing and new features in new product |
| Same specification need to carried due to national standard and prevailing practice. Bring in notice but comply till amended. |
| With new technology think differently considering functionality/purpose and usage. Also one need new test to ensure reliability of new features. Too many features can affect the cost and reliability |
Review Of Anti Theft features -- Smart energy meter specification

Smart meter can:
- Measure multiple parameters
- Can generate alarm based on defined logic
- Can send alarm if V low, abnormal wiring, neutral missing, power/micro off,
- can detect data change

Do we still need all anti theft feature needed in static meters or need smart logics and quick actions

In India, Anti theft feature dominate the meter specifications. Do we need all anti theft feature as we have in static meters??

There are thousand of theft methods. Irrespective of theft method, theft happens by
- Affecting energy measurement
- Switching off meter/micro
- Changing data
- By pass.
# Anti theft features - Review

<table>
<thead>
<tr>
<th>Anti theft feature</th>
<th>cost impact</th>
<th>Smart meter - review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral missing sph</td>
<td>Yes</td>
<td>Not recommended – Power outage alarm</td>
</tr>
<tr>
<td>Magnetic test</td>
<td>Yes</td>
<td>Only protection of current sensor required.</td>
</tr>
<tr>
<td>ESD/ spark test</td>
<td>yes</td>
<td>Mainly result to power / micro off and data change .. Smart meter can detect.</td>
</tr>
<tr>
<td>CT in PH and neutral</td>
<td>Yes</td>
<td>Recommended to continue</td>
</tr>
<tr>
<td>Theft logging</td>
<td>Cost of memory</td>
<td>Events can be reduced.</td>
</tr>
</tbody>
</table>

**Theft by wiring manipulation, lower voltage, relay/switch etc can be easily detected in smart meter. Further smart meter can be programmed to switch during any abnormal activity / measurement to avoid theft.**

- **Power to compare with neighbor**
- **On line Energy audit**
Review Of memory and display -- Smart energy meter specification

More information in memory and display .. Higher will be the cost

What about alarm LEDs ?

If read remotely who will look into display.. ??

When data is communicated periodically – why so large historical data

Smart meter cost is a challenge :

> Historical data is asked with a fear if meter does not communicate for long !!

> Is this acceptable ??

Only solution is ensure meter communicate. Give more emphasis on data usage rather data collection and storage only. No need for alarm LED rather communicate alarm.

Need for costly display if consumer display is separate ?? In fact do we need one in meter ?

Presently YES as asked by standard !!
Remote programming:

- Why it is needed?? Flexibility or uncertainty?
- Cyber security??
- If utility can change parameters – why cannot someone else??

*Flexibility is desirable but considering meter as cash and information box, it is critical to ensure same cannot be tempered!!*

Two option – restriction and logging of all write events.
Review Of RTC and RTC battery -- Smart energy meter specification

Static meter need RTC and RTC battery to ensure clock working even during power OFF

Do we need RTC to work during power off?/
Or correct clock during Power On only

Smart meter communication capability is important:

- What if meter get time sync as soon as it is switched ON ??
- Do we need separate RTC and battery

Need a review .. Seems not required if sure about communication.
Review Of Data communication capability --
Smart energy meter specification

Few Options:
- Need of optical port/ wired port
- RF or GPRS or hybrid
- Integral/ external or modular

One simplest way is ask for all. It will affect cost a lot.

Smart meter communication capability is important:

- It depends upon once confidence and SLA agreement with communication service providers
- Back up arrangement is good – but costly

Remember even if communication fail --- meter will still work, but may be you are dependent so may prefer Hybrid… Objective.
Review Of Construction features -- Smart energy meter specification

In static meters:
- Top cover open and sensor
- Terminal cover and wiring issues
- Box and optical chord issue

When smart meter have consumer display .. Or consumer data can be seen on web .. Why cannot be meter located as in assessable location ?

Need for assess ability

- For consumer to see display
- For utility to take meter data and for meter servicing

But meter get tempered since assess able. Since above requirement are otherwise taken care by smart meter, so one should review location and thus construction of meter while making specifications.
Review Of “Connect Disconnect capability” -- Smart energy meter specification

Connect disconnect features are desirable:

- But if for particular application/ objective if we are sure, that connect disconnect is not required can be avoided ie MIX.
- If nothing cannot be said – better with connect disconnect

Remember connect disconnect feature has high cost and may affect failure rate !!
In Indian Standard, **Functionality**/ **correctness** need to be checked after various tests.

**E.g. Short time over current**

Short Time over current shall not damage the meter and meter shall perform correctly when back in normal conditions.

The variation in error shall not exceed the values shown in Table.

What if memory / RTC / Historical data get corrupted?

Is it gap of definition or interpretation by test labs?

**Normally Functionality means No visual damage, meter recording energy correctly, no Abnormality on energy Register.**

The meaning of word “**Correctly**” need to be defined / reviewed and standardized. Does It mean only accuracy / energy registering or beyond?
Conclusion

- The guiding parameters for making specifications shall be need/expectations and concerns of stakeholders.
- Being new technology, it is equally important to remove old/existing specs before you continue same even for smart meters.
- Your smart meter project can get delayed due to over specification and thus over prize.
- It is important to educate other stakeholders including customer, legal etc to avoid old undesirable practices.
Thank You

Contact Details:

011-39999425, Mobile - 0091 9350261602
Email: rajesh.m.bansal@relianceada.com