

“.....Where’s THAT in the Specification?”

Definition

As a Technical Standard, the ASTM defines a Specification as “an explicit set of requirements to be satisfied by a material, product or service.”

The Use of a Specification

It is vital for suppliers, purchasers and users of materials, products or services to understand and agree on all requirements. A specification is often referenced by a contract or procurement document and provides the necessary details about the exact requirements.

The people who specify the item or service have the responsibility to consider the available specifications, specify the correct one, enforce compliance and use the item or service correctly. Validation of suitability is necessary.

Specifications are included in contracts and are a vital portion of that contract which must be understood in its parts and collectively.

Basically, we generally deal with two types of specification – “*recipe*” or “*prescription*” in which the product or service is tightly detailed and is acceptable for the work, and “*performance*” in which the required performance of the product or service is specified leaving the actual materials and service to another party (generally the contractor/sub contractor). There are occasions when the exact materials to be used are included in both types of specifications.

A good specification, by itself, does not necessarily imply that all products sold, or services performed to that specification actually meet the listed targets and tolerances. Actual production of any material or service involves inherent variation of output.

EFFECTIVE SUPERVISION, SURVEILLANCE AND ENFORCEMENT OF A SPECIFICATION IS NECESSARY FOR IT TO BE USEFUL.

Content of a Specification

In Australia, a specification may include (but not be limited to):-

- Title and scope of the specification.
- Person or agency responsible for questions on the specification and updates.
- The intended use.
- Terminology and definitions to clarify the meanings of the specification.
- Test methods for measuring all specified characteristics.
- Material requirements, targets and tolerances.
- Performance requirements.
- Workmanship.
- Certifications required.
- Safety considerations and requirements.
- Environmental considerations and requirements.
- Quality requirements, sampling inspections and acceptance criteria.
- Provisions for rejection, reinspection and corrective measures.

We often see that more than one specification may cover the above items within a document. For example, the some road authorities have separate specifications for Quality Management,

Environment and Occupational Health and Safety within one contract. The same contract may also cover Traffic Control requirements, materials etc.

The following comments are not intended to be an exhaustive exposé of all aspects of a specification, but are merely some details that we should all watch for.

The Uninformed Client

With the specification forming part of a contract/order/instruction, it is vitally important for the client to know what is required.

If the work is for “recipe” based requirements, this may mean specifying the exact material to be used (for example – thermoplastic), the method of application (extrusion, spray, screed etc) and other appropriate details such as material thickness, bead application rates etc.

In the case of a performance based (or specified) specification, this may mean leaving these aspects to the contractor. In this case the requirements may be to meet particular requirements such as retroreflectivity, skid resistance, luminance etc.

Mixing the two types of specification (recipe and performance) can provide a problem and result in significant contractual issues and variation claims. The client should stick with one type of specification.

Whatever the type of specification, there are particular requirements that cannot be overlooked. These relate to detailed aspects including line type (including any appropriate nomenclature), line width, placement, set out requirements etc. It is preferable for the details of any existing marking material types to be provided as well to enable new materials to be placed without fear of debonding or loss of adhesion from the existing materials and pavement surface.

On a recent contract for a road authority, the asset inventory details of the existing road markings by type were provided to tenderers and included the following list – this list is quoted verbatim, although merged from 4 spreadsheets (the three columns below are used to reduce the space taken in this paper). It is emphasised that this list is that supplied to tenderers – the writer has made no attempt to combine or alter it in any way

Note “AT” in the following means “audio tactile”

AT E4	AT E5	AT RH
AT BB	BB	BS
C1	C2	C3
E1	E2	E3
E4	E5	L1
L2	L3	L4
S1	S2	T1

Apart from the “AT RH” the above is all fairly standard. But on the next spreadsheet came the following:

AT Continuity: Continuity	AT Dashed Lane: Lane Line	AT Solid Lane: Lane Line
Audio Tactile E4 Edge Line	Audio Tactile E5 Edge Line	Audio Tactile RH Edge Line
Audio Tactile Edge Line	BB Audio Tactile Sep Bar Line	BS Sep Bar Line
C1 Continuity Line	C1 Edge Line	C2 Parking Restriction Line
E1 Edge Line	E2 Edge Line	E3 Edge Line
E4 Edge Line	E5 Edge Line	L1 Lane Line

L1 and L2 Lane Line	L2 Lane Line	L3 Lane Line
L4 Lane Line	RRPM’s Edge Line	S1 Sep Bar Line
S2 Separation Barrier Line	SB Sep Bar Line	SL Audio Tactile Sep Bar Line
SL Sep Bar Line	T1 Turn Line	TLL Lane Line

At this point, linemarkers in NSW are asking “What’s going on?” But it gets better. The next spreadsheet showed:

Channelizing Island	Diagonal Median Marking	Diagonal Shoulder Marking
Median Island	Solid Marking	Splayed App Chevron Marking
Splayed App Diagonal Marking	Three Line Median	Symbolic 60
Symbolic Bicycle	Symbolic Bicycle >	Symbolic BUS ONLY LANE
Symbolic Diamond	Symbolic DIAMOND	Symbolic Give Way
Symbolic Pedestrian Crossing	Symbolic Person	Text & Symbolic <LOOK
Text & Symbolic <LOOK>	Text & Symbolic Bus Lane	Text/Symbolic LOOK>
Text/Symbolic 40	Text/Symbolic BUS LANE ENDS	Text/Symbolic BUS ONLY
Text/Symbolic BUS ONLY LANE	Text/Symbolic KEEP CLEAR	Text/Symbolic LOOK
Text/Symbolic LOOK>	Text/Symbolic Rail X	Text 110
Text 1	Text 2	Text 3
Text 4	Text 5	Text 6
Text 40	Text 50	Text 60
Text 70	Text 80	Text 90
Text Ahead	Text AT BURNS BAY ROAD	Text BL T3
Text BUS	Text BUS EXCEPTED	Text Bus Lane
Text BUS LANE	Text BUS LANE AHEAD	Text BUS LANE ENDS
Text Bus Only	Text BUS ONLY	Text Bus Only Lane
Text BUS ONLY LANE	Text BUS ZONE	Text BUSES
Text BUSES EXCEPTED	Text BUSES ONLY	Text END
Text END T2	Text END T3	Text EXCEPT BUSES
Text FREE WAY	Text KEEP CLEAR	Text LANE
Text LANE AHEAD	Text LOOK	Text M2
Text M4 ONLY	Text NO U TURN	Text ONLY
Text ONLY BUSES	Text PARK CLOSES SUNSET	Text PM
Text RAIL	Text T2 AHEAD	Text T2 AM
Text T2 AM + PM	Text T2 END	Text T2 PM
Text T3	Text T3 AHEAD	Text T3 AHEAD BUS LANE AHEAD
Text T3 AM	Text T3 AM AHEAD	Text T3 AM BUS LANE PM
Text T3 BUS LANE AM	Text T3 PM	Text TOLL LANE
Text TRANSIT LANE AHEAD	Text TRANSIT LANE AHEAD T3	Text X
Give Way Holding Line	Keep Clear Line	Keep Clear Line Dashed
Pedestrian Crossing Stop	Pedestrian Crosswalk Line	Pedestrian Zebra Crossing
Stop Sign Holding Line	Stop Sign Stop Line	Traffic Signal Stop Line

Then follows the arrows with correct descriptions for the road authority. Incidentally, the drawing references and some descriptions of the lines in other locations was some 15 years out of date – there were also frequent references to a specification long ago superseded.

Apart from the obvious incomplete message duplications and needless similar wording there are issues such as “splayed app”, and misleading descriptions of various lines (eg BB Sep Bar Line, SL Sep Bar Line etc.). Why not use the usual nomenclature instead of words such as “channelizing island”, or “solid marking”. What is one of these? What chance does the linemarkers/tenderer have to price this, and what chance does a head contractor have for a major project when all that he wants is a price – he doesn’t necessarily understand all the differences.

This same contract also included details of fixed signage using long time superseded sign descriptions, signs not used any longer and masses of duplication. A printed list of the signs would make the above linemarking list appear to be minor by comparison.

These details showed that the client had not fully informed itself on the details of the asset and caused a deal of confusion for tenderers. The client’s list of works (“specification”) therefore left the issue open to interpretation which could have caused different tenderers to price the works in differing ways resulting in either unrealistically low or high prices for the works in a lump sum contract. The client appears to have left themselves wide open here to many high priced variations.

Was this a case of the client trying to use a “recipe” when it didn’t know the “recipe”?

Ambiguity

Specifications should be clear in their requirements to obtain the best and fairest price. Ambiguous statements must be avoided, and in complex contracts, it may often be best for an independent informed party to read over the requirements prior to the issue of the document. That said, if there is doubt in the tenderer’s mind, it should be clarified before tender submission.

To illustrate this, but away from the subject of linemarking, a recent tender by a major road authority for work including bridges, tunnels, roads etc. stated:

Bridge Maintenance

4.7 Clean Steelwork

4.7.1 This activity includes washing down surface protective coatings where the protective coating is sound and functioning as intended to protect the metal surface.

4.7.2 Exclude all work where the protective coat is lead based except for bridges where the requirements of AS 4361 can be satisfied

4.7.3 Remove all evidence of dirt, or grit, or fungal growth, or contamination from the protective coating

4.7.4 Provide for the collection and disposal or treatment of all contaminated water run-off.

This clause created confusion and raised several questions, including:

1. What is the definition of “clean”? This was not stated anywhere.
2. How often was the cleaning to take place? Again this was not stated.
3. What happens if the coating is not sound?
4. How many steel bridges were to be cleaned, and what type – girder, box girder, truss? This wasn’t shown anywhere in the document.
5. Who identifies the lead based coating? This was not shown.
6. Where were the bridges located? – to ascertain access, equipment required and quantity of work. The only information provided was a list of approximately 200 bridges.
7. Why weren’t concrete bridges included? They become equally as dirty.

In answer to the submission of these questions to the client, the client wanted to know why the information was required. When the clause above was paraphrased to the client over the phone, the question from the client was “where’s that in the specification?” They prepared the documentation!

What was the final answer? “Oh that’s only for the handrails on all of the bridges”. Tenderers reading the clause would see only ambiguity.

Implementation

As part of the requirement for the client to “be informed” (i.e. know what he/she wants), there is the subsequent requirement for surveillance and enforcement. Having detailed requirements in a specification is no use if they are not followed up. Again, an example is appropriate.

Some time ago on a major highway project in the eastern states, some longitudinal work was completed by a linemarking contractor, much of which didn’t meet the specification for alignment, width and thickness of applied material. After a short period, and when an enquiry was made by another tenderer to the client as to the suitability of the work, an astounded client asked “What’s wrong with it?” In short nobody from the client had been to the site during or after the application. The work has since been covered over by a further application of material, albeit considerably wider than the original at great expense to the client. When the standard specification requirements for alignment etc were noted to the client’s representative, he asked “Where’s that? I didn’t see that!”

A further example. Specifications vary from state to state and sometimes from client to client. In NSW, it is permissible to apply water borne paint in a single application of approximately 0.500mm wet film thickness to obtain approximately 0.300mm dry film thickness. Across the border in Queensland, a two coat application is used. Evidence from some contractors indicates that while they submit conforming tenders/quotes using the 2-coat systems, clients award tenders to some contractors who may be less professional because the client doesn’t realise that the cheaper price is because a single coat system will be used. Further, no on-site checks are made during application to ensure that the specification is being complied with. When enquiries by tenderers are made of clients before work is commenced, there is often a lack of understanding of requirements. Thus less professional contractors can cut corners and not be caught, and as a result, the client does not get what he really wants and the more professional contractors do not get work.

Details must be provided by the client in as accurate a form as possible. This must include precise locations for work crews, and an understanding by the contractor of requirements including time on site etc. An example relates to a very recent project in which the author was involved. The details of the work were communicated to the traffic control contractor, together with photographs of the site and a map reference for the project – in this case a bridge. Some 1½ hours after programmed start time, a frantic phone call from the site revealed that the traffic control had not arrived. Phone calls to the traffic controller’s office showed that the traffic control crew were at a totally different bridge quite a number of kilometres away. Result – backcharges to the traffic control company because of delays on a very tight daily schedule.

All of the above relates to the client, and in the following, we consider the contractor doing the work,

The Uninformed Contractor

Completion of the work as shown in the specification is the responsibility of the contractor or supplier for the goods and service.

While an uninformed client may suffer from additional costs, an uninformed contractor may not only suffer financial loss but will also suffer loss of reputation.

In a normal contract (either “recipe” or performance), there are usually a variety of specifications covering subjects such as Traffic Control, OHS Systems, Quality Systems, Environmental Systems as well as materials, application, testing etc. The contractor must know what is in each specification for each project so that it can be seen what must be done, what must not be done and

following these aspects, what it is possible to do. This latter aspect is the means of being able to formally offer alternatives for various aspects.

Many specifications appear at first glance to be the same as others. We are often repeatedly bombarded with the same specification and we become blasé about this. That’s a danger, because when a new edition or something that looks like the “usual” comes along, it gets ignored, even if there is a statement on the cover that this is a unique specification. The author has experience of some contractors saying “I don’t bother reading all that *garbage*” (polite word inserted by author). It is then quite possible that this contractor will win the job and then when something he should know from the specification arises, asks the inevitable question “.....Where’s that.....”

As an example, on a recent contract in NSW, the specification stated “*All longitudinal painted markings shall be applied by the Controlled Rheology Method (Double Gun). The contractor shall ensure that the equipment is arranged to correctly apply the paint using this method*”. During a phone call prior to the on-site start, the question was asked of the contractor “Are there any problems with the double gun application?” The response was “That’s not required in RTA Specifications.” When it was pointed out that the specification was not an RTA Specification, the response was “Oh, Where’s that in the Specification. We didn’t see that.”

One aspect that does require mentioning is the passing on of the correct specification by a Head Contractor to any sub contractors. If this is not performed correctly, it is usual and normal for the sub contractor to take the easiest path and use the cheapest material. This is particularly noticeable in areas such as car parks where the head Contractor contacts his favourite sub contractor and merely states “Go and mark XYZ carpark.” In one case with which the author is familiar, the linemarking subcontractor arrived on site and proceeded to set out the marking locations. Some time later, as he was about to start painting, the question was asked “Are you going to use THAT paint?” The answer was “Yes, we always do.” Comment from client’s representative “But it doesn’t comply with the specification asking for water borne paint.” Statement from contractor and subcontractor “Where’s that in the specification?”

Some of that problem could be avoided if the linemarker’s Quality Management System contained an initial tender/quote summary page for the pricing that asked questions such as “Materials”, “Surface”, “New work or remark”, “Colour” etc. Any contentious aspects could then be clarified before work begins and more particularly before pricing. This any potential problems could be clarified before they become an issue and profitability can be preserved without the need for expensive re-works and lost time.

Testing

Testing is a subject that is often raised during a contract. There are several parts to this.

Specifications often request material certification from a recognised body such as a NATA registered laboratory. Generally this information must be submitted some period prior to work on site commencing. It is totally up to the linemarking contractor to ensure that he knows precisely what is required and submit it in the appropriate format, by the appropriate date and to make sure that it is current.

On site testing for line width and thickness as well as bead quantity are subjects that often cause concern. The crew foreman should not only know how to carry out these tests and be prepared to do them, but have the right materials and equipment. Examples of this not occurring are many.

On a major project the crew arrived on site and immediately set up to start applying paint. When asked “What about the plate tests?”, the answer given was “We did those at the depot.” It is worth mentioning that this would have been 1½ hours previously and some 10 degrees warmer. A somewhat animated discussion followed until it was discovered that the crew did not have the equipment to perform these tests. Suitable plates were procured from the site compound. Tests

then showed that the lines would have been 20mm narrower than requirements and 0.21mm dry film thickness instead of the 0.300mm requirement. Following correction, the crew was about to start application and the next question was asked “What about the bead test?” Answer again “We did that at the depot.” Again the crew were asked to perform a check in front of the Project Manager. Again an animated discussion and it was admitted that not only did the crew not have the equipment for this, but didn’t even know how to do the test. Result – crew sent away until the following night, back charges for the wasted traffic control, further deterioration of the linemarkers’ reputation and a promise by the Project Manager to carefully watch their work.

The crews can’t always be blamed – sending the crews out with the wrong materials can cause increased costs for all. As an example of this, sending a crew to site with the wrong size glass beads will cause delay, cost increases and embarrassment. Take the case of the crew arriving on site with smaller Visibeads than those specified. The crew didn’t perform the on-site bead test and it was some kilometres later that the Project Manager called a halt to the night’s proceedings when the crew announced that they had to return to their store to get more beads. No-one on the crew had thought to check just how many beads were being applied. Result – linemarking that had to be re-applied due to shadowing of the beads, a surveillance officer being accused by the linemarking foreman as being *the progeny of unmarried parents* (polite phrase by the author), a less than happy client and consequent additional costs.

How Can We Get Around these Problems?

As stated before, specifications are usually part of a contract. Correct adherence to the specification by both client and contractor will ensure contract compliance.

- It is worth remembering that verbal contracts aren’t worth the paper they are written on. Verbal orders and contracts are a recipe for dispute. It is therefore crucial to have everything recorded and agreed prior to starting work.
- It is important to know what is contained in the specification and for the contractor to be willing to point out errors, omissions and inconsistencies with other parts of the contract during the tender process.
- Know the hierarchy of the specification when it comes to comparison with other documents in the contract. It may be that the hierarchy is something like:
 - Specification
 - Drawings
 - Relevant Standard
 - Local Condition Requirements

Whatever the hierarchy is, all parties should know and adhere to it.

- Consider what has to happen before the price is submitted. Ask what material, surface, material colour, existing materials, age, condition, application method, traffic control, tests etc.
- When the contract is signed, be ready to submit the relevant documentation including current laboratory test results, traffic control plans, Quality Management, OHS management and Environmental System details etc. Ensure all information is current.
- Use materials as required and confirmed as part of the previous point.
- Carry out on-site tests and complete traffic control in accordance with approved plans. Cutting corners will ultimately cause additional costs and in the case of poor traffic control, may cause death or injury.
- Carry out random checks to ensure crews are working as the specifications require. This applies to both client and contractor. A problem is more easily resolved at this point, rather than after the work is completed and payment is being sought.
- Think through the job and communicate this clearly to field crews for implementation and with the client to avoid misunderstanding.

As the author’s father used to say “If a job is worth doing, it’s worth doing well.”

Conclusions.

Clients must know that they want and be able to state it clearly. This will allow contractors to ascertain requirements and follow them causing less dispute. Clients must be prepared to carry out surveillance and enforcement during application.

Contractors should point out problems early in the process to build a good relationship and not rely on making “extras” which generally cause disputes and may not be paid in the longer term.

Everyone involved should know what is contained in the specification at all times. This will avoid costly disputes and allow all concerned to get on with the job.

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Ken is part of Tasman Associates Pty Ltd, a specialist consultancy specialising in road, bridge and other infrastructure maintenance operating in all states of Australia and overseas. Ken has been involved in the practical side of pavement marking application, and lately has participated in several major tenderers for head contractors involving signage, pavement marking, bridges and tunnels.

Ken was the foundation President of the New South Wales Roadmarking Industry Association, the organisation that became what we now know as the Roadmarking Industry Association of Australia.